[In]tangible

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[In]tangible interactions

[In]tangible interactions

In a historical context characterized by profound technological, social, and environmental transformations, the relationship between the tangible and intangible dimensions is gaining significance taking on an increasingly central role in design processes. Systems, services, and artifacts can no longer be interpreted exclusively as material or functional entities, but rather as components of hybrid ecosystems in which human, artificial, and environmental factors interact. In this scenario, design cultures are called upon to assume a critical mediating role, capable of making complex interactions legible, accessible, and negotiable. The [In]tangible Interaction track fits within this interpretative framework, offering itself as a space for interdisciplinary discussion on the changes taking place in the relationship between design and technology. In particular, the goal is investigating how contemporary design practices are increasingly oriented towards working with intangible elements, data, relationships, memories, behaviors, and experiences, without losing the connection with material, corporeal, and situated dimension of interaction. Exploring how design can contribute to the construction of more inclusive, accessible, and sustainable experiences, overcoming physical, cognitive, and cultural barriers, became one of the targets of this collection. The main objective is to investigate the role of design in the representation, and activation through enhancing the relationships between tangible and intangible, with particular attention to the impacts. Especially, this cluster investigates how contemporary design practices are increasingly oriented towards working with intangible elements, data, relationships, memories, behaviours, and experiences, without losing gaze of the material, physical, and situational dimensions of interaction. A second goal is represented by the delving on how design can contribute to the creation of more inclusive, accessible, and sustainable experiences, overcoming physical, cognitive, and cultural barriers.

The contributions collected address the topic from different but converging perspectives, highlighting design as a cultural and operational infrastructure capable of translating complexity into understandable and participatory interaction systems. Researchers, designers, and technologists responded to the call for action by presenting theoretical studies, applied experiments, and critical reflections that interpret design as a device for mediation between people, data, and systems. In this sense, the discipline of design is understood not only as a practice of formalization, but as a process capable of orchestrating interactions between heterogeneous actors, human and non-human, and generating new forms of shared knowledge. This approach is particularly relevant in application areas such as cultural heritage, public services, inclusive mobility, data visualization, and the relationship between society and artificial intelligence.

The contributions selected and presented in this section outline a complex panorama of research which, although operating on different scales and in different contexts, share a design-driven vision focused on the centrality of experience, social responsibility, and the construction of collective value. A first set of works addresses the theme of cultural heritage, both tangible and intangible, as a dynamic ecosystem of relationships. The original contributions dedicated to landscape, collective memory, and industrial know-how underline how design can operate as a tool for mapping, narrating, and activating distributed knowledge. In these studies, heritage is not understood as a static entity to be preserved, but as a living process, renewed through participatory practices and design devices capable of making often

invisible values like knowledge and identities, visible. In this case, the focus on the intangible dimension translates into methodological approaches that integrate field research, co-design, and digital tools, providing a systemic and situated knowledge overview.
A second thematic axis concerns the role of design in public services and systems, with particular reference to accessibility and inclusion. Contributions dedicated to Digital Twins, public services, and mobility for elderly or fragile populations show how technologies can become enablers of social innovation only if integrated within human-centered design frameworks. In these cases, design acts as a mediator between complex infrastructures, data, and citizens' needs, helping to translate abstract information into understandable interactions and to design experiences capable of reducing inequalities and barriers to access. considering that, focusing on tangible and intangible interactions allows the development of multi-level solutions, ranging from systems to services to products, while maintaining a design consistency oriented towards equity and sustainability.
Another conceptual core explores the relationship between data, their visualization, and derived behavioral change. Research on the representation highlight how the design of visual feedback can affect individual and collective attitudes, promoting more conscious and sustainable practices. In this sense, the intangible dimension of data is made perceptible through interfaces, dashboards, and that translate complex information into meaningful signals. Design emerges as a discipline capable of orchestrating such translations, taking into account cognitive, and social factors, demonstrating how interactions can become a lever for learning and transformation.
Beyond the specific themes, the contributions to the track share some key elements that outline virtuous design approaches. First of all, there is a strong focus on the participatory dimension of the project: users, communities, and stakeholders are not considered mere recipients of solutions, but active players in the processes of co-creation and evaluation. This orientation reinforces the role of design cultures as a relational practice, capable of building spaces for dialogue and negotiation. On the other hand, many contributions adopt a systemic perspective, recognizing the need to address complexity through multilevel and interdisciplinary models. Disciplinary mediation thus acts as a bridge between technical and social knowledge, capable of integrating advanced technologies, such as artificial intelligence, immersive systems, and digital platforms, within visions oriented towards the common good.
Finally, the sharpest outcome of this section highlights the potential of design to make the intangible aspects of experience visible and operational. Whether it is memory, data, behaviour, or relationships, the project action becomes a tool for translation and materialization, capable of transforming abstract elements into meaningful experiences. In this perspective, [In]tangible Interaction has established itself as a space for advanced reflection on the role of design in the future of interactions, helping to outline scenarios for a more inclusive, and sustainable society. At the same time, the variety and effort recordable in the collected contributions, confirm the need for more places where theoretical research and design experimentation can converge. Through design-driven approaches, the works presented show how design can operate effectively in the borderlands between tangible and intangible, offering critical and operational tools for addressing contemporary challenges. This cluster is not only a space for presenting research, but also a cultural platform for imagining and designing new forms of interaction between people, technologies, and environments.

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Artificial Intelligence, Design Cultures, and the Future of Digital Practice

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ABSTRACT
This paper examines the relationship between generative artificial intelligence and design practice, addressing three interlocking dimensions: the technical genealogy of machine learning and predictive models; the environmental and economic costs of large-scale AI deployment; and the emergent implications for design work, education, and professional identity. Drawing on two decades of research into technology production, power, and diversity, we argue that AI is not a magical or autonomous force but a deeply human enterprise shaped by the values, cultures, and biases of those who build it. The paper concludes with practical recommendations for designers seeking to engage critically and constructively with these technologies.

GENERATIVE ARTIFICIAL INTELLIGENCE | ETHICAL DESIGN PRACTICE | RESPONSIBLE AI | AUTOMATION | AI ETHICS

1. Introduction

The emergence of generative artificial intelligence as a mainstream cultural phenomenon has provoked widespread anxiety and enthusiasm in equal measure. Within design communities, disciplines long accustomed to successive waves of digital transformation, the arrival of tools such as Midjourney, DALL·E, and ChatGPT has catalysed urgent questions about professional relevance, creative authorship, and the future of skilled practice. These reactions, while understandable, risk obscuring a more nuanced and historically grounded understanding of what AI actually is, how it works, and what its adoption implies for society at large.

This paper presents the position and research we at the Digital Design Lab have developed through fifteen years of inquiry into technology production, diversity, and design methodology, which provide a critical framework for evaluating generative AI's promises and risks. My central argument is straightforward: AI is *human* work. Its outputs, its blind spots, and its power relations are all products of human decisions about what data to gather, whose labour to commission, which problems to solve, and for whom. Understanding this is not merely an academic exercise; it is a prerequisite for designers who wish to shape, rather than be shaped by, the tools of the coming decade.

2. Demystifying Artificial Intelligence: From Cognitive Automation to Predictive Models

2.1 A Terminological Clarification

Popular discourse has collapsed a rich taxonomy of techniques into a single, often mystified term: "AI." In everyday usage, artificial intelligence has become almost synonymous with large language models such as ChatGPT. This conflation obscures the historical depth and technical diversity of the field. Artificial intelligence is in fact an old discipline, concerned broadly with conitive automation, that predates the machine learning paradigm by several decades.

Machine learning represents one particularly powerful family of approaches within AI, distinguished by its capacity to extract patterns from data rather than following explicitly programmed rules. It is itself subdivided into three principal learning paradigms:

- Supervised learning, which operates on labelled datasets and is particularly suited to classification and price-prediction tasks, a labour-intensive process that demands extensive human annotation.
- Unsupervised learning, which discovers latent structures in unlabelled data, enabling applications in clustering, anomaly detection, and exploratory analysis.
- Reinforcement learning, in which agents learn optimal behaviour through iterative interaction with an environment, most visibly in robotics and game-playing systems.

These categories are not mutually exclusive: reinforcement learning is frequently used to refine classifiers initially trained with supervised methods, for example. Crucially, we observe a recurring cultural phenomenon: as soon as a machine learning application becomes reliably useful, it tends to be reclassified in the public imagination as something other than AI. This perpetual horizon effect serves to maintain an aura of novelty around whatever remains experimental.

2.2 The Production Pipeline: AI as Human Labour

A common misconception frames AI as a technology that generates outputs ex nihilo. In reality, every machine learning system is the product of an extended human production pipeline. This pipeline typically involves the following stages:

- Raw data acquisition, which raises immediate questions about whose experiences, images, and language are represented.
- Data cleaning and preparation, which together account for approximately eighty percent of the time invested in building a model, a figure that underscores the profoundly manual nature of the enterprise.
- Training, in which an algorithm iterates over the prepared data to construct a predictive model.
- Validation and testing, performed on a held-out subset to assess performance.
- Deployment and iterative refinement, which introduce further human judgements about thresholds, corrections, and acceptable failure modes.

The implication is significant: what is presented as machine output is, at every stage, the sediment of human choices. This is not merely a technical observation; it is a political one. As our doctoral research demonstrated, the communities producing AI, defined by nationality, gender, and institutional affiliation, disproportionately determine the values, aesthetics, and blind spots encoded in the resulting systems.

3. A Genealogy of Generative AI and Its Impact on Design

3.1 Neural Networks and the Long Prehistory of Generative Models

Neural networks, the algorithmic architectures underlying the most capable contemporary AI systems, were first theorised in the 1950s, long before the computational infrastructure required to realise them existed. Their development proceeded incrementally through successive generations of engineering contributions, producing a culture oriented toward incremental problem-solving and intra-community peer recognition rather than toward anticipating societal impact.

For design practice, this technical culture had a crucial consequence: until the emergence of publicly accessible generative tools, AI development was largely invisible to practitioners. The field advanced in specialist laboratories, its outputs circulating within technical communities rather than entering the broader design ecosystem.

3.2 Generative Adversarial Networks and the Arrival of Synthetic Images

The landmark development that began to change this dynamic was the Generative Adversarial Network (GAN), first proposed in 2014. GANs were originally conceived as a solution to the problem of training data scarcity: by generating synthetic labelled images, they would in theory augment the data available for supervised learning. The architecture pairs a generator, which

produces candidate images, with a discriminator, which evaluates their plausibility, in an adversarial training regime.

The trajectory from the 2014 proof-of-concept to NVIDIA's StyleGAN (2019) and the subsequent public release of Midjourney and DALL·E (2022) illustrates a characteristic pattern: techniques developed to solve narrow engineering problems within the machine learning pipeline are refined to such a degree that they ultimately transform entire creative industries. What began as an attempt to produce convincing training data became, within eight years, consumer software capable of generating photorealistic images indistinguishable from photographs of real people.

3.3 The Transformer and the Rise of Generative Text

The second pivotal architectural innovation was the Transformer, which addressed a fundamental limitation of earlier recurrent models: their inability to maintain coherent representations over extended sequences. This limitation had previously constrained the quality of machine-generated text, producing outputs that degraded rapidly in coherence. The Transformer's attention mechanisms resolved this, enabling the training of models capable of generating extended, plausible prose.

The GPT family of models instantiates this architectural advance at scale. The acronym GPT, for Generative Pre-trained Transformer, encapsulates the key elements: generative (producing new text), pre-trained (on vast corpora before task-specific fine-tuning), and Transformer (deploying attention-based sequence modelling). It is worth noting a chronological irony: the field achieved highly convincing synthetic image generation with diffusion models before it achieved comparably convincing synthetic text generation, inverting the intuitive expectation that visual creativity would prove more difficult to automate than linguistic composition.

4. Design Practice and the History of Automation

The panic that has greeted generative AI in design communities is understandable but, we argue, historically myopic. Every major design discipline has undergone successive phases of digitisation and automation over the past thirty to forty years: graphic design, photography, product design, animation, and architecture have all seen their tools evolve from manual craft to digital representation to increasingly automated production.

This dematerialisation has consistently facilitated transmission, accelerated iteration, and expanded the scope of what individual practitioners can produce. Generative AI can be understood as a further step along this trajectory, one that automates not merely the execution of a design decision but increasingly the generation of design options themselves. The relevant historical precedent is the Industrial Revolution, or more precisely, the Fourth Industrial Revolution (Industry 4.0), which represents the fourth major wave of technological transformation of labour.

Historical analysis of previous industrial transitions offers two recurring lessons of particular relevance to the present moment:

- Immediate impacts are systematically overestimated. Technological adoption is slower, more uneven, and more dependent on institutional and cultural factors than utopian or dystopian projections suggest.
- Long-term structural impacts are systematically underestimated. The cumulative displacement of skills, the emergence of new occupational categories, and the redistribution of economic value typically exceed initial forecasts by a considerable margin.

5. The Hidden Costs of Generative AI

5.1 Energy Consumption and Environmental Implications

The environmental cost of large language models and other foundation models is one of the most poorly understood dimensions of the generative AI phenomenon. Corporations have strong incentives to withhold or obscure energy consumption data, making precise accounting difficult. However, back-calculation from available information yields striking figures.

A single training run of GPT-3, a model that is small by contemporary standards, with 175 billion parameters trained on 45 terabytes of text, cost an estimated twelve million US dollars and consumed approximately 936 megawatt-hours of electricity across thirteen days of computation on approximately ten thousand GPUs. To contextualise this figure: 936 MWh corresponds to the annual electricity consumption of approximately two hundred French households, under conservative assumptions. These estimates cover only the training phase; they exclude data acquisition, storage, cleaning, and the ongoing costs of inference, that is, the energy consumed each time a user submits a query.

The current generation of high-performance GPUs (NVIDIA's latest flagship chips) consumes approximately 700 watts each. NVIDIA sold chips in 2024 at volumes that, in aggregate, exceeded the total electricity available globally to power them simultaneously, suggesting that organisations are accumulating computational capacity they cannot yet utilise, a pattern consistent with speculative investment dynamics. Beyond electricity, large data centres require substantial quantities of freshwater for cooling, placing additional pressure on local water supplies and competing with agricultural and domestic use.

These environmental pressures are not isolated to AI: data centre demand encompasses cloud computing, streaming media, and cryptocurrency. Nevertheless, the rapid growth of AI workloads represents a structurally significant and accelerating component of this demand. Several US states have already imposed restrictions on new data centre connections to their power grids due to infrastructural constraints. The question of whether this trajectory is ecologically sustainable, and who will bear the costs when it is not, is one that design communities, as major consumers and producers of digital content, have a responsibility to engage.

5.2 Intellectual Property, Copyright, and the Politics of Training Data

A second category of systemic costs concerns the provenance and ownership of the data used to train generative models. The legal and ethical landscape is contested and rapidly evolving.
In the United States, fair-use doctrine has historically been interpreted permissively, with considerable latitude extended to transformative uses of copyrighted material. Many AI companies have relied on this interpretation to justify training on publicly accessible web content, including the work of artists, photographers, and writers who did not consent to such use. This has produced a wave of litigation: Stability AI, developer of the open-source image generation model Stable Diffusion, faces copyright claims from Getty Images, among others, precisely because its open-source architecture makes the training data auditable.
A particularly instructive case is that of Zarya of the Dawn, a graphic novel whose copyright was initially granted and subsequently partially revoked by the US Copyright Office: protection was maintained for the text but withdrawn from the images, which had been generated using Midjourney, on the grounds that AI-generated outputs do not constitute authorial work in the relevant legal sense.
An unexpected dynamic has emerged from this litigation: AI developers depend on high-quality human-generated data not merely for ethical reasons but for technical ones. Models trained predominantly on AI-generated outputs undergo a degradation process, sometimes termed "model collapse", in which iterative self-referential training amplifies biases and reduces output quality. The organic variability and contextual richness of human-produced data are, it transpires, necessary for maintaining model performance. This technical dependency has provided leverage to media organisations and artists in negotiations with AI companies, shifting the landscape from pure litigation toward licensing arrangements.
A further dimension of the intellectual property question concerns the emergent demand for human labour in tasks created by AI deployment: content moderation, data labelling, output evaluation, and the production of training corpora. These roles, often low-paid and psychologically demanding, represent a new form of piecework that merits sustained critical attention.

5.3 Economic Models, Access, and Labour

The current accessibility of most frontier AI tools is sustained by venture capital and advertising revenue, not by the economic value they generate for users. This model has created an expectation of free or low-cost access that is unlikely to persist as development costs remain high and competitive dynamics intensify. The probability of significant price increases, potentially pricing out smaller studios, individual practitioners, and institutions in lower-income contexts, is real and underappreciated.
The labour market implications are complex. We resist simple narratives of wholesale job destruction, but observe a more insidious process of positional reduction: a design consultancy that previously employed ten designers may, with AI-assisted productivity, find that it requires five. The aggregate effect across many such organisations constitutes a structural contraction of

employment in certain categories of design work, potentially mimicking the trajectory of the music industry, in which the professional middle-market was substantially eliminated while a small number of highly prominent practitioners and a large number of self-funding amateurs remained.

6. Opportunities and Recommendations

6.1 Appropriate-Scale and Privacy-Preserving AI

Not all AI applications operate at the scale, and therefore the environmental and economic cost, of frontier foundation models. Retrieval-Augmented Generation (RAG) architectures enable open-source and small language models to run on local hardware, processing proprietary documents without transmitting data to external servers. This approach offers significant advantages for practitioners concerned with intellectual property, data sovereignty, and ecological impact. Tools such as NotebookLM offer user-friendly entry points to this paradigm, though they are not technically small language model deployments in the full sense.

6.2 AI for Social Good: The Case of Benin

We present an ongoing project as an example of AI deployment calibrated to genuine human need rather than market optimisation. In Benin, where a 56% illiteracy rate coexists with a linguistic landscape comprising approximately seventy languages, a government initiative is underway to collect speech samples across this linguistic diversity and develop text-to-voice systems. This text to speech (TTS) model may be capable of disseminating weather information, particularly storm warnings, via voice messages deliverable on basic mobile handsets to the farmers that make up 70% of Benin’s economy. The project addresses a concrete development challenge: helping smallholder farmers prepare for extreme weather events in a context where written communication is not universally accessible.

This example illustrates that AI's value is not intrinsic but relational: it depends on whether the technology is matched to the context, constraints, and genuine needs of the people it is intended to serve.

6.3 Implications for Design Education and Practice

Several trajectories for design practice and education merit consideration in light of the developments outlined above.

First, there is a growing need for designers with the capacity to participate in the development of predictive models themselves. Currently, the teams that build AI systems rarely include design practitioners, and the resulting products frequently exhibit failures of usability, accessibility, and cultural sensitivity that would be mitigated by earlier design involvement. Developing the technical literacy to operate at this interface, including understanding data pipelines, model architectures, and evaluation methodologies, represents a significant opportunity for the discipline.

Second, we anticipate a renewed valorisation of skills that resist automation: systemic thinking, strategic decision-making, craft, materiality, and oral performance. As AI-generated text floods

academic and professional channels, the capacity to perform knowledge credibly in real time, namely to present, discuss, and defend ideas in embodied social contexts, may recover value it had partially ceded to written documentation.

Third, there are grounds to expect aesthetic fatigue with the characteristic outputs of current generative models, which some practitioners have begun to call "AI slop": the smooth, saturated, compositionally competent but experientially vacant imagery that dominates AI-generated visual culture. Craft, imperfection, and the traces of embodied making may acquire renewed cultural significance as markers of authenticity in contrast to this aesthetic regime.

Fourth, future generations of practitioners may make deliberate choices about the degree to which their work is accessible to AI training systems, choosing, in effect, forms of creative production that maintain a degree of withdrawal from the open web. This would represent a significant shift in the culture of sharing that has characterised digital creative communities over the past two decades.

7. Conclusion: Embodiment, Agency, and the Stakes of the Present Moment

This paper has argued that generative AI is best understood not as an autonomous or magical technology but as the crystallised output of extensive human labour, shaped by the power relations, cultural assumptions, and economic incentives of those who produce it. Its environmental costs are real and insufficiently disclosed. Its intellectual property implications are contested and unresolved. Its labour market effects are already materialising, if more gradually and unevenly than either enthusiasts or critics have predicted.

Against the tendency in some quarters to frame AI as an impending surpassing of human intelligence, we insist on the irreducible significance of embodiment. Human designers do not merely generate outputs: they inhabit careers, cultivate aesthetic sensibilities over time, navigate social contexts, advocate for clients, and exercise situated judgement. The AI system that "won" an art competition was submitted by a human who conceived the entry, refined the prompts, post-processed the output, and made the decision to compete. The human dimension is not incidental; it is constitutive.

The appropriate response to generative AI is neither uncritical adoption nor reflexive rejection, but engaged, historically informed, and critically aware participation: understanding the pipeline, questioning the power relations encoded in training data, advocating for energy transparency, insisting on the presence of designers in AI development teams, and cultivating the forms of skill and sensibility, including systemic thinking, craft, oral performance, and embodied presence, that remain distinctively and irreducibly human.

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Driving behavioural change: the role of data visualisation in optimising dormitory energy strategies

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ABSTRACT
Global climate change and the energy crisis are intensifying, prompting the search for effective responses. Energy-efficient technologies and green standards are crucial to sustainable campus initiatives, especially in living-intensive student dormitories.
The eco-feedback and visualisation of energy data are key to encouraging behavioural change, offering users real-time insights into consumption and potential savings. While

substantial progress has been made towards applying visualisation feedback to enhance energy efficiency in residential sectors, research on student dormitories still faces challenges. Specifically, the complexity of students' energy consumption behaviours and preferences makes the effectiveness of tools to be verified.

This reviews relevant literature to assess the effectiveness of energy data visualisation tools in promoting energy-saving behaviours in dormitories. It also explores the impact of combining displays with other interventions, such as information prompts and incentives. Furthermore, future work will transit to maximise the efficiency of campus energy conservation approaches and support the transition towards more sustainable energy practices.

ECO-FEEDBACK | STUDENT DORMITORY | ENERGY-SAVING | BEHAVIOUR CHANGE

1. Introduction

As is widely known, the building sector accounts for over 30% of global energy consumption and emissions (European Environment Agency, 2013). However, current trends show that energy savings are not progressing at the necessary pace. Some research is shifting to user behaviour change; behavioural interventions alone have the potential to reduce direct household carbon dioxide emissions by 20% over the next decade (Dietz et al., 2009). Enhancing feedback mechanisms and fostering a better understanding and adjustment of individual energy use behaviours have become critical components of energy efficiency policies (Can We Save Energy by Changing Our Behaviour?, 2013). Moreover, younger generations often exhibit a more proactive attitude towards climate change-related issues, positioning them as potential leaders in driving the energy transition (Peng et al., 2024).

Eco-feedback, a data-driven approach that provides users with energy consumption information, encourages behavioural adjustments to promote savings (R. K. Jain et al., 2012). Existing studies confirm its effectiveness in shaping energy-efficient behaviour among building occupants (Francisco et al., 2018). Interdisciplinary research has also examined its integration with interventions such as social norms (Ramli, 2021), environmental psychology (Mozo-Reyes et al., 2016), gamification (Plichta et al., 2023), and social network influences (Romero et al., 2015). Moreover, university students, as they move out of their family homes to live independently, experience an increase in the autonomy of their energy-related behaviours. This period is typically more conducive to establishing new energy-saving behaviour patterns through interventions (Verplanken & Wood, 2006).

However, existing studies primarily focus on the behavioural effects of individual tools under specific interventions, with limited comparative analyses of the interactions between tool types, intervention strategies, and time dimensions. In particular, the effectiveness of different tool combinations under

the influence of variables like interaction formats, feedback frequency, and user preferences has not been sufficiently explored. To address this gap, this article will systematically review empirical studies on visualisation behavioural interventions in student dormitory environments over the past decade. The review aims to critically analyse the design, combinations, and synergies of data visualisation tools, comparing the mechanisms and differences in the roles of different visualisation tools in guiding energy-saving behaviours in student dormitories.

Furthermore, it will discuss the combinations of these tools with behavioural intervention strategies (such as social norms, competitions, and information prompts) and their impact on behavioural outcomes, including an exploration of the performance of these interventions in fostering short and long-term behavioural changes.

Through this review, it is hoped that practical recommendations will be provided for designing and optimising energy behaviour interventions in university dormitories while advancing the application of eco-feedback in energy-saving contexts in a broader range of public buildings.

2. Methodology

The workflow of this study progresses through four main phases, as shown in figure 1. In the first phase, strings are defined to search the database and apply filtering criteria. The second phase retrieves articles that meet the scope of this study based on the selection criteria. The third phase involves quantitative analysis, showing the distribution trends of publications in this field. The fourth phase divides the results into different domains and critically discusses them.

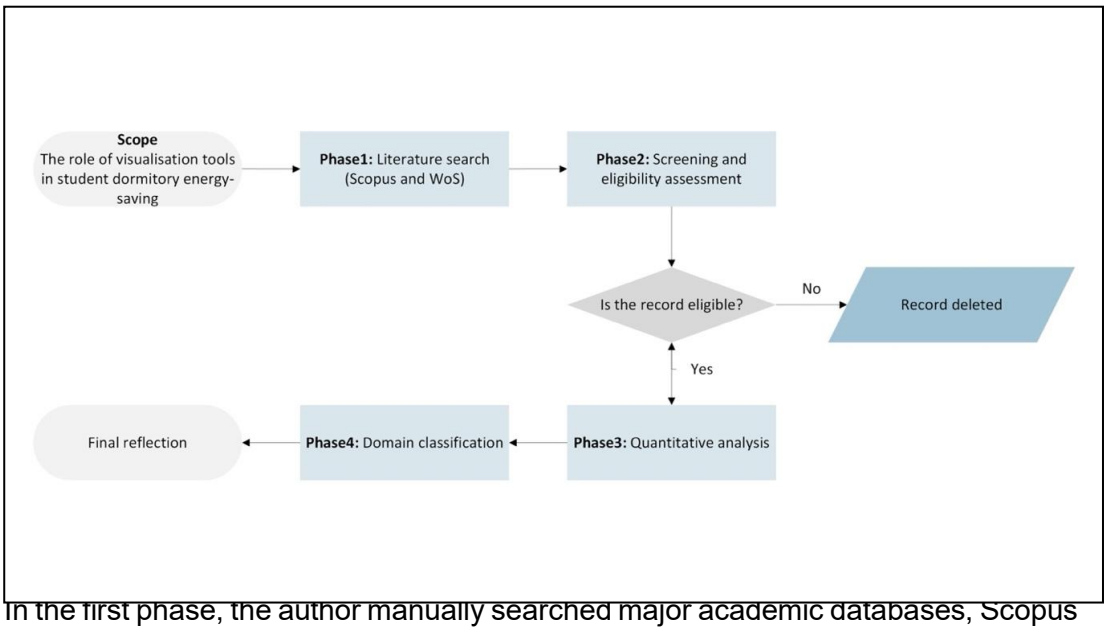

Fig. 1
The search workflow diagram.

In the first phase, the author manually searched major academic databases, Scopus and Web of Science (WoS), using a defined set of keywords and combinations to establish the core review scope on energy data visualisation in dormitories, focusing on energy use behaviour and related interventions. Boolean operators, the search string is defined as: (energy AND (feedback OR information feedback OR visuali* OR energy dashboard OR smart meter OR monitor OR energy

display OR screen) AND (dormitory OR residence hall OR student housing OR campus housing) AND (behavio* OR behaviour change OR intervention OR competition OR prompts OR incentives)). It is worth noting that the format of the search string may be slightly adjusted according to the specific requirements of different datasets. Initial screening based on titles, abstracts, and keywords, with further filters applied as shown in figure 2.

Filters	Scopus	Web of Science (WoS)
Language	English	English
Time	2015-2025	2015-2025
Article Type	Article, Conference paper	Article, Proceeding Paper
Subject Areas	Engineering, Energy, Environmental Science	Architecture, Construction Building Technology, Energy Fuels, Green Sustainable Science Technology

Fig. 2
Applied the filter in databases.

In the first phase, 58 articles were retrieved through database searches (18 from Scopus and 40 from WoS). 9 duplicates were excluded, leaving 49 articles for the second phase. In the second phase, titles and abstracts were reviewed according to the criteria in figure 3, excluding 15 studies. The full texts were then reviewed.

Inclusion Criteria	Exclusion Criteria
Reason1: Use of data visualisation tools (e.g., dashboards, screens) for feedback.	**Reason1:** No use of visualisation tools, or only feedback methods such as questionnaires, verbal communication, or written prompts are employed.
Reason2: The research environment is campus dormitories or student housing.	**Reason2:** The research is not conducted in student housing environments (e.g., normal households, office buildings, commercial buildings).
Reason3: The primary objective is behavioural intervention.	**Reason3**: No behavioural intervention objectives are included, such as focusing only on system performance evaluation (e.g., HVAC) or discussing user cognition and attitudes rather than behaviour change.
Reason4: There is a clear description of how visualisation tools are used.	**Reason4:** Lack of detailed descriptions of the intervention tools.
Reason5: The research is empirical, based on actual data collection and analysis, with specific feedback on intervention effects in the results section.	**Reason5:** Non-empirical literature, with no field implementation or data analysis results.
Reason6: Full text is accessible.	**Reason6:** Full information is not accessible.

Fig. 3
Criteria for inclusion and exclusion of literature.

Following a full-text review, 34 articles were further assessed, and based on the same criteria as the previous step, 15 articles were included in the analysis of this review.

The third phase involved a quantitative analysis of the publication years of the included works. In the fourth phase, the selected literature was categorised according to the types of visualisation tools. Finally, a critical analysis was conducted, examining the role of different visualisation tools in promoting energy-saving behaviours in student dormitories. The discussion also explored the combined effects of these tools with other intervention strategies on both short- and long-term behavioural changes.

3. Results and Discussion

As illustrated in figure 4, a preliminary quantitative analysis of the 15 empirical studies indicates a peak in publications during 2016–2018, reflecting growing interest in energy visualisation and behavioural interventions. However, from 2019 to 2021, the number of research declined due to COVID-19-related disruptions such as remote learning and reduced dormitory occupancy, which likely hindered or interrupted the implementation or monitoring of experiments. Research output continued to decrease from 2022 to 2024, possibly reflecting both the incomplete recovery of research cycles post-pandemic and a shift in focus towards other areas of building energy conservation. Although articles were published in 2025, considering that the literature search concluded in early April 2025, only a few earlier released results are included from this year.

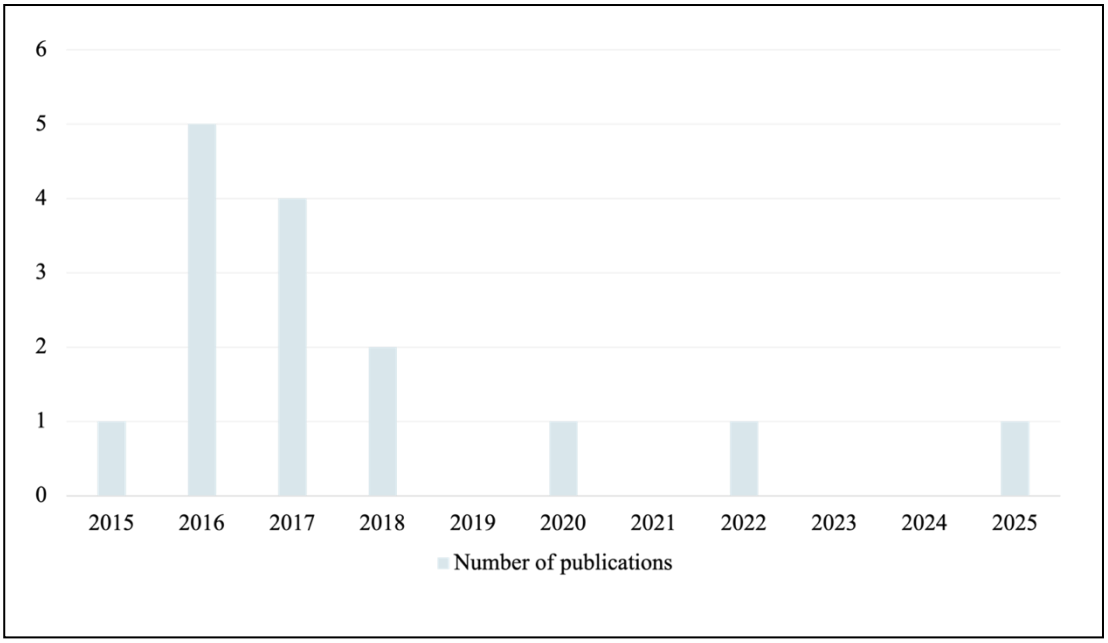

Fig. 4
Annual distribution of the articles selected for inclusion in this review.

Based on the previous findings, feedback tools are categorised into three domains: (a) Physical tools, including the dynamic feedback (touchscreen monitors/dashboards), which are installed in dormitory common areas. These tools, sometimes referred to as “kiosks”, allow users to view energy consumption data at any time. Another type is static feedback, where energy consumption information is provided in a one-time release, like paper-based energy consumption reports or the posters in public areas. (b) Online tools, including web, emails, and mobile applications (App), which offer real-time energy consumption data and feedback. (c) Mixing tools, where both physical and online tools are used within the same intervention group.

Figure 5 illustrates that combining visual tools with informational prompts and social norm feedback is the most common intervention. Notably, some articles like Jain et al. (M. Jain et al., 2015) adopted multiple experimental groups, each using different visualisation tools. In such cases, intervention groups are treated as independent instances and are categorised by tool type.

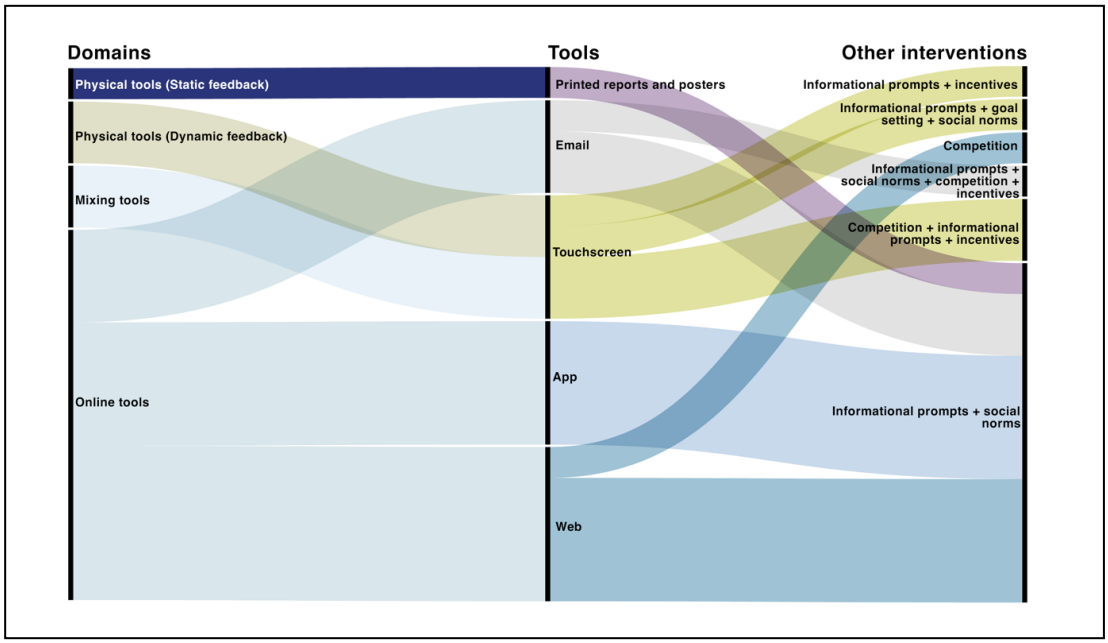

Fig. 5 Combination relationships between visual tools and other interventions.

Although physical and online tools have shown promise in raising energy awareness and encouraging behavioural change, their effectiveness varies across different contexts. The following sections critically examine the strengths and limitations of these visualisation tools and their combinations with other interventions.

As shown in Table 1, visualisation tools are categorised into three domains. To ensure consistency, all intervention durations have been standardised in weeks, except for one study recorded by academic cycle.

Visualisation	Other interventions	Research cycle	Reference
(a) Physical tools (Dynamic feedback)			
Touchscreen	Informational prompts + incentives	234 weeks	(Wisecup et al., 2017)
	Informational prompts + goal setting + social norms	7 weeks	(Karp et al., 2016)
(b) Physical tools (Static feedback)			
Printed reports and posters	Informational prompts + social norms	6 weeks	(M. Jain et al., 2015)
(c) Online tools			
Web	Competition	2014-2015 and 2015-2016 academic years	(Bull et al., 2018)
	Informational prompts + social norms	13 weeks	(Ma et al., 2017)
	Informational prompts + social norms	13 weeks	(Lin et al., 2016)
	Informational prompts + social norms	9 weeks	(Lin et al., 2017)
	Informational prompts + social norms	6 weeks	(M. Jain et al., 2015)

Email	Informational prompts + social norms + competition + incentives	10 weeks	(Alberts et al., 2016)
	Informational prompts + social norms	44 weeks	(Anderson et al., 2017)
	Informational prompts + social norms	15.5 weeks	(Myers & Souza, 2020)
App	Informational prompts + social norms	53 weeks	(Ma et al., 2018)
	Informational prompts + social norms	3 weeks	(M. Liu et al., 2022)
	Informational prompts + social norms	9 weeks	(Lin et al., 2017)
	Informational prompts + social norms	5 weeks	(N. Liu et al., 2025)
(d) Mixing tools			
Touchscreen and energy report	Competition + informational prompts + incentives	7 weeks	(Konis et al., 2016)
	Competition + informational prompts + incentives	7 weeks	(Sintov et al., 2016)

Tab. 1 Classification of visualisation tools into three domains.

3.1 Physical tools

Dynamic feedback, delivered via touchscreen displays in common areas, provides real-time data and comparisons. Static feedback includes paper-based reports and public posters.

Wisecup et al. (Wisecup et al., 2017) conducted a 234-week experiment; interestingly, informational prompts alone were more effective than combinations involving touchscreen feedback. Karp et al. (Karp et al., 2016) suggested declining user engagement with touchscreens over time, although an overall 3.5% reduction in energy consumption was observed. Touchscreens, incorporating colour coding and emojis for social comparison, effectively motivated users to save energy. However, detailed visual feedback did not lead to immediate behavioural change, likely because students needed time to process the feedback-behaviour connection.

In contrast, Jain et al. (M. Jain et al., 2015) found that static feedback, such as paper reports and posters with peer comparisons, outperformed online feedback in promoting stable behavioural change. Gender differences were observed, with paper reports reducing male students' energy use by 11.8%, compared to 7.6% for females.

Overall, physical tools show positive impacts but present challenges. Informational prompts can enhance outcomes, yet information overload may cause ignoring. Additionally, the long-term impact is uncertain, especially as novelty wears off, leading to a decline in interaction. Touchscreens also cause higher costs, and their return on investment remains debatable. Combining physical tools with social norm strategies, especially in shared spaces, more effectively stimulates energy-saving intentions. Data comprehension and gender preferences should be considered, as digital familiarity alone does not guarantee engagement.

3.2 Online tools

Online tools (web, email, Apps) offer flexible, real-time feedback and lower access barriers, particularly appealing to younger users.

Bull et al. (Bull et al., 2018) demonstrated that a web-based dashboard led to energy savings of 5.26% and 8.76% over two academic years, with behavioural change persisting six months post-dormitory departure. However, participants suggested improving accessibility, simplifying visuals, and integrating social media. Competition, often facilitated through peer comparison, was a key motivational factor. Ma et al. (Ma et al., 2017) and Lin et al. (Lin et al., 2016) found that normative comparisons and weekly email reminders effectively reduced energy use, though cross-cultural differences were significant; for example, savings ranged from 75.4% in Ethiopia to 62.0% in France. In a comparison between Chinese and international students, the former reduced usage by 16.7%, while the latter increased it by 23.7%. Cultural background also influenced feedback comprehension, sometimes initially increasing consumption. These findings show the importance of cultural alignment when deploying online interventions.

Lin et al. (Lin et al., 2017) reported minimal behavioural change using a web platform, attributed to limited accessibility and participants' inaccurate perceptions of their energy use. Similarly, M. Jain et al. (M. Jain et al., 2015) observed that real-time web feedback often went unchecked.

Alberts et al. (Alberts et al., 2016) showed that combining email, informational prompts with social norms achieved over 20% energy savings without financial incentives. However, the addition of competition or incentives in long-term interventions yielded unclear effects, suggesting that awareness, rather than rewards, is key to sustaining change. Contrarily, Anderson et al. (Anderson et al., 2017) found that normative content had a limited short-term impact; high-standard individuals saved 14%, while others increased consumption by 5%. Myers and Souza (Myers & Souza, 2020) similarly concluded that emails are effective, but social norms may have limited influence on students who do not pay for energy directly.

Apps indicated effectiveness over short (9 weeks) and medium (19 weeks) interventions. Ma et al. (Ma et al., 2018) reported that 92.31% of participants shifted to energy-saving behaviour when Apps were combined with prompts and social norms. Liu et al. (M. Liu et al., 2022) examined that daily notifications outperformed hourly feedback in promoting engagement. N. Liu et al. (N. Liu et al., 2025) further observed that positive, low-intensity normative feedback enhanced personal norms and achieved a 29.18% energy reduction.

In summary, online tools show potential for student dormitory interventions. Web tools depend on user-initiated access, highlighting the importance of usability and competitive elements. Email effectiveness varies with cultural and normative sensitivity, while Apps provide stable outcomes when combined with social norms, particularly in short- to medium-term interventions.

3.3 Mixing tools

Mixing tools combine touchscreen kiosks with customised weekly email reports. Interactive kiosks provide real-time graphical feedback, while weekly reports offer personalised consumption analysis.

Mixing tools, when combined with informational prompts, competition and incentives, can encourage peers to adopt energy-saving behaviours. Based on the same experiment, Konis et al. (Konis et al., 2016) and Sintov et al. (Sintov et al., 2016) reported a 6.4% average energy reduction during the intervention, rising to 9% two weeks post-competition, suggesting that fostering group identity enhances engagement. However, simple prize incentives may not sustain long-term behaviour change. More scientifically grounded incentive designs are needed to maintain motivation beyond short-term participation.

4. Conclusion

This review analysed the use of data visualisation tools in energy-saving behavioural interventions within student dormitories, particularly their integration with informational prompts and incentive mechanisms. Findings highlight contextual differences in the effectiveness of physical and online tools.

Physical tools, such as touchscreen devices, offer real-time interactivity and have shown positive short-term effects. However, declining novelty and information overload may limit long-term impact, and high installation costs necessitate careful cost-benefit evaluation. Static feedback, like paper reports, can be effective but lacks sustainability and should form part of greener strategies. Gender-based differences suggest a need for more targeted intervention designs. Publicly displayed feedback enhances the effectiveness of social norms, encouraging collective energy awareness.

Online tools, particularly web-based ones combined with peer competition, demonstrate strong potential in engaging students. Social media may further enhance interaction. When paired with prompts and normative feedback, online tools can improve engagement, though effectiveness is affected by feedback frequency, accessibility, and cultural differences.

Mixing tools combine real-time and personalised feedback, further enhanced by incentives and competition. Students are incentivised by rewards for energy-saving performance, which increases their enthusiasm and helps maintain savings in the short to medium term. However, limited follow-up data means the long-term impact remains unclear, necessitating further investigation.

In conclusion, visualisation tools are effective in promoting short to medium-term behavioural change in student dormitories. Future research should focus on integrating different types of tools and developing scientifically grounded interventions tailored to various implementation contexts and user profiles. Although this review is constrained by the short-term nature of most included studies, it offers initial insights for advancing sustainable behaviour interventions in broader shared residential environments. Moreover, extending visual feedback tools to other sustainability-related behaviours, such as food waste reduction, could foster wider energy-conscious practices among younger generations.

Acknowledgments

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Mapping Industrial Intangible Heritage: a Design-Based Approach

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Università Iuav di Venezia

ABSTRACT

This research, which is part of the iNEST – Interconnected North-East Innovation Ecosystem, 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. Our research

methodology incorporates field research activities, including interviews and workshops, which led to the development of a glossary of design-based indicators, which enabled the measurement of intangible heritage awareness and presence within a pilot group of companies operating in the Italian North-East territory through both qualitative and quantitative methodologies. Collected data and information will converge into a digital platform functioning as a collaborative ecosystem, in order to enhance the accessibility of industrial intangible heritage, reflecting its evolving and dynamic nature, as well as its connections with design practices.

INTANGIBLE ASSETS | INDUSTRIAL HERITAGE | DESIGN | MAPPING

1. A grey zone: industrial heritage vs. intangible capital

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 (Berger & High, 2019; Dell'Anna, 2022) and intangible capital (Haskel & Westlake 2018), that is, between the study of our industrial past and the recognition of its contemporary forms (Corò & Volpe, 2006; Volpe, 2018), as well as between theoretical studies and business strategies, between economy and culture, between politics and aesthetics (Bouchenaki 2003; 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 concerning 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, investments in design often include expenditures targeted to knowledge creation and management (Norman, 2023), taking forms such as, for instance, education and training, public and private scientific research, product research and development, communication and brand identity, quality of working and production spaces, and organisational efficiency (Cross, 2007; Harju, 2012).

Such kinds of assets are generally difficult to measure and to assess: understanding the interactions between business and design, we argue, could lead to detecting features which are not recognizable in merely quantitative terms, outlining interpretive paradigms that could eventually go beyond those of traditional financial accounting and reporting.

While it is becoming increasingly clear that expanding knowledge management is crucial to enable a critical evaluation of companies' organisational base (Roverato, 1996; Brunetti, 2015), our research interprets design as a major carrier of encoded knowledge, in order to unveil an underlying immaterial heritage able to activate virtuous interactions. Such a perspective appears particularly significant at the time when Made in Italy needs to reinvent itself relocating beyond financial capitalism (Lees-Maffei & Fallan, 2013; Haskel & Westlake, 2018), bringing into play the relevance of intangible assets and capabilities in enhancing companies' economic and cultural value (Kirshenblatt-Gimblett, 2004) [Fig. 1].

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 and 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[1].

Representation highlighting the impact of intangible assets on the different actors operating in the Northeast industrial ecosystem

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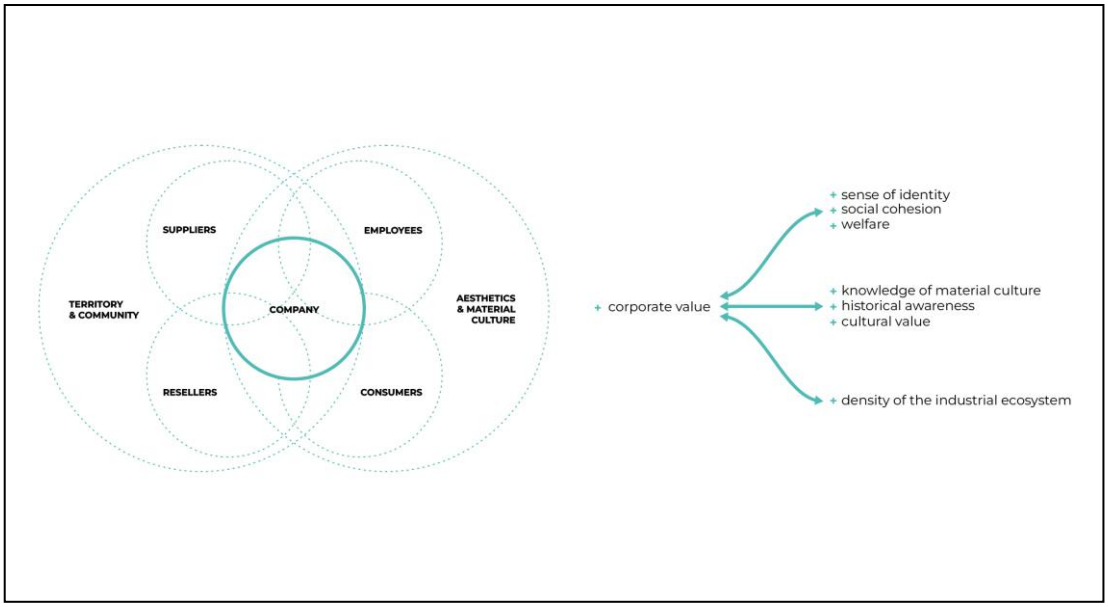

Fig. 1
Representation highlighting the impact of intangible assets on the different actors operating in the Northeast industrial ecosystem.

2. A mixed approach: an interdisciplinary and cross-sectorial mapping methodology

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. Our research methodology incorporates field research activities, including interviews and workshops, which has contributed to the development of a comprehensive glossary of design-based indicators [Fig. 2]:

- Design
- Research & Development
- Identity and Communication
- Cultural Heritage
- Territorial Context
- Work Organization
- Company Spaces
- Welfare
- Relationships
- Education

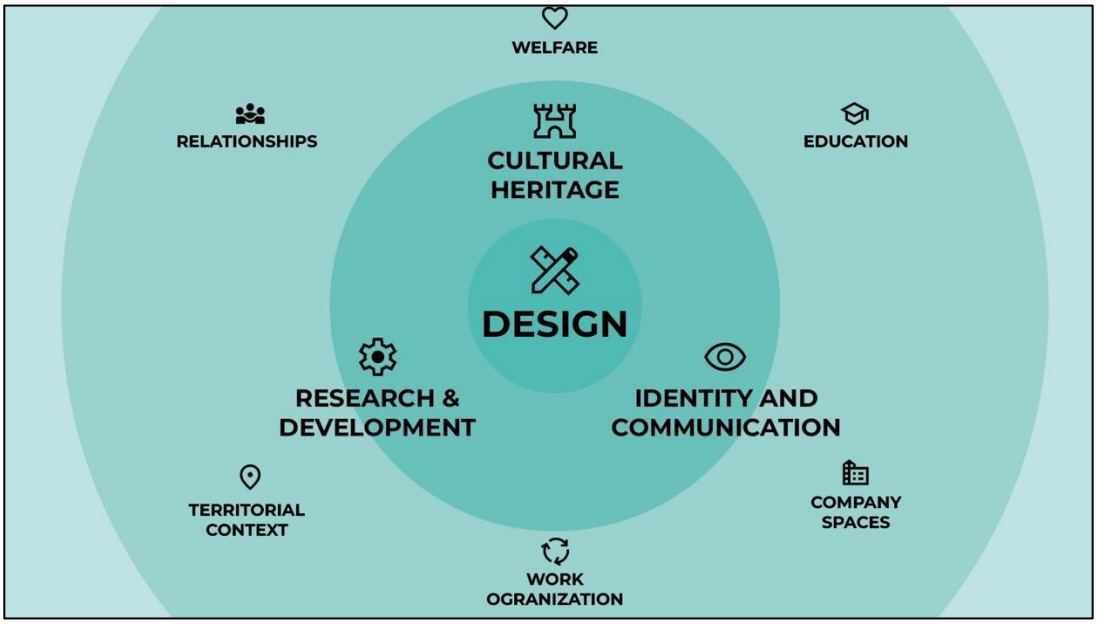

Fig. 2
Representation of the proposed design-based framework.

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.

The assets at the third level define the domains that could mainly benefit from the adoption of a design-driven management strategy. 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, to consider 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).

This glossary served as a foundation for data collection and analysis, enabling the measurement of intangible heritage (UNESCO, 2003) awareness and presence within corporate entities through both qualitative and quantitative methodologies.

Actually, to date there are no tools capable of systematically and exhaustively mapping crucial and determining aspects of a company's identity and success, such as design and project culture, visual identity, advertising and communication, research and development, human resources, welfare measures, architecture and design of work spaces, relations with the territory and the community, the density of the industrial ecosystems in which the company operates, the belonging to districts, the presence of archives, museums, libraries, institutions, foundations and exhibit, design and visual design practices (Bulegato & Dalla Mura, 2014; Ramírez Martín & Portela Filgueiras, 2022).

Design and project culture, visual identity, research, human resources, welfare, local relations, and cultural heritage are and can be drivers for increased competitiveness of individual companies and the entire region.

The ability to recognise and transmit one's own cultural heritage has multiple direct advantages also for the individual enterprise:

- it affects the ability to react to changes in markets and socio-cultural contexts
- it affects visibility, reputation, prestige and commercial and tourist attractiveness
- it facilitates connections with other public and private stakeholders and communities
- increases competitiveness in markets and for access to EU funding and tenders

In the initial phase of the project, we asked companies to help us define and articulate indicators of the company's intangible heritage, through in-depth interviews (Bottà, 2018) in which we attempted to appreciate the role played in the company by design, communication, research, human resources, networks of relations with stakeholders and the community, and other intangible assets (Forlizzi & Zimmerman, 2013).

We need to talk to companies in the area that are particularly virtuous in one or more intangible asset headings, in order to define indicators that are as precise and useful as possible for mapping, quantifying and enhancing these assets and addressing investment measures in this direction.

On the basis of the information and knowledge acquired in this first phase, we designed an interactive questionnaire aimed at a selection of companies and the communities of stakeholders intercepted by them, with the aim of mapping also the connection with the territory. The collection and analysis of this data has the objectives of:

- offer companies tools to analyse and enhance their intangible heritage
- make companies aware of the competitive advantages offered by its various items
- stimulate cultural production on business intangible assets, fostering relations and collaborations with the art world, the specialised press, cultural and creative businesses, the third sector

- activate training and accompaniment paths for companies to enhance and strengthen intangible assets

3. First findings and expected results

The study involved multiple rounds of interviews with companies, focusing on their intangible assets and their potential for quantification and representation. Thanks to the mediation of the Iuav Foundation, we established a pilot group of companies[2] to test our design-based indicators: at this stage, a central aspect involved identifying managers capable of virtuously managing knowledge exchanges within their network of employees, partners, customers and suppliers, helping to build a shared innovation-oriented vision.

The selection of the case studies has been limited to a precise geographical area, the Veneto region in Italy, and to a relatively small number of a few dozen, to focus on a methodology that – looking at a variety of industrial sectors – could be able to develop a model of both data analysis and visual representation.

During the initial phase of company interviews, several key observations were made. Each company provided insights into its intangible heritage across various domains, demonstrating the multifaceted nature of industrial intangible assets. For example complexities and singularities have been highlighted regarding the role and the importance of having an archive or a museum, the specificities connected with a particular production sector have emerged, as well as the necessities of every industry.

Moreover, companies exhibited positive engagement with the research topic, expressing interest in further involvement in subsequent phases of the study.

Upon completion of the first round of interviews, several conclusions were drawn. A need was identified for developing quantitative measurement methodologies for intangible industrial heritage to complement qualitative assessments. Meta-values related to intangible assets, such as design, were formalized, elucidating their function within companies. The critical role of interconnections between various assets in defining a company's identity was recognized. Additionally, a set of pragmatic questions was formulated regarding numerical data potentially capable of providing a more objective measure of each company's investment in its intangible heritage. The data will also be a means of control to avoid bias in the findings, considering the inevitable risk of subjectivity in the collected answers.

Data and information will converge into a digital platform functioning as a collaborative ecosystem, in order to enhance the accessibility of industrial intangible 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

[2] In particular the following industries have been interviewed: ARPER, Lanificio Bottoli, CMP Campagnolo, Magis, Riso Melotti, Battistella Spa, Manifattura Valcismon, Salco, De Longhi, Formest, Selle Royal Group and Luxardo.

North-Eastern entrepreneurial ecosystem, strengthening the relationships between economy, culture, and society, thereby contributing to a more ethical business landscape [Fig. 3].

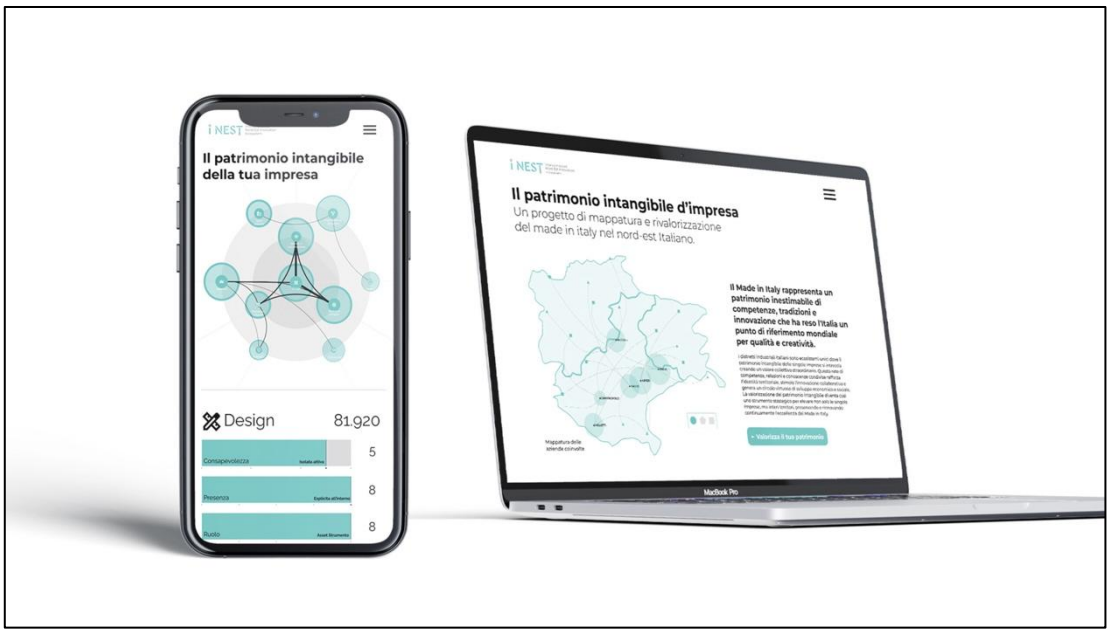

Fig. 3
Mock-up of the digital platform being designed and developed as part of the project.

Regarding the proposed platform, companies were identified as the primary users. The platform's objective was articulated as encouraging a shift (Drew et al., 2022) towards a holistic view of companies, to be integrated at a systemic level in an evolution from a financial model to a district-based model. The platform is designed to represent intangible heritage on two levels: a collective territorial level accessible to all users, and an "individual" level for each company, private for personal analysis. In order to allow an open and organized process (Valsecchi & Menichinelli, 2016), the platform's private area will be designed to allow continuous input from various company users.

Future directions for the research include refining the model for quantifying intangible heritage through a second round of interviews, modeling automation systems (Luo et al., 2021) for company evaluation following a standardization of collected data types, evolving interview methodologies from semi-structured in-person interviews to a mixed online approach, and expanding the pool of companies involved in the study.

This research contributes to the growing body of knowledge on intangible industrial heritage and provides a foundation for developing innovative tools for its measurement and representation. The findings have significant implications for both academic understanding and practical applications in industrial heritage management.

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Designing the future of Public Services: Digital Twins for Inclusive and Accessible Experiences through Service Design

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ABSTRACT

Digital Twins (DT) are already considered an important technology of Industry 5.0, but to fulfill their promises, DT's future development should prioritize human-centricity. In parallel, the Public Sector is undergoing digital transformation, with DTs emerging as vital tools in government feasibility studies. The article aims to understand how the DT approach may enhance social innovation, inclusion, and accessibility for citizens in the Public Sector.
While the human-centricity of DT in Industry 5.0 is extensively studied, there is limited focus on its application in accessible public service experiences. To explore the potential of DT in this area, this research offers an integrative literature review. It was found that only a few studies delve into the use of the DT for social innovation, leaving a gap for Service Design with its consolidated methods and a Human-Centered approach. Therefore, this study proposes a new framework Digital Twin Approach for Social Innovation in Public Offices through Service Design. The latter in a given system is necessary to engage stakeholders, design their journeys through (in)tangible interactions, and develop scenarios and prototypes.

DIGITAL TRANSFORMATION | PUBLIC SECTOR | SOCIAL INNOVATION | ACCESSIBILITY

1. Introduction

Digital Twins (DT) are already considered significant technological tools of Industry 5.0, but to fulfill their promises, Digital Twins' future development should find applications for improving human health and safety, work assistance and error reduction, training, and fair decision-making (Barata & Kayser, 2024).
In parallel, the Public Sector is undergoing digital transformation (Alvarenga, Matos, Godina & CO Matias, 2020), and its potential can be enhanced with the DTs.
The article aims to understand how the DT approach may enhance social innovation, inclusion, and accessibility for citizens in the Public Sector supported by Service Design.
Although DTs' human-centered priorities for Industry 5.0 are well-discussed in the scientific literature, there is still limited attention on their applicability for fostering inclusive and accessible experiences in public services. Some cases that are related to this question use DTs to improve user interaction with equipment (Tu et al., 2023), to collect citizen feedback for smart cities (White, Zink, Codecá & Clarke, 2021), and to guarantee universal accessibility to architectural heritage (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022), suggest the untapped potential for broader application in the Public Sector.
Design can promote inclusion and accessibility across digital technologies, as shown by numerous projects from product design to participatory design. Service Design, with its Human-

centered approach makes it uniquely suited for addressing the complexity of public services and creating flexible solutions.

In order to explore the potential of DTs for social innovation in the Public Sector through Service Design, this research offers an integrative literature review (Torraco, 2005) that deconstructs this topic into two basic elements: Digital Twins and Design, which were the main keywords for the literature search. Starting from 46 articles, the paper concentrated on the 18 more related to this emerging topic.

2. Digital Twins in the Public Sector and Digital Twins for Social Innovation

Starting with the first element of the literature review, the Digital Twin is a virtual representation of a physical asset that can be used for better decision-making, real-time prediction, optimization, monitoring, and controlling via data (Rasheed, San & Kvamsdal, 2020).

Research into DTs emphasizes leveraging technologies like AI, IoT, 5G, RFID, and cloud computing (Jones, Snider, Nassehi, Yon & Hicks, 2020). This study focuses on the DT approach, a theoretical framework for developing DTs.

Digital transformation is critical for public organizations, yet its full potential remains untapped (Alvarenga, Matos, Godina & Matias 2020). Some studies already highlight DT's application in this field; for example, a Digital Twin bureaucracy uses autonomous decision-making to manage government affairs (Eom 2022), while DT for public policy uses simulation modeling to optimize a bike-sharing system (Hwang & Choi, 2023).

Despite these studies about DT for the Public Sector, there is a noticeable gap in exploring how it can drive social innovation, inclusion, and accessibility. All these concepts deal with human-centricity: social innovation from the general point of view of the beneficial for society services (Murray, Caulier-Grice & Mulgan, 2010); inclusion from the value for all individuals without no one remains excluded (Saviano, 2025); and accessibility from the goal of universal access (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal 2022).

Because the implementation of DTs for social innovation in the Public Sector remains untapped, the paper brings as one of the examples Industry 5.0, where DTs already focus on human-centricity. While Industry 4.0 integrated advanced technologies like AI, robotics, and IoT to enhance productivity, it did not cover concerns about automation, job displacement, and the need for reskilling. Industry 5.0 shifts the focus from replacing humans to fostering collaboration, emphasizing human expertise alongside intelligent systems by optimizing workflows to alleviate stress, offering insights to make informed decisions, and creating virtual training environments to acquire new skills and others (Barata & Kayser, 2024).

Enhancing DT human-centricity requires designing both tangible and intangible interactions. Examples include integrating extended reality to improve user interaction with equipment (Tu et al., 2023), or other tools like natural language processing (Barata & Kayser, 2024), metaverses, and

gamification for achieving universal accessibility in DT for architectural heritage (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022).

DT solutions also enable access to remote monitoring, vital for restricted locations or during crises like the COVID-19 pandemic (Singh et al., 2021) or becoming the platform for gathering citizen feedback to foster participation (White, Zink, Codecá & Clarke, 2021).

Inclusive DT solutions personalize services, such as human DTs that model behavior and characteristics through real-time sensor data (Asad et al., 2023), supporting data-driven ergonomics.

Therefore, the DT approach can foster social innovation in different fields. However, there is still limited literature that demonstrates how the DT approach can be a tool for inclusion and accessibility for the Public Sector.

3. Service Design in the Public Sector and Design for Inclusion

Thus, the literature review covers its second element, Service Design. Service designers are valued in the Public Sector thanks to their capacities to improve policy making (Mortati, Schmidt & Mullagh, 2022), to move towards necessary cultural and organizational changes, to train and build capacity among state employees, and to engage citizens through co-design sessions (Mager, 2016). Moreover, for the successful integration of technologies, Service Design is becoming a necessity to create fruitful synergies between human operators and complex data structures (Colley & Häkkilä, 2018).

Design can promote inclusion and accessibility across digital technologies, as shown by numerous projects from product design to participatory design. Starting from Product Design, a significant example is the EASTIN Association, which provides expertise on assistive technology for people with disabilities, their families, and carers (Wouters, 2015). Another notable example comes from a Community-based Participatory design, called Commonfare.net, a platform enabling individuals in precarious conditions, such as poverty and unemployment, to share experiences and connect for mutual support (Lyle, Sciannamblo & Teli, 2018). Speaking of Design for social integration, a Digital Companion project uses AI-based profiling and chatbots to enhance public services for migrants and improve their quality of life through participatory co-creation approaches (Pollini & Caforio, 2021).

Despite these practices of using Service Design in the Public Sector and Design for inclusion, there is no Service Design literature yet on the integration of the DT approach for Social innovation in this area.

4. Framework of Digital Twin approach for Social Innovation in Public Offices

The integrative literature review finishes describing its two elements and results in tables 1, 2, and 3, which represent the new framework, building relationships between concepts of Digital twin and Service Design, that reveal 9 building blocks for Digital Twin function development within pre-service,

service, and post-service (Stickdorn & Schneider, 2011). To focus the framework, the context was narrowed down from the Public Sector to public offices where the state employees communicate directly with the citizens, and thus, there is space for possible Social innovation intervention. The tables consist of five columns: the first is the possible DT function (what) in the public office [Fig. 1], the second and third are the (in)tangible interactions (how), the fourth is a benefit (why) associated with this DT function, the fifth is a possible role of Service designer and the last one is the similar case study. The description of the DT function is inspired by the Golden Circle model (Sinek, 2009). The first table describes how DT functions within public pre-service can improve: accessibility evaluation through the office layout simulation for accessibility testing; inclusion training for employees to teach them handling diverse needs; service testing through the development of virtual experiment environments to service optimization. In this case, the Role of the Service designer is to develop scenarios and spaces to encourage engagement.

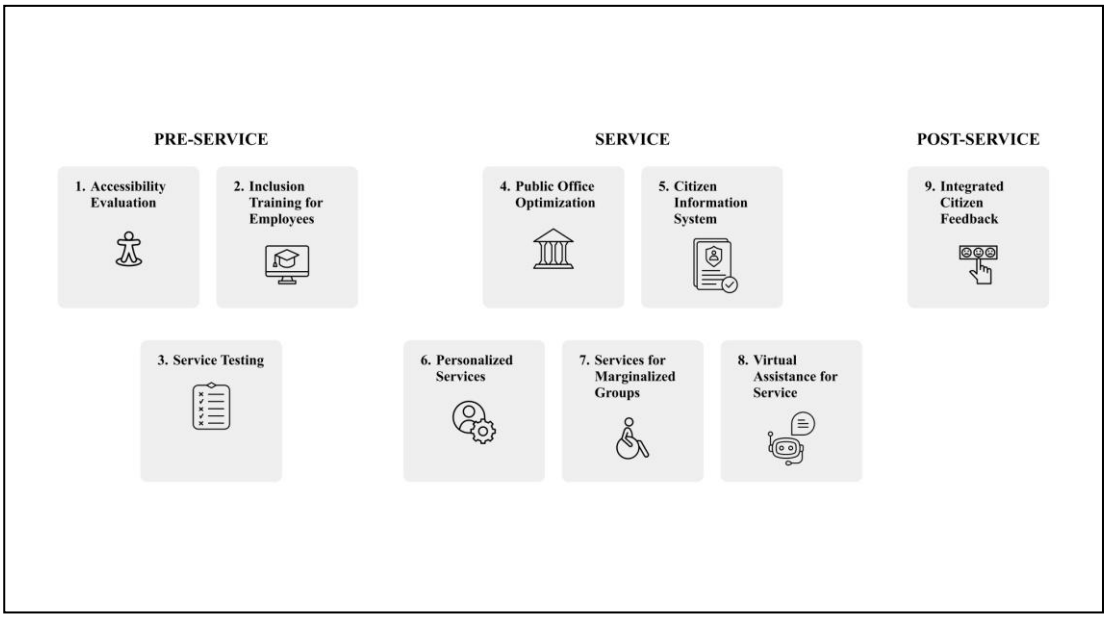

Fig. 1
DT functions within pre-service, service, and post-service in public office.

DT function (what)	Tangible Interactions (how)	Intangible Interactions (how)	Benefit (why)	Role of the Service Designer	Case study
1. Accessibility Evaluation	Simulate office layouts for accessibility testing	Collect and analyze citizen feedback to refine accessibility	Create an inclusive physical environment	Test and improve layouts, thanks to user feedback	Wouters, 2015; Hwang & Choi, 2023
2. Inclusion Training for Employees	Utilize XR simulations to train employees in handling diverse needs	Deliver AI-driven adaptive training programs	Improve inclusion of services	Design inclusive training scenarios	Barata & Kayser, 2024; Mager, 2016
3. Service Testing	Develop physical prototypes and	Aggregate real-time user	Reduce risks and costs by initial	Design participatory prototypes enabling citizen interaction	Barata & Kayser, 2024

	virtual test environments	interaction data to optimize services	validating, ensuring accessibility		

Tab. 1 Pre-service in the public office improved by the DT approach and the role of the Service designer.

The second table describes how DT functions within public service can improve public office optimization that monitors physical flows of citizens/employees to manage queues; citizen information system that centralizes citizen data for easy access at service desks; personalized services that offer customized service recommendations at desks; services for marginalized groups that enable remote access for citizens with mobility challenges; virtual assistance that provides help at service desks. In this case, the Role of the Service designer is to develop data-driven user journeys and user-friendly systems.

DT function (what)	**Tangible Interactions (how)**	**Intangible Interactions (how)**	**Benefit (why)**	**Role of the Service Designer**	**Case study**
4. Public Office Optimization	Monitor the physical flow of citizens/employees to manage queues	Predict peak times and distribute staff	Reduce waiting times, predict problems, enhance citizen satisfaction	Design user journeys based on data	Barata & Kayser, 2024
5. Citizen Information System	Centralize citizen data for easy access at service desks	Track and update citizen profiles	Simplify interactions, improve transparency, and save time by consolida-ting information	Develop a centralized and user-friendly system	Eom, 2022; Asad et al., 2023
6. Personalized Services	Offer customized service recommenda-tions at service desks	Analyze citizen interaction histories to tailor services	Increase satisfaction	Develop adaptive interfaces that personalize information	Pollini & Caforio, 2021
7. Services for Marginalized Groups	Enable remote access for citizens with mobility challenges	Provide adaptive digital interfaces for accessibility	Increase inclusivity for citizens unable to visit public offices	Design user-friendly remote service options	Singh et al., 2021; Tu et al., 2023; Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022
8. Virtual Assistance for Service	Assist at service desks	Use a virtual assistant to guide citizens and provide solutions	Enhance transparency and empower citizens to	Design accessible virtual assistants that provide support	Barata & Kayser, 2024; Pollini & Caforio, 2021

			navigate independently		

Tab. 2 Service in the public office improved by the DT approach and the role of the Service designer.

The third table describes how DT functions within public post-service can integrate citizen feedback to collect it through service desks. In this case, the Role of the Service designer is to develop accessible systems to ensure feedback informs decision-making.

DT function (what)	Tangible Interactions (how)	Intangible Interactions (how)	Benefit (why)	Role of the Service Designer	Case study
9. Integrated Citizen Feedback	Collect citizen feedback through service desks	Analyze feedback data to inform service adjustments and improvements	Promote transparency and foster citizen involvement and trust	Develop accessible systems to ensure feedback informs decision-making	Lyle, Sciannamblo & Teli, 2018; White, Zink, Codecá & Clarke, 2021

Tab. 3 Post-service in the public office improved by the DT approach and the role of the Service designer.

5. Discussions and Conclusion

The Framework of the Digital Twin Approach for Social Innovation in Public Offices proposes 9 building blocks for Digital Twin function development. Some of these blocks can be combined and integrated into existing Building DTs depending on the necessities.

The role of Service designers in fostering social innovation, inclusion, and accessibility through the DT approach is described for each DT function in the tables, and overall, their responsibilities can be summarized as follows:

- Engaging stakeholders and users, particularly marginalized groups: developing inclusive feedback loops using tangible and intangible interactions.
- Designing data-driven stakeholder journeys: plan their experience and develop inclusive tangible and intangible interfaces for DT systems.
- Prototyping and scenario development: designing them to test concepts and train employees.

The findings of this research help designers and public stakeholders understand the social, spatial, and relational impacts of DT systems, fostering deeper connections between citizens and public services. This research can have an impact on the democratization of technology, as Service Design

promotes inclusivity and stakeholder participation, ensuring that their needs are taken into account when designing DT systems. This approach promotes collaboration and transparency in the Public Sector, improving service delivery and public good.

However, when implementing DT for social innovation, some ethical and technical challenges must be taken into account. Thus, future studies could be aimed at creating recommendations for policymakers to develop inclusive policies for public services, taking into account ethical and technical issues such as algorithmic bias and discrimination, privacy and surveillance issues, and large-scale data collection (Vesnic-Alujevic et al., 2019).

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Tangible Interfaces for Intangible Experiences: the Role of the UX Specialist in the Software Development Team

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ABSTRACT
The term "technology" originates from the Greek words téchnē (art) and lógos (science), highlighting the link between creativity and scientific knowledge, which forms the basis for understanding the relationship between technology and design today. Technology is no longer just a set of tools; it is an ecosystem where both aesthetic and functional principles shape design. Design goes beyond the visible, influencing how individuals interact with technology, particularly on the Web, where interface design impacts the intangible element of User Experience (UX). This research explores the responsibilities of UX specialists within software design, showing how their expertise enhances web product development. A case study of an Italian hospital's web platform compares user satisfaction between two versions of the same interface - one developed with a UX specialist and one without - demonstrating the benefits of integrating UX expertise. The study highlights how incorporating usability and accessibility as core values in IT companies fosters both product quality and a collaborative, innovative culture, contributing to a more inclusive, user-focused future.

USER EXPERIENCE SPECIALIST | HUMAN CENTERED DESIGN | ACCESSIBILITY | USER SATISFACTION

1. Balancing function and form: the essential role of UX in digital design

In the rapidly evolving domain of digital technology, the relationship between design and technology has become increasingly pronounced. Technology is no longer merely a collection of tools or processes; it now constitutes an integrated ecosystem where experiences, interfaces, and products are shaped by principles that harmonize aesthetics and functionality. Design transcends the visible elements of objects or interfaces and encompasses the nuanced ways in which individuals engage with technology. This interplay is particularly evident in web-based contexts, where the tangible dimensions of user interface design significantly influence the intangible domain of user experience (UX). The importance of human-centered design lies in its capacity to address the persistent gap between user needs and developer outputs. This gap, often attributed to miscommunication and an inadequate understanding of user requirements, can compromise the success of digital projects. This highlights the critical role of designers in balancing functionality with aesthetics and of UX specialists in transforming implicit user needs into actionable design solutions.
Incorporating a preliminary design phase grounded in human-computer interaction principles generates substantial benefits throughout the lifecycle of digital services. Empirical evidence shows that software developers spend nearly half their time reworking tasks that could have been avoided, resulting in significant resource inefficiencies, particularly when errors are identified post-production (Ramdoo & Huzooree, 2015) (Aleryani, 2020).

This study, conducted in collaboration with an IT company, advocates for embedding accessibility and user satisfaction as fundamental values in corporate design practices, achieved through the systematic integration of UX specialists into organizational workflows.
The development of digital products involves distinct phases, including conception, design, development, and deployment, each of which presents unique challenges. These challenges become more complex when user input is not effectively incorporated during the initial stages of the process. This research argues that the early involvement of UX specialists provides a strategic response to these challenges by aligning user needs with technological possibilities. Their expertise allows for the identification of critical interaction details, minimizing errors and reducing the need for subsequent revisions. Rather than simply collecting requirements, UX specialists foster a comprehensive understanding of user expectations, ensuring their seamless integration into the design process.

Through a case study on the development of a web platform for an Italian hospital service, this research illustrates the transformative impact of involving UX specialists from the outset. A comparison of two interface versions, one developed with UX input and the other without it, demonstrates substantial improvements in user satisfaction, workflow efficiency, and error reduction. The findings also emphasize how usability and accessibility contribute to fostering a culture of

collaboration and innovation within IT organizations, ultimately enhancing both product quality and organizational practices.

In an era where technology permeates everyday life, designing user-centered digital solutions has become a necessity. This study contributes to academic discussions on the role of design in technological development, highlighting the importance of addressing user needs while promoting innovation, collaboration, and satisfaction within the digital industry.

2. Analyzing the design process: a case study of a hospital website

This research advances the discussion by presenting a case study centered on the analysis of a hospital web application developed by ManyDesigns, an Italian software company. The service, initially designed and implemented by a programmer, is analyzed in depth to identify areas for improvement. Following this analysis, an alternative solution is proposed and developed with the involvement of UX specialists and web designers. This new approach integrates principles of usability and web accessibility into the interface design.

The next phase of the study involves user testing to assess preferences and determine which solution is perceived as more effective and satisfying. In addition to assessing user satisfaction, the research will look at wider impacts, including the social well-being of staff involved in the development process and the optimization of workflows. In particular, it investigates improvements in time and resource allocation and proposes a collaborative team model that improves efficiency and outcomes.

The service being studied, called Self-Accettazione (Self-Acceptance), addresses a critical need in the healthcare sector: streamlining and expediting access to medical facilities. By allowing insured patients to complete registration and payment for services remotely, the platform reduces queues at hospital counters, increases service efficiency and improves overall patient satisfaction.

Since its launch in July 2021, the Self-Acceptance platform has operated as part of a broader and more complex user journey [Fig. 1].

This journey typically starts with a doctor's prescription, continues with appointment booking through the central booking office (CUP), and culminates in the consultation or medical procedure. Within this framework, the Self-Acceptance service addresses the administrative phase of the patient journey, encompassing tasks such as submitting medical claims, registering patients, and processing payments for insured services.

Traditionally, these steps are performed in person at the hospital reception on the day of the appointment. By transitioning to a digital platform, the service seeks to streamline this process, enhancing efficiency and improving outcomes for both users and healthcare organizations.

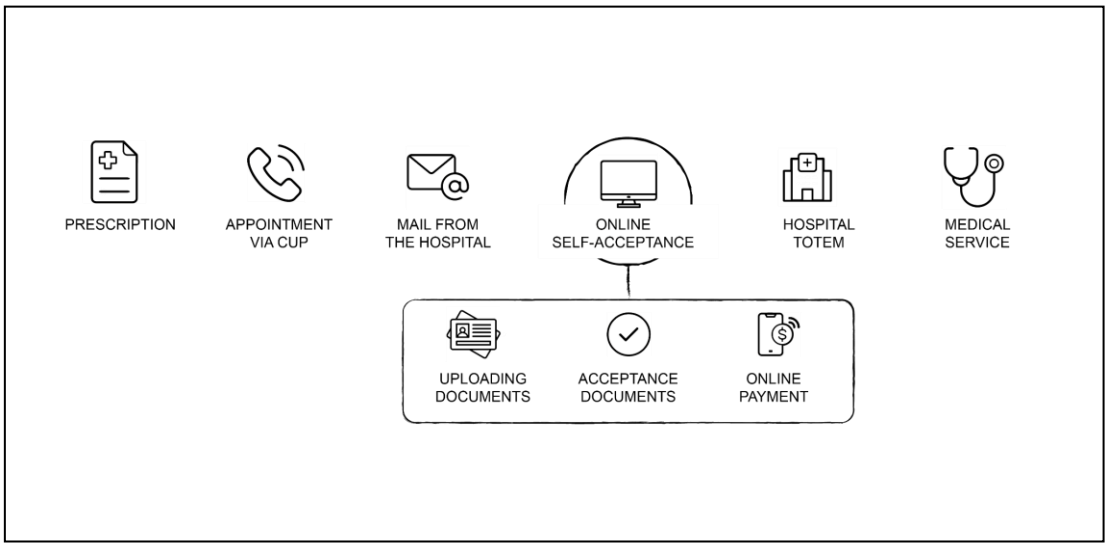

Fig. 1
User journey illustrating the steps the patient follows to book a medical service through the Self-Acceptance service.

In addition, this study examines how adopting a UX-oriented approach fosters collaboration between designers and developers. This collaborative model not only enhances the quality of the digital solution but also contributes to the creation of more sustainable and human-centered technologies, aligning with broader goals of accessibility and inclusivity in the healthcare sector.

3. Exploring user needs: research activities and insights

The case study was analyzed through various user research activities: analytics, interviews, and expert analysis.

3.1 Analytics

A review of the analytical data from the platform's launch in July 2021 to November 2023 revealed a total of 172,130 processed performances, providing a substantial dataset for evaluating service efficacy and user behavior. The age distribution of users, ranging from infants to a 104-year-old, was analyzed due to its relevance in understanding the target audience. This analysis is essential for adapting the service's communication strategies and design to meet the needs of different age groups. Notably, the data identified a peak in usage around the age of 54, offering insights into key demographics for optimizing user engagement and service effectiveness [Fig. 2].

Upon classifying the users into age groups, with one group for those under 18 and another for those over 95, and dividing the intermediate ages into 10-year intervals, the most active user segments were found to be those between 46 and 65 years of age [Fig. 3].

The data analysis also provided a comprehensive overview of the overall success rate of the service. The data revealed a significant problem with both document upload and payment: only 15,053 users successfully uploaded the required documents (8.75%) and only 7,613 completed the required payments (4.42%). These results indicate the need to further investigate the barriers users face during the process in order to improve the service and increase completion rates.

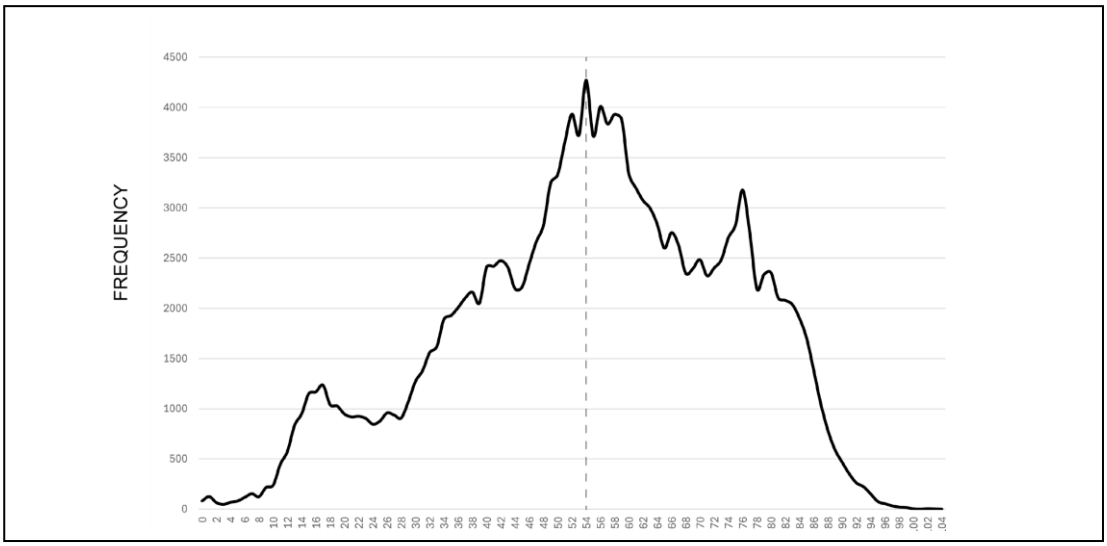

Fig. 2
The chart illustrates the number of interactions performed by users for each age, spanning from 0 to 104 years, with a peak in usage observed at the age of 54.

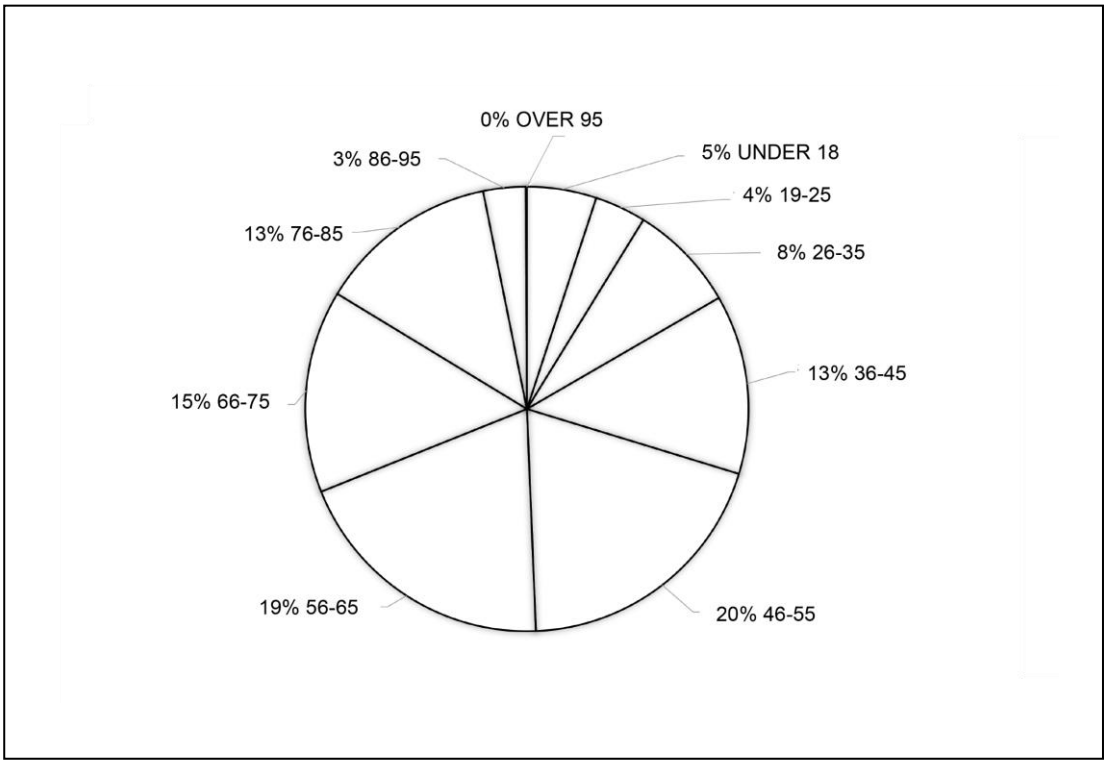

Fig. 3
The pie chart represents the percentage of interactions divided into different age groups, highlighting higher activity among users aged 46 to 65. Data is grouped into 10-year age ranges, with separate categories for users under 18 and over 95 years old.

3.2 Interviews

In order to gain a full understanding of the development process and the challenges encountered during the creation of the website, an anonymous interview was conducted in July 2024 with the developer responsible for the design and realization of the website. The aim was to explore the methods used in the development, the difficulties encountered and the organisational aspects of the work, from the initial concept to the final implementation. A number of key points about the development of the project emerged from the interview.

Firstly, the developer noted that although aware of the overall project objectives, there was limited communication with the client and access to strategic decisions made prior to the start of the project. This lack of direct interaction with business decision-makers may have contributed to the initial

specifications being unclear, compromising alignment with the client's real needs, which in turn affected both the timing and quality of the final product. The urgency to complete the project meant that the developer worked largely in isolation, with little opportunity for feedback or collaboration with more experienced colleagues or end users. This limited approach resulted in an initial product that fell short of expectations and required significant restructuring of the code to improve security, configurability, and management.

The visual design phase also suffered from limited resources, as the developer explained that the design was based on general guidelines rather than detailed mock-ups. This lack of clarity and visual consistency required further revisions, highlighting the importance of clearer initial documentation. Dissatisfaction with the outcome was expressed, with quality problems attributed to tight deadlines and a lack of timely feedback from a team of experts. A more collaborative management approach and additional time were suggested as factors that would have led to a better result. A significant issue raised was the lack of attention to accessibility and usability. The developer admitted a lack of knowledge of the Web Content Accessibility Guidelines (W3C, 2018), an area that represents a crucial opportunity for improvement. Compliance with accessibility standards is essential not only to ensure the inclusiveness of the website, but also to meet legal obligations, making it a priority for future improvements.

3.3 Expert Analysis

The final phase of the user research involved an expert evaluation of the current graphical user interfaces of the service to assess their usability and accessibility. The evaluation considered several parameters of the user interface and user experience, such as user flow, needs coherence, accessibility, service flexibility, layout and visual content hierarchy, visual consistency, interactivity and responsiveness, and finally aesthetics.

The analysis was carried out according to core UX design principles, web design guidelines and human-computer interaction concepts, including Jakob Nielsen's usability heuristics (Nielsen,1993). The main problems identified were a lack of visibility of system status, an excess of redundant information and a non-intuitive visual hierarchy, which resulted in a sub-optimal user experience. In addition to the aforementioned interface issues, the lack of clear feedback and system information compartmentalized the user experience in terms of reliability and security. For example, the platform did not provide a confirmation email at the end of the process, which would have reassured users and provided a clear record of their actions. Furthermore, there were no clear instructions on what to do on the day of the visit, nor explicit information on the importance of using the service, with an effective communication strategy to convey the benefits of the platform.

4. Redesigning the user interface: a focus on usability and accessibility

Following a thorough analysis of the issues identified in the current version of the service, a redesigned set of interfaces was developed. This proposal was presented as mockups, prepared by

a web designer under the direction and supervision of a UX specialist. The redesign process utilized Adobe XD, which enabled detailed visualizations of the updated system architecture, simulations of navigation flows, and preliminary evaluations of user interactions to be produced before the development phase. These prototypes function as comprehensive visual references and essential tools for gathering feedback, supporting an iterative and user-centered design process.

The proposed improvements focus on simplifying and enhancing user communication, adopting a more accessible and reassuring language, and optimizing the reading flow to highlight key interface elements requiring user action.

For each stage of interaction, a comparative visualization is provided, with the current interface displayed on the left and the proposed interface on the right [Fig. 4-11].

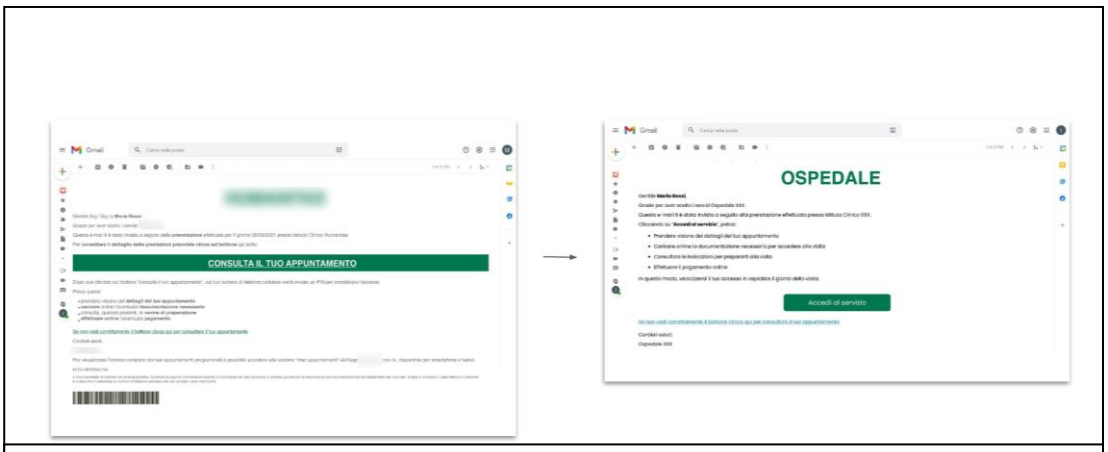

Fig. 4
Step 1: After scheduling the appointment, the user receives an email to access the service.

Fig. 5
Step 2: To access the secure area, the user must enter the code received via SMS.

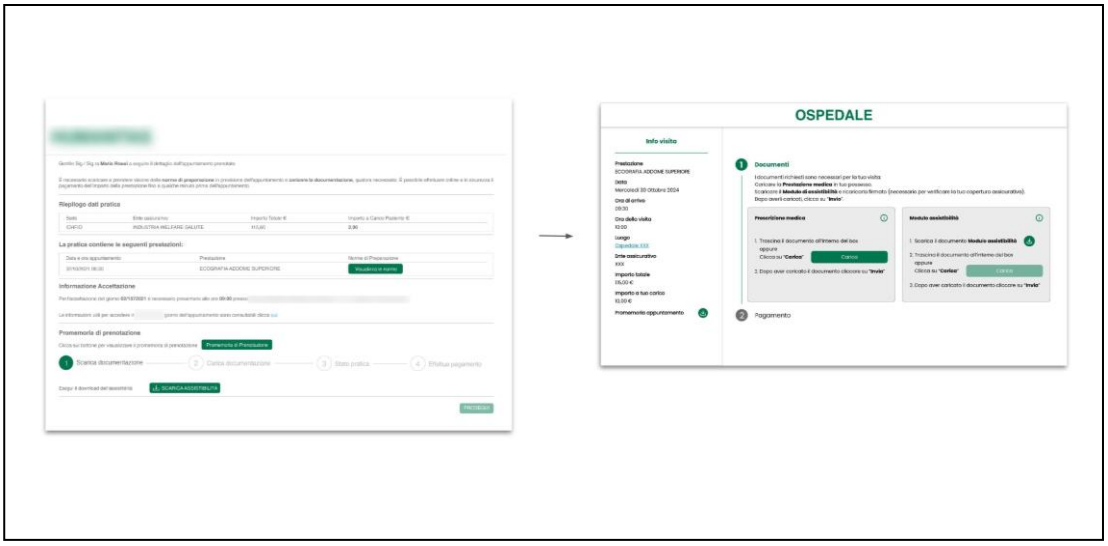

Fig. 6
Step 3: The user is provided with a summary of their booking. This screen prompts the user to download the necessary documentation for acceptance.

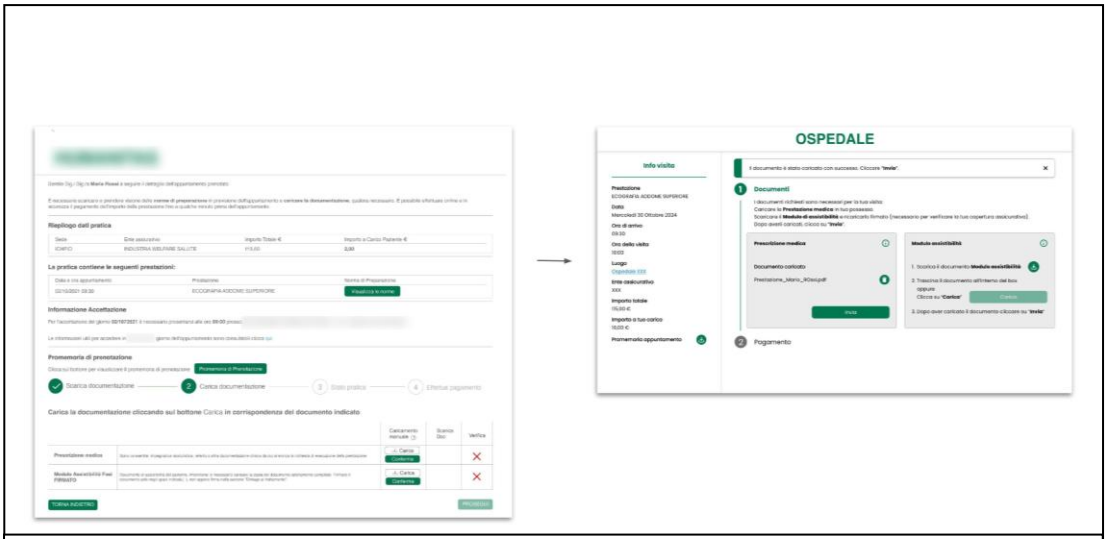

Fig. 7
Step 4: After uploading the documents, the current interface does not allow the user to modify the file. The proposed interface, however, enables the user to review and confirm the accuracy of the uploaded file.

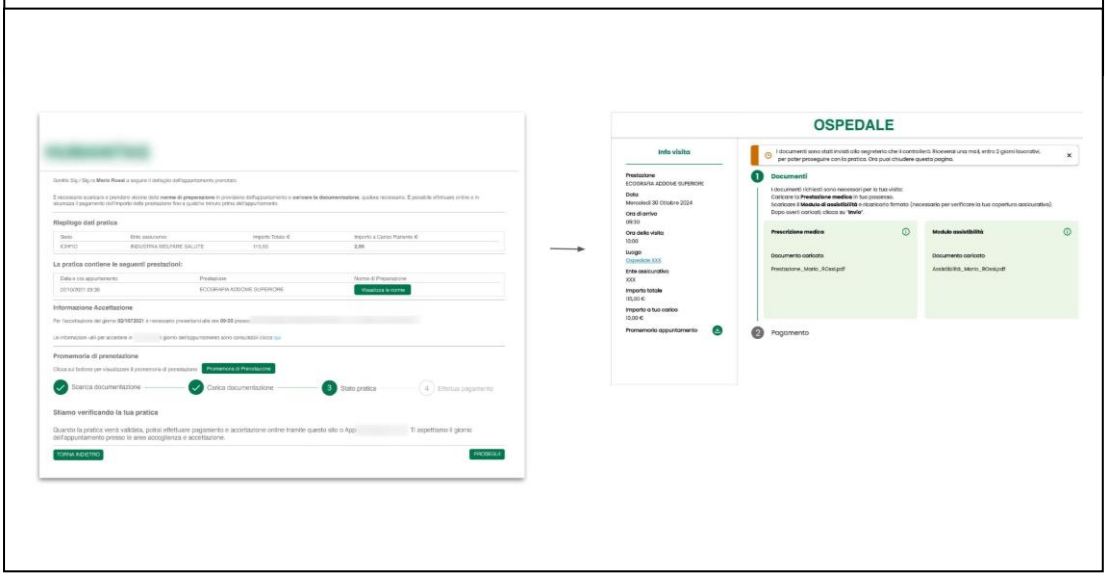

Fig. 8
Step 5: After appropriately completing the PDF documents, the user must upload them to the platform. The user is then notified that they must wait a few days for the application to be validated.

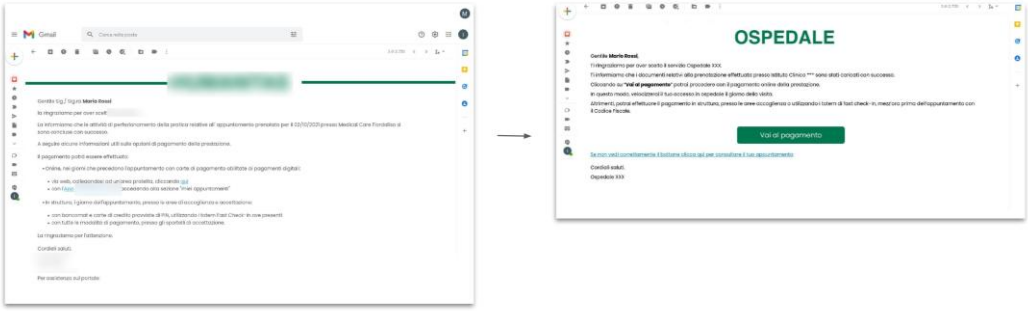

Fig. 9
Step 6: The user receives another email prompting them to proceed with the payment. This section is not analyzed here, as it falls outside the scope of the company and is managed externally.

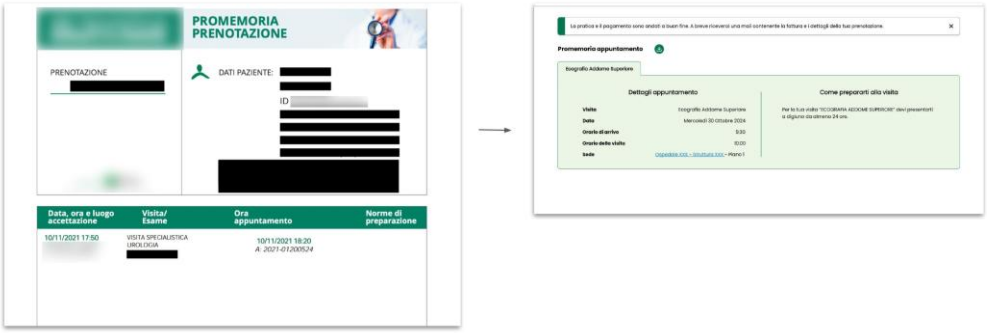

Fig. 10
Step 7: Once payment is completed, the user can view a summary of the application.

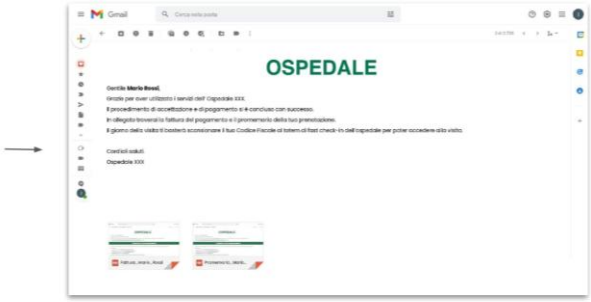

Fig. 11
Step 8: An additional communication summarizing the information for attending the appointment on the day of the visit has been implemented, which was not previously included.

5. Conclusions and future testing phases

The work detailed in this paper illustrates a comprehensive interface redesign process aimed at enhancing usability, accessibility, and overall user experience, alongside a refined workflow

implemented by the company to achieve these outcomes. By addressing critical pain points in the existing version and aligning with established design principles, the newly developed interfaces mark a significant step forward in improving service quality.

The next phase involves conducting an A/B test to compare the proposed interfaces with the current version. This evaluation will not only capture user preferences and satisfaction but also assess usability and interaction flow efficiency. Through a combination of quantitative metrics and qualitative feedback, the testing phase will provide actionable insights, guiding further refinements and ensuring the final implementation is both user-centric and functionally robust.

Key to the success of this process has been the adoption of mockup-level changes, which enabled faster iterations, reduced development time, and streamlined prototyping. This approach, combined with a clear division of roles within the team, ensured that each stage of the redesign benefited from specialized expertise, fostering collaboration and boosting productivity. The efficient handover between design and development teams further enhanced the quality and smoothness of the workflow.

Looking ahead, this methodology will extend beyond the Self-Acceptance project, serving as the foundation for upcoming initiatives. By integrating UX specialists into IT teams from the outset and moving away from direct code-based workflows, the company is embracing a more structured and effective design approach. This shift not only underscores the importance of user-centered design but also demonstrates its potential to elevate the efficiency and impact of software development projects.

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Towards an Equal, Sustainable and Aware Multi-level Mobility

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ABSTRACT
Urban mobility is an evolving context characterized by the rise of smart cities, digital connectivity, and on-demand transportation services. While these innovations enhance efficiency, they often overlook human needs and in particular those of elderly individuals—a demographic category that is expanding due to the ageing society. In fact, older adults play a crucial role in the economy and society, yet they frequently face barriers in accessing modern transportation systems, which are often designed without their physical, cognitive, and digital capabilities in mind. This paper examines the intersection of aging and mobility, emphasizing the importance of including elderly people's needs in transportation

infrastructures. It explores three case studies - DIGNITY, TRIPS, and Urban Sherpa - analyzing mobility solutions at different levels: system, service, and product. These projects highlight key factors such as accessibility, user-centered innovation, and equitable transport policies. Findings suggest that while technological advancements offer new mobility possibilities, they must be integrated with human-centered approaches to ensure elderly users can navigate urban spaces safely and independently.

The research underscores the need for holistic urban planning that balances efficiency with inclusivity. Future mobility systems must be designed with a multi-level perspective that prioritizes equity, sustainability, awareness and intergenerational accessibility. By incorporating these principles, cities can develop transportation networks that accommodate all users, reinforcing mobility as a fundamental right rather than a privilege.

INCLUSIVE MOBILITY | AGING POPULATION | ACCESSIBILITY | URBAN INFRASTRUCTURE TRANSFORMATION

1. Introduction

In contemporary times, urban mobility and its related infrastructure is becoming an increasingly complex place. A place which is governed by numerous phenomena closely interconnected such as: the transition towards the smart city or smart city (Dameri, 2013), the return to living in proximity following the concept of the 15-minute city (Manzini, 2021), the transition from the use of a car owned to an on-demand mobility service (BMW, 2019). Mobility as a service often referred to as 'MaaS' (TTS Italia, 2021; Petrocchi, 2023) and the ultra-connectivity of vehicles increasingly able both to receive information from the outside and to communicate with personal devices such as smartphones (Deloitte, 2024). In this context of sudden transitions in urban mobility, this contribution focuses in particular on the mobility of an important category of users: the elderly. This category is decisive for the future for several reasons such as: the ageing of the world population, their economic potential, the related ethical and inclusive duty. WHO is confirming this trend reporting in their statistics that by 2030 16 % of the population will be older than 60 years old, passing from 1 to 1.4 billion of elderly people.The aging of the world's population will be a lasting phenomenon and will increase in the coming years with a forecasted 2,1 billion of elderly all over the world. Last but not least, also seniors over 80 years old are expected to rise by 300% reaching the amount of 426 million in the timeframe between 2020 and 2050 (WHO, 2022). According to the Nielsen and Norman Studio (2013), older people are an important category for the design future, not only because they represent, and will increasingly represent, a considerable part of the world's population, but also because they are users who have the economic capacity to invest in new mobility solutions which solve their problems, especially when it comes to maintaining their daily routines and their health. Another important reason comes from Umberto Eco, one of the greatest Italian professors,

journalists and writers of the 19th century, who states that elderly are the social memory keepers. Especially in the past, elderly were heard to provide wise advice and to increase the experience of young adults with their family history. In this way, even an inexperienced young man could benefit from the same knowledge of those who lived before him, becoming more wise and understand its role linked to the past, present and future (Eco, 2000).

2. Methodology

In light of the fluid context and the general ageing of the global population, the most appropriate approach to address this issue appears to be inclusive. This type of approach is helpful not only as a form of charity for fragile, weak or unlucky people but it is also useful to accept life in all its forms within the community boundaries. Furthermore equality and non-discrimination are the founding values of the European Union, as expressed in Article 2 of the Treaty on European Union (Equinet, 2024). Moreover, the inclusive approach is consistent with human-centred methods, which are based on the study of human needs and propose a design solution that takes into account not only the technical-functional component, but also the needs of human interaction with the machine (Tosi, 2018; Petrocchi et al., 2021). Taking into account these reasons and the inclusive perspective this contribution objective is to focus on the mismatch (Holmes, 2020) between the high-tech mobility and a progressively ageing citizenry that requires ways, times and mobility that are more suitable and inclusive of their needs. Three case studies of inclusive mobility will be analyzed taking into account three levels: the system level, the service level and the product level. The three cases will be selected in order to prove that mobility infrastructures, service and products can have an impact from a large to a small scale and in terms of equity, sustainability, and awareness.

3. Case studies

In the context of mobility, the rapid development of physical and digital technology has been shown to favour economic criteria while neglecting human aspects such as people's needs, behaviour, attitudes and social conventions. This design phenomenon is particularly pronounced in the context of vulnerable groups, such as the elderly. The selection of three case studies presented here was guided by the objective of elucidating the significance of inclusive mobility design. The selection of projects is guided by a shared vision of enhancing accessibility to mobility for vulnerable individuals, encompassing diverse scales ranging from systemic frameworks to specific services and digital mobility solutions. A commonality across all projects presented is a human-centred approach, predicated on user needs.

3.1 Case Study 1 - System level

Inclusive Mobility Design – The DIGNITY Project[1]

[1] More info at thttps://www.dignity-project.eu/

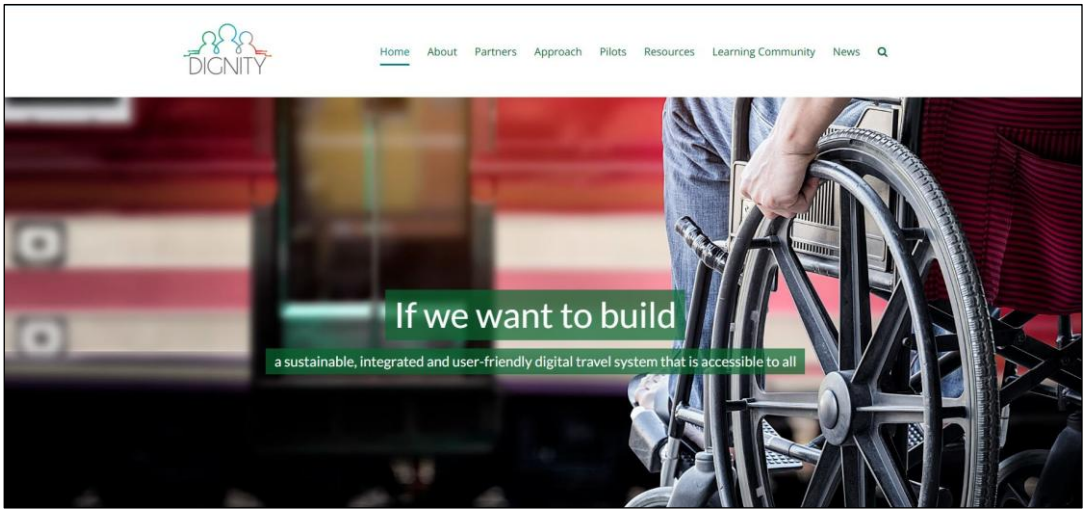

Fig. 1
The DIGNITY project.

The DIGNITY project (Digital Transport Inclusion) addresses the digital divide in urban mobility by promoting inclusive digital solutions for all, particularly vulnerable groups such as the elderly and individuals with disabilities. As urban transport increasingly incorporates digital platforms for navigation, ticketing, and real-time updates, DIGNITY ensures that these advancements remain accessible to everyone, regardless of digital literacy or access to technology. By developing an inclusive framework for mobility innovation, DIGNITY collaborates with stakeholders, including policymakers, technology developers, and mobility providers. This multidisciplinary approach emphasizes co-creation and user-centered design, ensuring that digital tools align with the diverse needs of urban populations. The project serves as a model for integrating social equity into the development of smart mobility systems, advocating for accessible and user-friendly technologies as essential components of future transport infrastructure.

3.2 Case Study 2 - Service level

User-Centered Mobility – TRIPS (Transport Innovation for Persons with Disabilities)[2]

[2] More info at https://trips-project.eu/about-the-project/

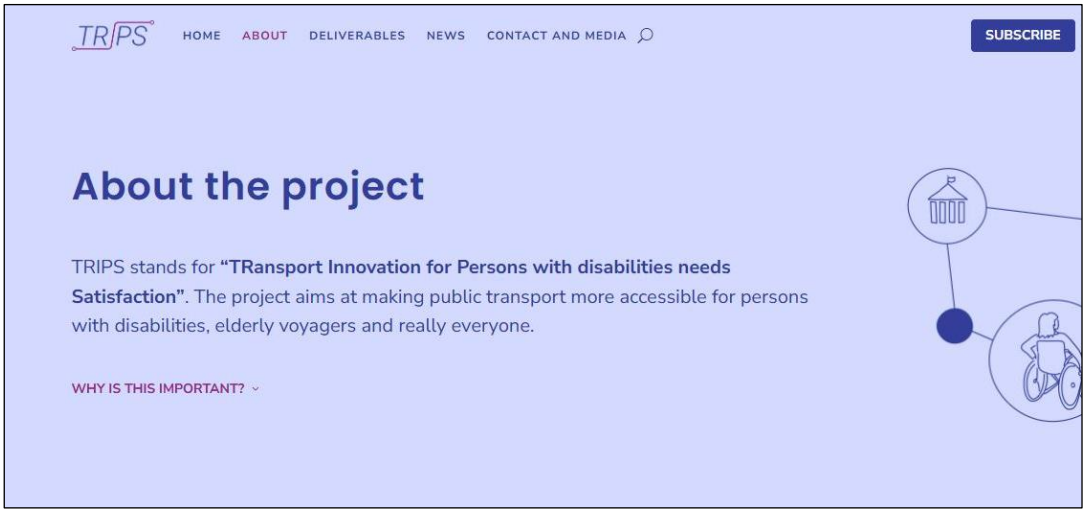

Fig. 2
The TRIPS project.

The TRIPS project exemplifies a participatory design approach to inclusive public transport. Operating across seven European cities - Lisbon, Zagreb, Bologna, Cagliari, Brussels, Sofia, and Stockholm - the initiative engages people with disabilities, like elderly, in the co-design of mobility solutions. This collaborative framework ensures that their specific challenges and insights directly inform the development of transport systems. TRIPS focuses on overcoming barriers to accessibility through solutions such as improved wayfinding systems, redesigned public transport vehicles, and user-friendly digital interfaces. By incorporating the perspectives of marginalized users, TRIPS fosters transport innovations that address real-world issues. Furthermore, the project offers policy recommendations to urban planners and transport operators, advocating for inclusivity as a central criterion in mobility design. Its participatory methodology demonstrates how inclusive practices can lead to practical, scalable solutions that benefit broader demographics.

3.3 Case Study 3 - Digital product level

The Urban Sherpa project[3]

[3] More info at https://sfera.unife.it/handle/11392/2576671

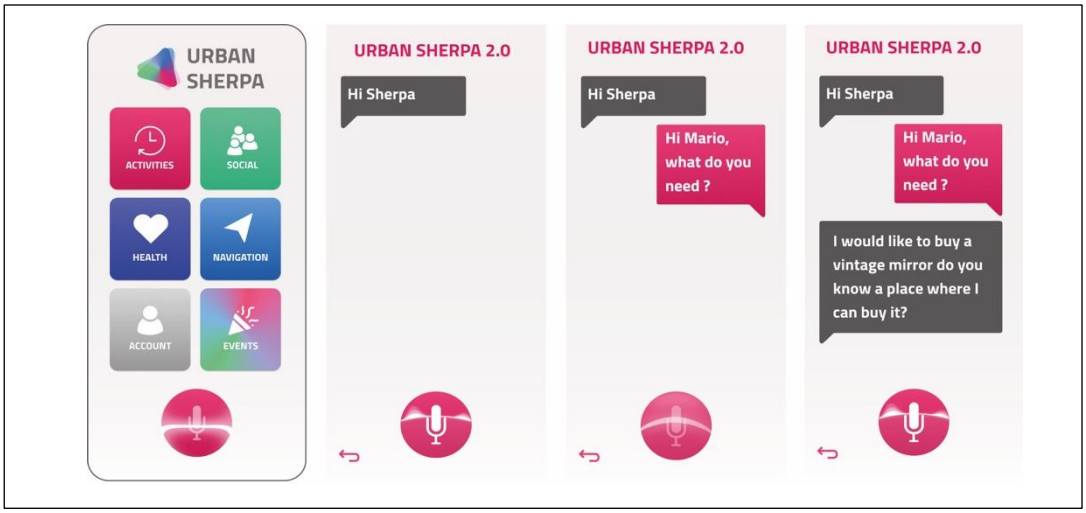

Fig. 3
The Urban Sherpa project.

The Urban Sherpa project addresses the issue of mobility for the elderly in large urban centres. In particular, the project proposes the establishment of a mobility system that would facilitate the elderly user's integration into the mobility landscape by proactively encouraging their engagement in activities that promote physical, mental, social, and recreational wellbeing. The urban sherpa project is a mobility system designed to facilitate the inclusion of the elderly user in the urban mobility landscape. It does so by providing a digital platform that not only enables safe navigation but also encourages the user to engage with new people, explore new places and attend significant events in the city. Furthermore, the project is enhanced by the incorporation of artificial intelligence, which facilitates communication between the user and the system through voice interaction. This mode of communication was selected due to its efficacy and multimodality, which enables effective communication between the elderly user and the machine. In essence, the visual interface of the monitor is complemented by the auditory feedback provided by the artificial intelligence, allowing the user to interact with the system to navigate, interact with new individuals, access health-related information, and organize their routines.

4. Discussion

Once described, the projects are analysed here by considering three main evaluation criteria: equity, sustainability and awareness [Table 1].

Criteria / Case study	DIGNITY	TRIPS	URBAN SHERPA

Equity	Aims to provide a system which is inclusive to all frail people (elderly included).	Aims to include all the people with disabilities, (elderly included).	Aims to include elderly in the society by an inclusive digital product for elderly mobility.
Sustainability	By providing a digital platform accessible to all, the project aims to make frail people more independent and make mobility more sustainable.	It aims to improve public transportation by including disable needs into the design criteria of mobility.	Linked to the mobility as a service the project aims to reduce private mobility and increase public mobility.
Awareness	The project dignity make more aware how important is to provide access, by leveraging to mobility tools to the vast majority of people.	By include people with disabilities, the project aim to increase the awareness and the importance of include those people into the society by make them autonomous and independent.	The project aims to make the mobility ecosystem more aware of the demographic shift that the current society is facing and will face in the future.

Tab. 1 The three case studies compared with the criteria of equity, sustainability and awareness.

The concepts of sustainability equity and awareness emerge in all three illustrated projects concerning inclusive mobility for the frail and elderly. The concept of equity is present in the DIGNITY mobility system where the main aim is to provide the majority of the population with access to a mobility platform capable of taking into account the needs of the most fragile categories in the design and implementation of the mobility system. We also find this concept in the TRIPS mobility service whose main objective is to provide broad accessibility to mobility for people with disabilities and the elderly in order to include them in society. Finally, the digital product URBAN SHERPA also has the objective of promoting equity, as it aims to provide concrete digital help to elderly persons who have to move within the metropolis and in an increasingly digital context. The concept of sustainability is also present in all three projects. DIGNITY, TRIPS, AND URBAN SHERPA all aim, albeit at different levels, to promote public transport. DIGNITY promotes an accessible digital system that aims to integrate existing mobility services through the digital platform tool. TRIPS is a mobility service focused on elderly and disabled people which aims to make them autonomous and able to book and use digital services. URBAN SHERPA is a digital product which helps elderly people to get around, socialise, and be autonomous in their routines and movements without the help of third party stakeholders. Furthermore, the project is related to mobility as a service or MaaS which aims at a more sustainable mobility in cities by favouring the integration of public transport and new mobility models. The concept of awareness is also present in the illustrated projects. The DIGNITY, TRIPS,and URBAN SHERPA projects not only aim for greater equity and sustainability but also focus

on making the user and the mobility system more aware. The user is made more aware through the use of mobility tools that make him better aware of the context in which he operates and the consequences of his movements. The system for its part through these projects has the potential to include fragile users in the design and planning criteria.

5. Conclusions

The changing landscape of urban mobility presents many challenges and opportunities for all people who use it, and the advent of new technologies accelerates the process of changing mobility patterns, increasing the risk of excluding many people including the elderly or disabled. Equity, Sustainability and awareness are therefore significant concept. Equity is a key concept to coordinate technological and economic development opportunities with elderly people's mobility needs. This considering not only the ethical aspect but also the progressive ageing of the world. Sustainability is an important factor for the future mobility system not only in terms of preserving the natural environment but also in economic terms. A mobility system that can offer the possibility to move also to persons with disabilities or fragility in moving presents a strategic advantage especially in a society that is progressively ageing. Awareness is also a strong and important concept for the mobility future. Only a community which is aware of their weakness is able to deal and avoid future mobility issues. All the future mobility infrastructures should be redesigned to make it intuitive, fast and inclusive not only for young or adult people but also for older seniors.

Finally, it should be emphasised that such a conception linked not only to the technological and economic world but also to the needs of the user (and thus Human Centered) is important at different levels of design. In designing the mobility of the future, it will be decisive not only to take into account an inclusive but also a multi-level perspective. A perspective that does not only act in the problem-solution logic but deals holistically with the entire system, the entire service and only finally with the related product-solution.

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In/active. The Role of Design in the Creation and Transmission of Collective Memory

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ABSTRACT
Intangible cultural heritage (ICH) refers to practices, expressions, and knowledge recognized by communities as part of their cultural identity (UNESCO, 2003). Unlike tangible heritage, ICH is a living, distributed knowledge embedded in people, places, and actions. Central to its transmission is the concept of memory, which becomes collective and dialogic when activated in cultural contexts. This paper explores how inclusive design can support the activation and intergenerational transmission of ICH, especially by involving older adults as cultural mediators. Rather than viewing them as passive custodians, the study frames them as active agents capable of engaging in storytelling, reinterpretation, and co-creation. By leveraging participatory methods and digital tools, even home-based individuals can contribute to shared heritage-making processes. Through case studies such as Mingei and iHERITAGE, the paper highlights how design can foster social inclusion, strengthen community bonds, and promote heritage as a dynamic, evolving practice.

INCLUSIVE DESIGN | INTANGIBLE CULTURAL HERITAGE | COLLECTIVE MEMORY | DIGITAL HERITAGE INITIATIVES

1. Introduction

Intangible Cultural Heritage (ICH) represents a fundamental pillar in the preservation and transmission of collective identity. It encompasses traditions, practices, expressions, knowledge, and skills recognized and shared by communities. According to the 2003 UNESCO Convention, ICH includes performing arts, social practices, rituals, festive events, and traditional ecological knowledge, all capable of evolving and adapting over time to remain relevant in contemporary life (Lenzerini, 2011). Unlike tangible heritage, ICH exists as a distributed system of knowledge, continually reinvented through interaction with cultural and technological contexts. For instance, the adoption of tools such as augmented reality and interactive storytelling has enhanced community accessibility and engagement in the safeguarding and valorization of ICH, as explored by Alivizatou-Barakou et al. (2017) and Liu & Pan (2023). These approaches facilitate intergenerational transmission, fostering new cultural expressions that address the challenges posed by globalization and cultural homogenization.

Furthermore, as discussed by Lupo (2011; 2023), design plays a crucial role in activating the value of ICH, conceived as an 'open-ended knowledge system'. Through participatory and collaborative practices, design can reinterpret living heritage, emphasizing its authenticity and enabling its sustainable integration into contemporary contexts. This perspective underlines the importance of transdisciplinary approaches, where design operates as a bridge between tradition and innovation (Koenig et al., 1991; Papanek et al., 1972).

Within this framework, the contribution proposes an operational model that emphasizes the active role of older adults, even within domestic contexts, thereby expanding participation opportunities through inclusive design practices and accessible technologies. The approach considers design not only as a tool for preservation but also as a relational device capable of stimulating intergenerational dialogue and the shared reinterpretation of heritage. The three-phase articulation (collection, mediation, and transmission) offers a replicable design framework supported by European case studies that demonstrate the vitality of this perspective.

On these grounds, the paper explores collective remembering as a central practice for activating shared memory processes and strengthening the connections between identity, place, and community.

2. Collective remembering as a form of ICH activation

Collective remembering refers to the process through which groups or communities share memories, often through social interactions, narratives, or rituals (Meade et al., 2020; Rajaram, 2024). Unlike individual memory, it emerges from social negotiation, a dialectical process involving the comparison of different experiences and interpretations, which enriches collective memory with new perspectives. This practice contributes to structuring cultural memory, influencing collective narratives and perception of cultural identity (Abel et al., 2018).

Design plays a role not only as a facilitator of these dynamics but also as an active agent in creating platforms and spaces that stimulate shared remembering. For instance, participatory design

techniques (Simonsen & Robertson, 2013) are effective tools for engaging people in the co-creation of collective memory experiences. These techniques leverage technologies and methodologies that encourage dialogue, collaboration, and storytelling, thereby helping to preserve and contemporize intangible cultural heritage (Meade et al., 2020).

A particularly relevant aspect is the impact that such activities have on individuals and communities as a whole. When mediated by design, collaborative remembering can generate a range of positive effects, such as strengthening cultural identity, fostering inclusion, and affirming diversity through the valorization of multiple perspectives and narratives. Furthermore, these practices open up innovative modes of transmission, enabling reinterpretations of heritage that adapt to contemporary contexts and ensure its long-term sustainability.

In this light, design is not merely an operational tool but becomes a cultural mediator, capable of connecting past, present, and future (Celaschi, 2008).

3. Designing for home-based participation in inclusive community practices

Innovative approaches to transmitting, adapting, and reinterpreting intangible heritage are essential to preserving it for future generations, ensuring it remains alive and meaningful in a fast-changing, globalized world. In this context, design becomes not only a process of archiving or documentation but also a means of activating cultural heritage, stimulating intergenerational reflection, and ensuring the longevity of traditions. Similarly, through the principles and practices of Design for All, it is possible to engage individuals who, for various reasons, are confined to their homes but can nonetheless contribute meaningfully to the discourse around intangible heritage.

During the COVID-19 pandemic, collective remembering was explored in various contexts, with design contributing to activating collective memory, even under conditions of physical distancing and limited social interaction (Bosco et al., 2022).

Home-based participation, enabled by digital tools, represents an innovative modality for including individuals who cannot physically access cultural spaces. This approach promotes the preservation and activation of intangible cultural heritage, fostering the development of inclusive communities in which personal stories, memories, and experiences contribute to a shared cultural dialogue.

Burkley (2019) uses ‘Digital Heritage Initiatives’ to describe heritage-related activities and content produced and shared through digital platforms. These initiatives leverage multimedia formats and user-generated contributions, creating spaces of cultural co-creation. As Cameron (2007) points out, digital storytelling subverts traditional top-down models of cultural narration, favoring instead an active negotiation of meaning by the community.

Within the framework of collective remembering, this democratization of digital heritage allows individuals to participate not only as passive recipients but as active creators of shared narratives, a process that Kansteiner (2002) defines as essential for intergenerational heritage transmission. This approach is further enriched by the concept of participatory ius archivi (Valacchi, 2018), which advocates for community co-creation and inclusion in the management and reinterpretation of

archival materials. According to Valacchi, active engagement in archival practices enables greater appropriation of heritage and contributes to the construction of more inclusive and dynamic collective memories. In this sense, participatory archival rights provide a means to ensure that diverse cultural narratives are adequately represented and passed on to future generations.

To structure the design of such initiatives, the activation of intangible culture can be divided into three main phases: collection, mediation, and transmission. Depending on the variables involved at each stage, appropriate tools, languages, and design strategies can be selected. This process is summarized in the following figure [Fig.1], which illustrates the active role of older adults and how they can contribute, particularly from home, to the activation and transmission of intangible cultural heritage.

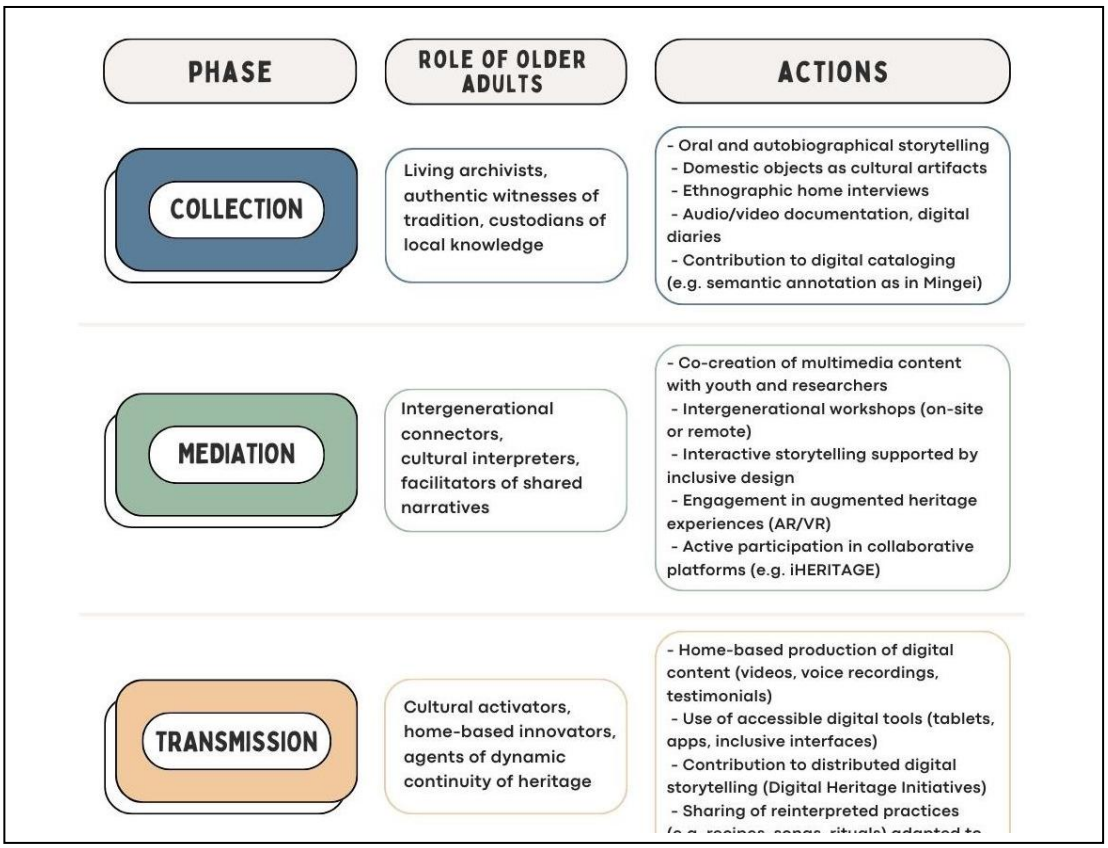

Fig. 1
Role of older adults in activating the Intangible Cultural Heritage (ICH). This diagram outlines the contribution of older adults to the three key phases of ICH activation .(collection, mediation, and transmission), emphasizing their active roles and the design-enabled tools that support participation from home. The process highlights how inclusive design transforms passive recipients into cultural protagonists.

4. Discussion

Older adults represent not only custodians of intangible cultural heritage (ICH) but also potential innovators in its transmission and reinterpretation. Their lived experience and memory, often rooted in the domestic environment, position them as central figures in the collection, mediation, and dissemination of traditional knowledge. As illustrated in figure 1, the role of older adults unfolds along a structured process in which they evolve from witnesses to mediators and, ultimately, to cultural innovators. Through design and digital technologies, older adults can be actively involved in this process, challenging and transforming the perception of their “inactivity,” a stereotype that cultural heritage has the potential to confront and overturn.

4.1 Phase 1: collection. Older adults as living archivists

Collection represents the first step toward the active preservation of intangible cultural heritage (ICH). It involves documenting practices, stories, rituals, and knowledge through both traditional methods (such as interviews and oral archives) and technological tools (including digital platforms and immersive technologies). The domestic environment often serves as a rich archive of artifacts, narratives, and practices that embody this type of heritage.

A significant example is the Mingei project[1], which brought together older artisans, researchers, designers, and digital developers in a collaborative process to document traditional craft techniques. Older adults, as bearers of practical knowledge, transmitted gestures, stories, and contextual insights through demonstrations, interviews, and narratives. These were subsequently mediated by the technical and curatorial team. Designers played a key role in the semiotic translation of the material, making it accessible in digital formats, while developers created interactive interfaces and semantic annotations (Kaplanidi et al., 2019).

The project highlighted the value of older adults as sources of knowledge and conscious cultural actors actively engaged in all phases of the collection and modeling of traditional knowledge (Zabulis et al., 2022).

4.2 Phase 2: mediation. Intergenerational connectors

Mediation is the phase in which the collected heritage is reinterpreted and made accessible to younger generations. In this stage, older adults are facilitators of shared narratives, becoming true intergenerational connectors. Through participatory design approaches (Simonsen & Robertson, 2013), they can contribute to co-creating cultural content by offering context, meaning, and interpretations of traditional knowledge.

Through interactive workshops, reciprocal interviews, or guided production of digital materials (such as audio, video, or augmented storytelling), older adults collaborate directly with younger people, designers, or cultural mediators, transforming their experience into an educational and collective resource. In these contexts, mediation is not a vertical or one-way transmission but rather a dialogical process in which listeners are invited to question, reinterpret, and actively contribute to the narrative. Design acts as a relational infrastructure, enabling physical and digital environments where generations can come together to rework and regenerate the meaning of shared heritage (Celaschi, 2008).

Contemporary technologies offer new possibilities for mediating intangible cultural heritage, facilitating intergenerational interaction, and providing access to knowledge that might otherwise be difficult to transmit. Tools such as virtual and augmented reality, interactive games, and digital storytelling enable the reinterpretation of cultural content in immersive and participatory ways. The

[1] Mingei – Representation and preservation of heritage crafts is a project funded under Horizon 2020, aimed at documenting and enhancing traditional European crafts through digital technologies. https://www.mingei-project.eu

use of 3D representations, touch-sensitive or motion-based interfaces (MoCap), and the integration of semantic data reinforce the dialogical potential of these experiences, turning cultural engagement into a co-creative process (Hou et al., 2022).

A concrete example is the iHERITAGE project[2], which involved older adults, youth, and researchers in the co-creation of digital cultural content through user-friendly interfaces and augmented reality tools. In this context, older adults served as narrative mentors, guiding the interpretation of local traditions and contributing to their contemporary reimagining (Corrao, 2023). The design of co-creative and inclusive environments enabled a distributed form of cultural mediation in which traditional knowledge is not merely transmitted but also collectively reinterpreted.

4.3 Phase 3: transmission. Elders as pioneers of cultural innovation from home

The transmission of intangible cultural heritage is not solely about preserving traditions, it is about transforming them into living, shared experiences accessible to diverse communities, including marginalized groups and individuals with physical limitations. Traditionally seen as passive conservators, older adults become innovators when they actively participate in the cultural transmission process. This transformation was particularly evident during the pandemic, when many older individuals found new ways to share their cultural heritage by using digital technologies to overcome physical and social barriers.

Active participation in knowledge transmission engages older adults in an ongoing process of learning and interaction. When an elder tells a story or shares a tradition, it is not merely a one-way transfer of information but part of a dynamic and iterative process. Listeners learn, reflect, and contribute, enriching the narrative with new interpretations, experiences, and perspectives. This reciprocal exchange fuels the transmission of heritage, strengthening interpersonal connections where past and present are interwoven into a shared flow of knowledge.

Participating in these moments makes older adults active agents, not only as keepers of knowledge but as protagonists in a living culture that evolves through intergenerational dialogue. In this process, culture is not simply preserved; it is continuously re-created and adapted, reinforcing social bonds and enriching the collective heritage.

5. Conclusions and future directions

The activation of intangible cultural heritage (ICH) through inclusive design practices offers unique opportunities to enrich the social and cultural lives of individuals, particularly older adults. This form of activation proves valuable not only for preserving cultural diversity but also for transforming how older people are perceived in society. Thanks to design, they can be recognized as co-creators of

[2] iHERITAGE – ICT Mediterranean Platform for UNESCO Cultural Heritage is a project funded by the ENI CBC MED programme. It aims to enhance the intangible cultural heritage of the Mediterranean through immersive technologies (AR/VR), digital platforms, and participatory storytelling. Older adults were involved as co-creators and cultural interpreters at various stages of the design process. More information: https://www.enicbcmed.eu/projects/iheritage

cultural meaning, a role that goes beyond their more traditional image as memory keepers or bearers of stories and traditions. Far from being “inactive” or mere recipients of cultural initiatives, older adults can become key agents in cultural creation and reinterpretation while simultaneously fostering a sense of belonging and identity. The human and cultural heritage they embody, made up of lived experiences, stories, and traditions, can provide fresh perspectives and stimulate intergenerational interaction, nurturing meaningful connections between different generations and cultural backgrounds.

Within this scenario, design and technology can play a vital role: by shaping appropriate tools and environments, it becomes possible to stimulate communication and collaboration. As demonstrated by projects such as Mingei and iHERITAGE, the thoughtful use of interactive technologies and user-centered design can transform the domestic space into a dynamic environment that promotes dialogue and mutual learning. These projects allow older adults to express their creativity and encourage them to explore and reinterpret cultural heritage in new and meaningful ways.

Looking ahead, inclusive design can become a powerful tool for social cohesion and cultural vitality, recognizing older adults as active agents of change and contributing to the development of more resilient and cohesive communities where each individual has a meaningful role (Agenda 2030, 2015, Goal 10). It is an invitation to rethink the value of lived experience and to consider intangible cultural heritage as a living, evolving element rather than a static set of traditions to be preserved.

Future developments, by way of example rather than limitation, may include:

- Experimenting with scenarios in which intangible heritage is activated through emerging technologies (e.g., generative artificial intelligence, mixed reality, decentralized cultural archives);
- Designing co-curated platforms where older adults can not only share their stories but actively participate in the selection, categorization, and reinterpretation of cultural content;
- Creating new hybrid formats (analog-digital) that enhance both physical artifacts and digital narratives;
- Transforming the home into an interactive storytelling environment, using augmented objects, voice interfaces, ambient sensors, or lightweight immersive devices to stimulate spontaneous, everyday narration;
- Developing design tools that foster ongoing intergenerational interaction, where the roles of transmitting and receiving knowledge are fluid and shared;
- Promoting a view of heritage as a relational asset, where design acts as an infrastructure of cultural citizenship, reinforcing belonging and social cohesion.

However, several barriers continue to hinder this transformation. These include a prevailing ‘youth culture’ that prioritizes innovation and novelty while overlooking the value of experience and wisdom (Harrison, 2016). Cultural stereotypes and biases persist, depicting older adults as

incapable of adapting to change, thus undermining their perceived contribution to cultural production (Gullette, 2022). In addition, a lack of opportunities for older individuals to share their knowledge, coupled with various forms of social isolation, makes their involvement more difficult. Many have not received adequate training on how to effectively share what they know or may simply never have been encouraged to do so (Carstensen, 2021).

In conclusion, the integration of intangible cultural heritage through design-driven methodologies enriches society as a whole while offering older adults the opportunity to become protagonists in shaping and narrating contemporary culture. This approach marks a significant step toward a more inclusive society, one in which every story is heard and valued.

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Heritage Landscapes – Interactions and Transition

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ABSTRACT
Landscape is a complex entity in which the tangible and intangible are intertwined in a network of dynamic interactions. Material elements, such as territories, monuments and infrastructure, are not simply static containers, but supports through which intangible values such as memory, traditions, identity and knowledge are expressed. This mutual interaction shapes a living heritage, capable of evolving over time and responding to contemporary challenges. In the context of the Anthropocene, understanding the relationship between the tangible and intangible becomes crucial to promote collective care practices that foster a balance among different ecosystem actors. Through a planet centered vision, innovative and inclusive design driven approaches, it is possible to preserve and reinterpret these connections, strengthening a sense of belonging, spreading awareness, and promoting participatory management of heritage as a cultural and symbolic ecosystem.

LANDSCAPE | CULTURAL HERITAGE | TRANSITION | PRACTICES

1. Introduction

The landscape is a privileged context for analyzing and researching the interactions existing among the different agents of an ecosystem: it is the place where contemporary hybrid ecosystems co-

evolve. At the same time, it guards tangible and intangible heritage values capable of representing memory and ecological consciousness: as it was defined by Eugenio Turri a *landscape-theater* (Turri, 1998) in which culture and nature meet and knit together. Investigating in the landscape the interrelationships present between human, artificial and environmental, delving into innovative research approaches that can pursue a vision of ecological balance represent the initial prerequisites of a research path interested in identifying new collective care practices for the Anthropocene that are able to find new ways of fruition and enhancement of natural and cultural heritage. What does it mean to analyze a landscape starting from interactions?

A first step could be the search for those landscapes that are still able to express the concept of wilderness, the desire for the wild as an anthropological category of the imaginary (Rametta, 2011). Places that characterize unprecedented, hybrid landscapes in which wilderness meets the built environment, giving rise to what is referred to as a *fourth nature* (Kowarik, Körner, 2005): a form of nature that emerges spontaneously within urban and anthropized environments, shaped by human presence yet not intentionally designed. These spaces become a fertile ground for experimentation and innovation. Carefully analyzing typologies of built and unbuilt space highlights the need to study and experiment with the interactions existing between these different typologies to record the intensity of relationships present within the artificial, human and environmental contexts and try to experiment/generate the same intensity of relationships within the generated encounter space (Metta, Olivetti, 2019).

These are often interstitial spaces that, from a *planetary garden* perspective (Clément, 2008), assume a particularly important role in the process of ecological transition. At the European level, the launching of the *Green Deal* policies and its operational declination of the *New European Bauhaus*, has set the course for European cities to follow and to be on to facilitate the process to a just transition that is able to repair the damage done in the past and create new relationships of interest for the future. In doing so, we move away from the crystallized vision of time stability to embrace a new active perspective, of socio-ecological ecosystem, a complex system where the basis is instability (Manigrasso, 2022). The hoped-for ecological transition process espouses the multidimensional morphology that territories are assuming given the constant ongoing mutations involving territories, citizens, communication and production patterns, consumption and services. Consequently, innovation processes are also increasingly conceived as open systems where different actors collaborate and interact thanks to an equally open and inclusive governance system aimed at supporting the participation of all actors, old and new, in innovation.

A second step is to recognize the fact that climate change is a major global challenge and threat affecting every aspect of our life on the planet, including World Heritage: according to IUCN's World Heritage Outlook 3, which monitors the conservation of all World Heritage natural sites published in 2020, climate change is assessed as a high or very high threat in 33 percent of World Heritage natural sites (Osipova, et al., 2020). Climate change generally affects all types of tangible and

intangible cultural heritage (Borotová, 2022). The division between tangible and intangible cultural heritage (Buonincontri, et al., 2013), as indicated by Article 2 of the relevant 2003 Convention[1], highlights the dynamic character of heritage by drawing attention to people as creators and active agents of a constantly changing and evolving culture (UNESCO, 2009). We often link the concept of heritage to the past, as a means of accessing, remembering or celebrating, but it is necessary to highlight its value as a dynamic process: heritage is about the present, lives in the present and is received, practiced and consumed today (Rodney, 2010) and as such can assume an important role in future processes of ecological transition. Reference to the intangible is not explicitly associated with natural heritage as well, but it is evident how nature can express intangible value, enshrined within the complexity of landscapes (Jakob, 2009). A complexity that sees the territory itself as complex cultural heritage where the production of value and the enhancement of territorial heritage are closely linked to both the identity factors of the territory and its community (Gaddi, 2018).

The next step is to recognize the complexity of this overlapping of interactions present in landscapes that requires innovative knowledge mediation skills; skills that design has historically assumed through its ability to explicate the relationship between functions, forms, values, and meanings (Celaschi, 2008).

The following article summarizes the initial phase of a doctoral research focused on the study of design - driven practices for ecological transition, delving into innovative approaches related to the enhancement and fruition of complex cultural heritage starting precisely from the tangible and intangible interactions present in hybrid ecosystems. This research adopts a qualitative and experimental approach, combining case study analysis, field observation, and mapping tools to investigate the interactions between human, artificial, and environmental components of the landscape. The methodology draws from design research practices and systems thinking, aiming to identify emerging patterns of collective care and spatial transformation. These tools allow for a situated understanding of landscape dynamics, supporting the formulation of context-sensitive design strategies.

[1] UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, Paris

2. Interactions

Fig. 1
Cityscape.
Bologna, spring 2024.
Credit: the Author.

To map the existing interactions between nature and culture, it is necessary to take up the approach to design brought forward by Posthuman Design (Forlano, 2016) and reconsider the relationship between nature and culture. No longer a relationship of duality, but rather an interaction in continuum, in a cooperative (Braidotti, 2013), collaborative alignment between human culture and nonhuman nature. The call to overcome the dichotomy between culture and nature is based on the idea that both dimensions are closely interconnected, forming a unique heritage that includes both cultural and natural elements. In this view, cultural heritage is not limited to monuments or works of art, but also includes natural landscapes and the environment, as their value is enriched by human interactions over time. This action delineates a new horizon of interaction with the nonhuman, namely the postnatural (Institute for Postnatural Studies, 2023), in which nature is not described in opposition to humans and in which it is recognized that the processes of which we are a part derive from humans as well as from what is not human. A vision of nature that includes within it that of culture (Bernardi, Labor, 2023), but above all a plural vision that embodies a horizontal idea of an ecosystem in which different actors move within a network of equal exchanges.

Moving beyond the centrality of the human subject means embracing a planet-centered method and vision rooted in the ecosystem concept. The dimension represented by sustainable development, which promotes environmental, social and economic well-being in an integrated way that arose with the first signs of ecological crisis in the 1960s and 1970s and was later formalized with the publication of the Bruntland Report in 1987, has seen a strong evolution since those very years. The concept of sustainability contained within the report started from a strongly anthropocentric view, paying particular attention to the issue of social justice and human needs, framing sustainability within a particularly static definition. Thanks to the productions and literature offered in the following decades by environmental movements, institutions, and the world of research, the term has increasingly taken on an environmental prerogative, recognizing this dimension as a kind of sine qua non capable of

defining the other aspects of development as well, particularly by providing necessary sources for economic and technological development (Gaziulusoy, et al., 2019). In this way, the concept has evolved from a dimension of static to a strongly more dynamic one that identifies sustainability as a goal that can respond to the growing understanding of the interdependencies between social and ecological systems.

A planet-centered vision generates an operational mode that can engage humans and nonhumans, entrusting project cultures with the responsibility of aggregating creative practices and facilitating the co-evolution of sociotechnical aspects underlying transitional phenomena (Geels, 2005). This vision shifts the focus from human-centered frameworks to a broader perspective where both human and nonhuman elements—such as ecosystems, climate, and natural processes—are seen as interconnected and co-dependent. It emphasizes a holistic approach to design, one that integrates the needs of the planet alongside those of human society, recognizing that our actions must align with the ecological limits and systems that sustain all life forms. Diversity is a key element in developing a planet centered design approach that can foster sustainable transformations guided by the idea of maintaining a socio-ecological balance. Paola Antonelli, in the introductory essay to the XXII Milan Triennale entitled Broken nature, emphasizes, through the definition of reconstituent design, the political act that design thinking assumes in a context of paradigm upheaval. A design that seeks empathy and awareness that we are also part of nature and not its masters (Antonelli, Tannir, 2019).

Foundational within this vision are the networks of relationships that are generated: value is generated from exchange. It is precisely on this concept of value that the development of ecosystem services is based (Millenium Ecosystem Assessment, 2005), a way to give economic value to the services that nature offers for free and that human activities increasingly put at risk, but that we sorely need (Metta, Olivetti, 2019). An anthropocentric concept at first glance, but one that, when delved into, leads us to recognize the value of such natural goods/services unrelated to their use; a relative value given simply by their existence. The research approach we want to build espouses the planet centered view and starts from the framework proposed by Transition Design (Irwin, 2015), trying to overlay it with the conceptual models of Responsible Innovation and Advanced Design (Formia, et al., 2023). Transition Design is also a useful process and methodology for establishing interactions, linking different types of solutions by identifying numerous tools that can support the application of Responsible Innovation in real-world contexts: co-design processes have been the most widely used to bring the principles of Responsible Research and Innovation from conceptual visions to experimentation contexts (Formia, et al., 2023). Among these, the promotion of participatory co-design practices that can promote the well-being of territories and the formation of new multi-species alliances is of paramount importance (Institute for Postnatural Studies, 2023).

The very places where these actions of relational exchange and interweaving take place today are very different from premodern community organizations, explicitly linked to the spatial dimension of

the village or neighborhood, to which members usually belonged by birthright (Manzini, 2018). Today, this type of community is joined by new types of communities that are more open, dynamic, and intentionally built around a project. More important, these modern communities exist by choice: they often arise from a need or desire that acts as a catalyst and shapes an idea to be realized collaboratively. When the goal of the community is the production of organized, quality knowledge, we speak of communities of practice (Montévil, 2024). In these communities, each member aims for continuous learning through awareness of his or her own knowledge and that of others (Wenger, 2009). Awareness is an excellent starting point: providing information, data and insights that can foster a sufficient level of understanding is essential to facilitate a participatory experience that can promote change. Change is a multidimensional process, and the transition from individual to community change is far from linear. To foster these dynamics, it is essential to offer participatory experiences based on meaningful and conscious exchanges that promote innovative and responsible collective action (Formia et al., 2023). Through these virtuous co-design processes, it is possible to include communities in the enhancement of tangible and intangible cultural heritage, fostering territorial innovation centered precisely on community processes.

We have already anticipated the theme of landscape/territory as a form of complex cultural heritage in which to find aspects of identity and value for the communities that pass through it, live in it. It is also an interesting aspect to analyze the representative tools that can illustrate this network of interactions, visible and invisible, that are established within the landscape. Among these, it is worth mentioning the tool of community maps, born in England in the early 1980s under the name of Parrish Maps (Bianchetti, 2013). These are maps built with the active participation of the population and serve to represent the heritage, tangible and intangible to which the community attaches value, with the aim of strengthening local identity and as an active and dynamic working tool for planning future transformations. They are temporally dynamic representations, where the tangible and intangible are layered, capable of containing traces of a widespread heritage and able to dialogue with those who consult them (Bolletti, 2022). A permanent and always updatable archive that includes memories, often collective ones, actions and relationships, values and facts that are often closer to the actors of the territory than to the geography itself (Magnaghi, 2010). This is only one of several existing tools capable of narrating important and identity-related aspects of a territory, such as collective memory, and that can represent and translate the visible and invisible stratifications of systems of interactions hidden in a landscape. Collective memory through responsible and innovative curation practices can promote greater environmental and cultural awareness (Succini, et al., 2021), similarly the analysis of the tangible and intangible interactions existing between the different actors in a landscape, thanks to a design-driven approach, can become a tool/agent for change.

3. Practices

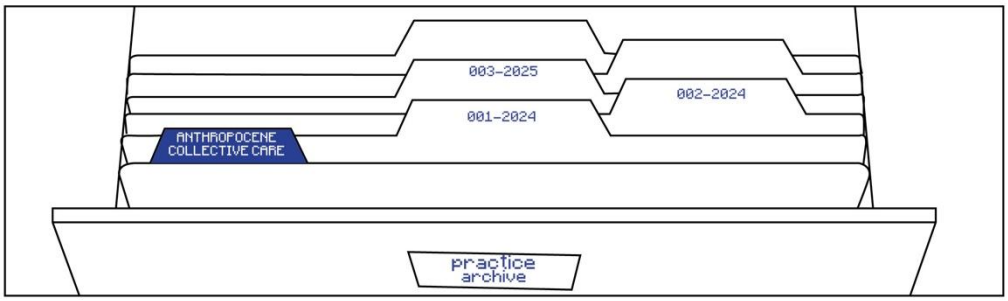

Fig. 2
Archive of projects. Anthropocene section. Credit: the Author.

Building on this conceptual foundation, the following section explores how these principles of planetary design can be translated into real-world practices. Through the examination of experimental case studies, we will see how the theoretical ideas discussed earlier are being put into practice.

The following experimentations of practices are the result of project processes, the first concluded, the second and third still ongoing, related to the theme of ecological transition, responsible and sustainable choices, and climate change adaptation measures. These practices emerge from the analysis of interactions between tangible and intangible elements, focusing particularly on cultural productions (such as exhibitions, festivals, and workshops) as tools for promoting awareness and collecting data. The aim is to harness these cultural tools to make the practices not only agents of change but also vehicles for engagement and collective action. By emphasizing the use of these cultural platforms, the practices encourage a high level of audience interaction and participation, thereby fostering a greater sense of ownership and responsibility for ecological issues. They are systematized and synthesized into cards, useful for cataloging and future creation of an archive. Archiving becomes an action to systematize and promote enabling processes. In fact, the proposed experiments of practices aim to define conscious design guidelines, evaluating what to archive, what to eliminate and what to enhance, to maximize the positive impact on communities and the environment in favor of collective care practices for the Anthropocene. The archive, from this point of view, is not merely reduced to a container of memories/memories, but is transformed into an organic, almost living tool, capable of changing and growing together with the communities that interrogate and nurture it.

4. Final remarks

Expressing the awareness that the climate crisis we are experiencing, characterized by its strong impacts and consequences, is changing and redrawing the geography of risks in our territories (Manigrasso, 2022) allows us to define a new approach to design, which makes adaptability an

001–2024

TITLE: SCEGLILO SFUSO O RICICLABILE_Experience
TYPE: Exhibition
DATE: May 17–18_2024
LOCATION: Milan_Italy
KEYWORDS: circularity_packaging_experience_responsibility, sustainability

DESCRIPTION: Project curated by Altroconsumo on the theme of packaging and responsible consumer choices involved the Advanced Design Unit, Archeoplastica, and the studio il Vespaio. An interactive exhibition at the spaces of the Milan Triennale to engage visitors in stimulating experiences and practices capable of generating reflections on the themes of waste, the end of life of objects and responsible choices. The collaboration realized with Archeoplastica provides the starting point to witness how musealization practices are assimilated to the idea of "living archives" whose goal is to document and enhance forms of collective care for the Anthropocene.

TOOLS:
_Qualitative and quantitative data collection
_Starting from individual experience to define collective practices
_Exposure as a tool for bringing individual and collective experiences to life

Fig. 3
Case 001–2024. Credit: the Author.

002–2024

TITLE: CULT-UP Upcycling and Cultural Heritage
TYPE: Workshop
DATE: March 2024_Ongoing
LOCATION: Bologna_Turin
KEYWORDS: reuse_end of life_circularity_memory_archive

DESCRIPTION: CULT-UP is a project that promotes upcycling as a form of cultural enhancement, focusing on waste such as plastic and textiles. It aims to create critical reflection on waste management by collecting best practices and proposing upcycling strategies and benefits to stakeholders through a "white paper." The practice focuses on creating moments of interaction and co-design with different audiences to test dynamic digital archiving modes based on the concept of collective memory

TOOLS:
_Identify creative and responsible upcycling techniques
_Define the architecture of a shared archive
_Identify forms of evolution related to the concept of waste-patrimony and linked to collective memory

Fig. 4
Case 002–2024. Credit: the Author.

003-2025

TITLE: Po River Blue Fest
TYPE: Festival
DATE: May 16_17_2025
LOCATION: Bologna_Ravenna
KEYWORDS: water_excess_climate_heritage_culture

DESCRIPTION: The first edition of the Po River Blue Fest is one of the actions of a complex multi-target awareness campaign on the issues of river landscapes and climate change. Embedded within the Life Climax Po project, the festival presents itself as an opportunity to build a co-design pathway with local stakeholders belonging to different cultural and creative industries to promote processes of raising awareness of climate issues using cultural productions as a medium and to present project progress data in a widespread way.

TOOLS:
_Multi target awarness campaign
_Co-design processes
_Investigate the relationship between the world of Cultural and Creative Industries, adaptation measures and the enhancement of territories
_Create a dynamic observatory on the relationship between landscape and cultural productions.

Fig. 5
Case 003–2025. Credit: the Author.

increasingly essential variable. Adaptation measures do not cure the causes of climate change, but are concerned with curing the symptoms, with making our territories fit for the many changes to which climate change is forcing us: an adaptive design approach serves to anticipate change.
This study focuses on exploring the dynamic interactions between tangible and intangible heritage, and how these can be harnessed to strengthen community-driven adaptation processes. It aims to delve into how innovative hybrid ecosystems within landscapes can promote multi-species alliances and sustainable coexistence, proposing new design strategies to foster interdisciplinary collaboration between cultural, environmental, and social systems.
When we talk about adaptation, the themes of uncertainty, the temporal dimension, the tangible and the intangible turn out to be particularly important aspects offering a new meaning to design actions (Manigrasso, 2022). Adaptation to climate change forces us to revise the linear dimension of time to embrace a perspective of strongly evolving scenarios. The time horizon opens identifying a multifaceted, multidirectional and no recursive conception of time (Manigrasso, 2022). This perspective determines an increasingly open system, which tries to relate problems and solutions, policy makers, technicians, with the intention of anticipating the evolving context and being prepared for unexpected events. Cultural heritage if enhanced in innovative ways can also contribute to strengthening resilience, promote adaptation actions, support transitions to sustainable development, and stimulate social awareness and encourage participation (UAEU, 2021).

Emphasizing that spreading awareness is itself a measure of adaptation gives us the opportunity to enhance co-evolutionary interactions among different actors in hybrid ecosystems and archive useful data to make these interactions the subject of new practices and actions for change. However, concrete common measures that recognize tangible and intangible heritage as having this transformative power are still lacking. Investigating the scenarios offered by cultural heritage, in light of the reformulation of the culture-nature dualism, would allow its unexpressed potential to emerge and be exploited, for example, by unearthing in landscapes a privileged place for the creation of communities of practice that foster the exchange of interactions, the diffusion of awareness, imagining a new multi-species alliance capable of promoting unusual forms of co-inhabitation and co-existence between human, artificial and natural.

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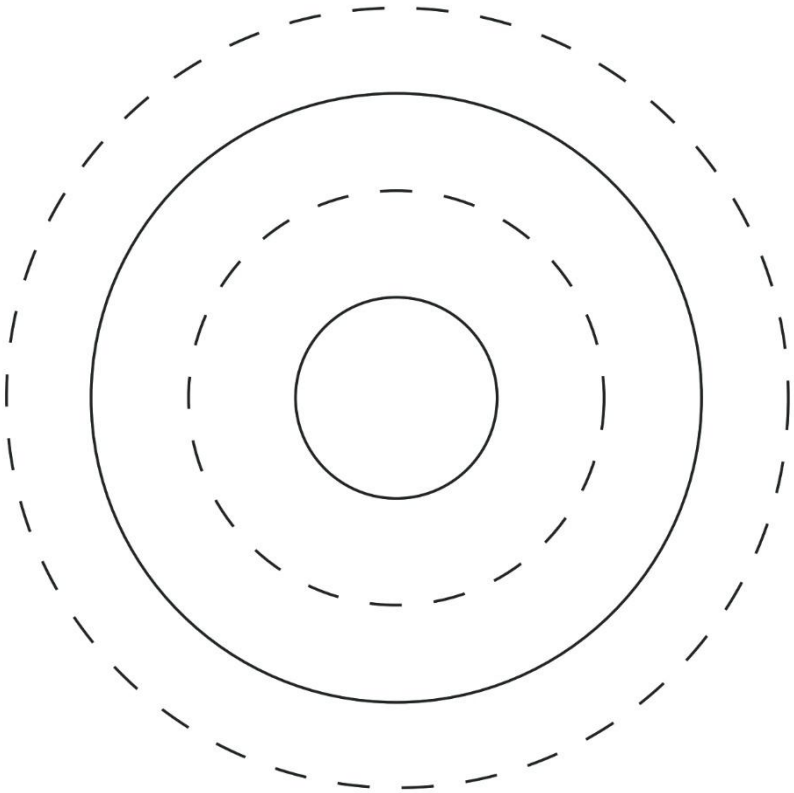
[In]tangible projects



[In]tangible projects

In contemporary cities, the boundaries between tangible and intangible, visible and invisible, physical and abstract are increasingly blurred, creating a continuum of interactions between individuals, society, and urban space. [In]tangible proposes a research framework that embraces this grey zone, where architecture operates both as a tool for interpreting current dynamics and as a catalyst for transformation. Specifically, [In]tangible projects highlights how unbuilt or theoretical architectural proposals have contributed to the evolution of the architectural and urban discourse, influencing real environments despite remaining unconstructed. In this perspective, representation and drawing become critical tools for envisioning alternative scenarios, understanding transformations, and reclaiming the role of architecture as a form of knowledge capable of critiquing and reshaping the spaces where we live.

Taken together, the four contributions by Traeger and Delli Ponti, Skerl, Lucchi, and Veronese all articulate a shared concern with the role of architectural and urban design that operate beyond immediate materialization, yet actively shape spatial, political, and environmental realities. While approaching different scales, contexts, methods, and disciplinary fields, the papers explore how unrealized projects continue to inform the contemporary design discourse and act as catalysts for reimagining the city. They interrogate the tension between the intangible and the tangible, though they do so from markedly different positions. Rather than treating unbuilt or speculative projects as autonomous exercises, the contributions emphasize their embeddedness within existing territorial, cultural, institutional, and ecological frameworks. In this sense, intangibility is not opposed to reality, instead it becomes a mode of engaging it critically.

In their contribution *Exploring the Seasteading Hypothesis: a Floating utopia for the Techno-solutionist age?*, Isabella Traeger and Alessandro Delli Ponti identify water as the generative matrix of a speculative field oriented toward alternative futures, complex imaginaries, as well as utopian and dystopian scenarios. Within this perspective, the sea operates as “a seemingly frictionless and bountiful medium”, capable of hosting experimental forms of thought and design. Water and its qualities thus become both tangible and intangible tools capable of informing the project, enabling the exploration of alternative modes of urbanization in response to the contemporary condition of polycrisis.

Traeger and Delli Ponti focus on the Seasteading movement as a specific evolution of marine utopianism. They frame it as the convergence of anarchic secessionist ideologies and floating-city models, configurating in offshore micro-realities strongly shaped by techno-solutionist imaginaries. At the same time, they echo the legacy of both Japanese Metabolist experiments of the 1970s as well as anarcho-secessionist practices, albeit in a significantly transformed and often distorted form.

According to the authors, under the rhetoric of “alternative realities”, the Seastanding experimentations reproduce an extractivist logic in which the marine environment is reduced to a new surface for urbanization. This process unfolds through highly selective and fragmented operations of spatial and social parcelization where access is limited, and economic costs are prohibitive. The sea is thus conceived

through a functionalist lens, as a territory to be colonized to evade the crises of the contemporary world. Rather than addressing these conditions, the project displaces them elsewhere. Even more urban-oriented proposals, such as those advanced by BIG and OCEANIX, remain embedded in a similar narrative. They promote a form of escapism from land-based civilization which implicitly normalizes a condition of permanent catastrophe on land. Habitability is confined to isolated and supposedly secure enclaves, surrounded by an inhospitable outside.

The work of Traeger and Delli Ponti therefore invites a critical reassessment of how architecture engages with both water and the state of contemporary crisis. It calls for models of coexistence that move beyond escapist and extractive paradigms. Such models should confront the realities of the present more directly, while critically reworking the lessons of past speculative and experimental visions.

As Francesco Lucchi observes in his contribution *The Possible Milan of Giuseppe De Finetti*, De Finetti's work offers a concrete way of reflecting both the tangible and intangible dimensions of urban space. His projects reveal a deliberate relationship with the built environment, guided by a clear intention: the construction and transformation of the city. Many of his proposals engage directly with existing parts of Milan, demonstrating an active dialogue with the consolidated urban fabric and exploring how renovation and transformation can become tools for rethinking the city.

Thanks to Lucchi's original analyses and drawings, this attitude is visible in several of his transformation schemes, from the redesign of Fontana and Beccaria squares to the proposal La strada Lombarda, where classical compositional logic meets the functional requirements of the contemporary city. De Finetti's proposal reimagines an existing urban block by introducing a new east–west train line beneath it and reorganizing the public space above through a system of streets, courtyards, and squares. The project reflects his recurring strategy of reconnecting Milan through direct, linear routes that pass through the city's core, diverging from administrative plans when necessary to restore urban continuity. While the overall composition remains modern in intent, specific collective spaces incorporate explicit references to classical architecture, demonstrating how historical forms are used as tools to articulate a contemporary urban vision.

As Lucchi observes, the project for the Arena Civica and its surroundings reveals De Finetti's attempt to bind architecture and public space to infrastructural systems, constructing a connective tissue between the historical city and its future development.

De Finetti envisions this project as an opportunity to address what he considers as an unresolved area of the city, using the renovation of the stadium as a catalyst for broader urban reform. The stadium becomes a pretext for reimagining the surrounding district, introducing a larger urban reorganization centered on new public spaces. Taken as a whole, these proposals outline an urban vision where theoretical speculation becomes an operative tool, offering design strategies that negotiate between historical continuity and modern urban needs.

According to Ursula Skerl's *Imaginations: Public Good is Uberarchitecture*, utopias have often operated within an intangible dimension, suspended between project and vision, generating lasting and tangible effects despite remaining unbuilt. Such proposals have addressed the city as a global system, challenging conventional distinctions between public and private, natural and artificial, local and global. Within these experiences, architecture emerges as a critical

instrument able to act on the conditions of space possibility rather than on its immediate formal outcome. The intangibility of the project thus becomes an operative condition through which the invisible structures governing territory – often preceding and shaping any material transformation – are rendered visible.
Building on this legacy, Skerl's contribution examines a series of projects that engage the theme of large-scale urban visions through a universalist ambition, while confronting the concrete constraints that have historically limited their implementation. These projects envision planetary cities, continuous infrastructures, and new forms of collective life. In doing so, they reveal the megastructures produced by legal and administrative frameworks that organize space and determine the development and fate of territories. Through the mapping of infrastructures, land, and regimes of access, a latent territorial continuity comes into view, grounded in spaces oriented toward common use and withdrawn from the logic of property. Utopia is thus reconfigured as an intangible yet situated project, capable of both operating from within existing structures and transforming control instruments into tools for imagining new forms of shared spaces.
Starting from the utopian proposals for the urban countryside developed by the French landscape architect Pierre Donadieu, and from a critical analysis of selected theoretical, methodological, and design-related elements, Emma Veronese's contribution *An Interdisciplinary Model for the Next Nature-based City* explores the possibility of outlining an intervention model capable of integrating theoretical and applied dimensions, thereby linking the tangible and intangible aspects of the urban and design realm. The overarching aim is to stimulate a dialogue on potential future scenarios for urban projects within a context increasingly shaped by profound ecological and social crises. In particular, the paper focuses on the growing frequency and intensity of hydrogeological instability affecting the European territory, with reference to the recent flood events and landslides.
The contribution adopts a deliberately interdisciplinary perspective, integrating insights from urban planning, landscape architecture, geography, environmental sciences, and social sciences, based on the assumption that the complexity of these phenomena cannot be adequately addressed through sectorial approaches. Within this framework, the agro-urban landscape is interpreted as a strategic infrastructure capable of reorganizing the relationship between the natural environment and the settlement system, placing soil and its permeability at the core of climate change mitigation policies and resource management strategies, particularly regarding water.
The paper draws on the comparative analysis of significant case studies, including the Continuous Productive Urban Landscape model, to assess the transferability and adaptability of the proposed theoretical principles to real-world contexts. Through the comparison of utopian visions, design practices, and concrete territorial conditions, the research provides operational insights for a sustainable reorganization of the European landscape, capable of responding to current environmental emergencies while simultaneously promoting new forms of balance between city, countryside, and society.
The four contributions gathered in this section investigate the intersection between intangible practices related to architectural and urban design – such as theoretical frameworks, cultural narratives, and methodological approaches – and their capacity to structure, mediate, and inform material transformations of space. Rather than treating abstraction and speculation as autonomous domains, the papers examine how these practices are received, negotiated, and translated into

operative frameworks that shape spatial strategies, design processes, and territorial transformations.
By analyzing this interplay between immaterial constructs and their material outcomes, the four contributions emphasize the project's role as a form of knowledge capable of acting on the conditions of spatial production. In this perspective, [In]tangible projects foster a deeper understanding of the mechanisms through which urban and architectural theory is operationalized, ultimately contributing to the development of more informed, responsive, and context-sensitive approaches to contemporary challenges.

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A catalog in the shape of a map. Piranesi's and the Campus Martius

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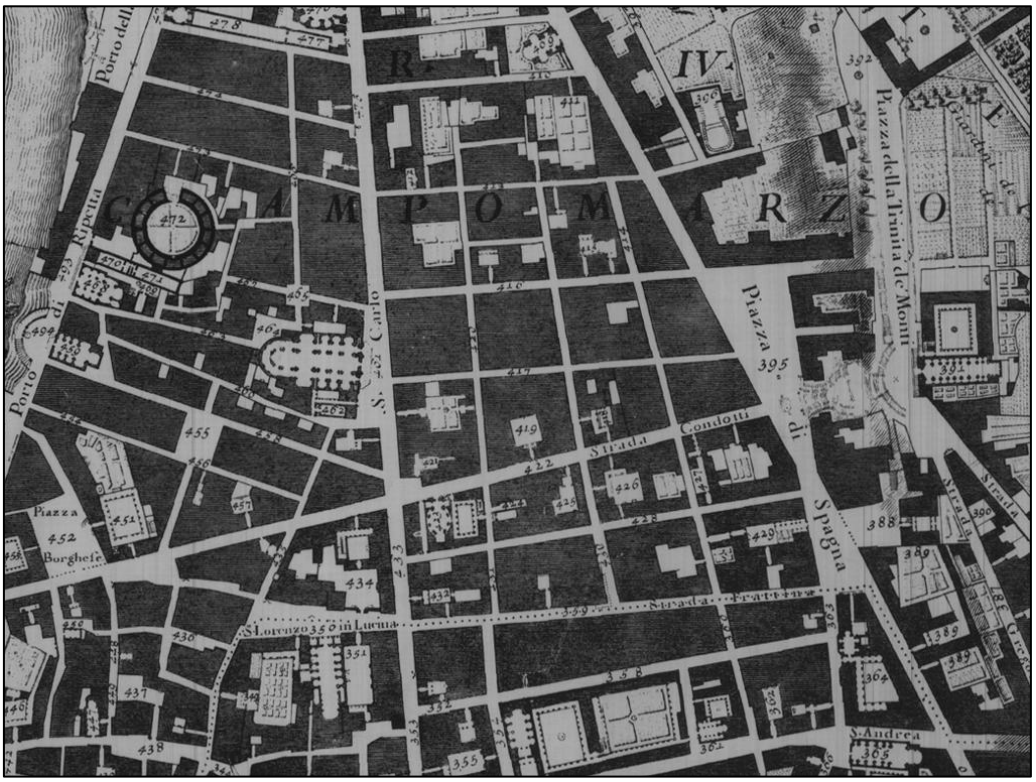
Upon its initial publication in the early months of 1762, the *Ichnographia Campi Martii Antiquae Urbis* was construed as a work of fantasy. The first to do so was Charles Joseph Natoire, director of the French Academy in Rome, who on April 7 of the same year wrote to the Marquis de Marigny that Giovanni Battista Piranesi (1720-1778) "works within imaginary spaces." The impression that this plan is a work of invention persists in almost all those who have studied it, perhaps also due to its undeniable allure. It is usually interpreted as the megalomaniacal and hallucinatory exercise of a melancholic mind, and even today the most renowned interpretations, including those by Manfredo Tafuri and Pier Vittorio Aureli, view the *Campus Martius* as a compulsive accumulation of fragments or an exercise in the realm of invention of forms devoid of any respite. Piranesi himself is aware that the proposed reconstructions may seem "invented at whim (inventate a capriccio)," and to preempt this criticism, in the dedication of the work, he warns the reader that he has worked "with solid foundation and reasonable conjecture (con sodo fondamento e con ragionevole congettura)," although few will try to believe him. Subsequently, an attempt is made to understand what he might have meant when he reiterated that this map is the result of passionate, profound, and meticulous study of Roman antiquities.

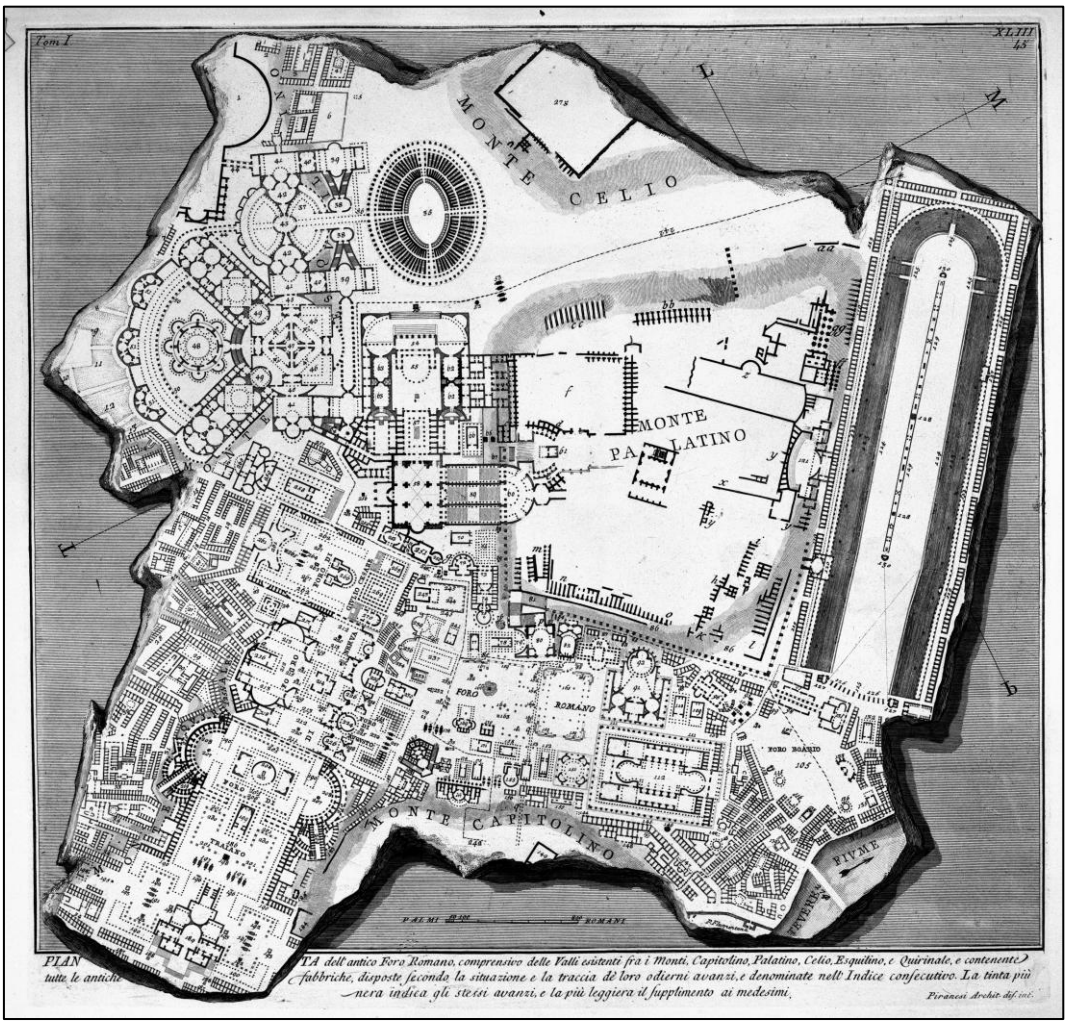
The idea of creating a topographic plan of ancient Rome can be traced back to Leon Battista Alberti or Raphael Sanzio and recurs several times thereafter. It certainly undergoes an acceleration with the topographic work carried out by Giovanni Battista Nolli between 1736 and 1748. Piranesi, who arrived in Rome at the end of 1740, immediately began collaborating with Nolli and perhaps followed his attempt to create a plan of ancient Rome that also integrated the famous Severan Marble Plan. This plan of ancient Rome, although announced in 1743, will never see the light of day, and in 1748 Nolli will publish the *Nuova Pianta di Roma* where, along with the Rome of the time, he also represents the ancient ruins, sometimes integrating them with reconstructions not always precise [Img. 1].



Img. 1
G. B. Nolli, Nuova Pianta di Roma, Roma, 1748, detail

Piranesi seems not to abandon this idea. The volumes entitled *Le Antichità Romane*, which he works on in the following years, seem to prepare him for this objective. In this publication, one finds not only meticulous reconstructions of views of the principal surviving monuments. Within *Le Antichità Romane* he presented not only a map of the *Campus Martius* depicting the few surviving ruins (Antichità Romane, vol. I, II), but also a reconstruction of the layout of the urban aqueducts derived from a close study of Frontinus' treatise (Antichità Romane, vol. I, tav. XXXVIII), that is a necessary starting point for a more precise reconstruction of the topography of the ancient city (Wilton-Ely 2008). Moreover, at the conclusion of the publication, Piranesi included a reconstruction of the Roman Forum in which the extant ruins are rendered in black, while the portions of the buildings integrated by Piranesi himself appear in grey (Antichità Romane, vol. I, tav. XLII, Img. 2). This represents a genuinely archaeological attempt to reconstitute the form of the ancient city and the most interesting precedent for the work at the *Campus Martius*.

In *Le Antichità Romane* (1756) Piranesi also announced a forthcoming map of ancient Rome. Although this project ultimately remained unrealized, the announcement indicates that work on such an undertaking was already at an advanced stage.

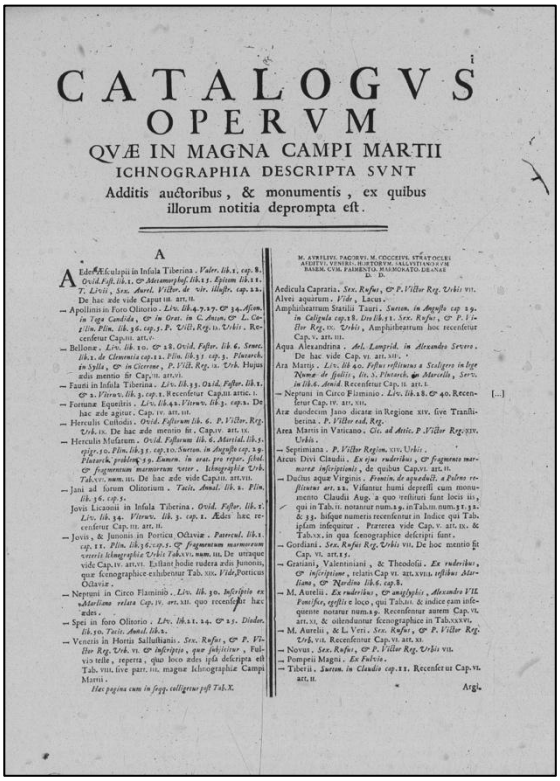


Img. 2
G. B. Piranesi, Le Antichità Romane, vol. I, tav. XLII, Roma, 1784.

An important impetus for creating a map of ancient Rome came from the Scottish architect Robert Adam, who arrived in Rome in 1755 and by June of the same year could already claim to have become an intimate friend of Piranesi. Their friendship seems to stem from a passion “very similar, indeed twin (somigliantissima, anzi gemella)” for Roman antiquities, as reported in the dedication of the volume, and reinforced by the contemporary trend which was instead leaning towards Greek classicism. During their meetings, Piranesi spoke to Adam about the idea of creating a map of ancient Rome and was encouraged by him to undertake this venture, perhaps even with mutual benefit. In 1757, perhaps recognising the challenge of creating a map of the entire city of Rome, Piranesi decided to scale back his objectives and shift his attention to *Campus Martius*. The *Ichnographia* of the *Campus Martius* was published in 1762 and, as a sign of continuity with the project of a map of the whole ancient Rome, it retained the dedication to Robert Adam. This dedication was notably very unusual, as it was more common to dadicate such works to a patron rather than to a fellow architect. The choice of the *Campus Martius* is only apparently senseless because, although ancient remains are less frequent in this area of Rome, there is a concentration of buildings and monuments that are described or mentioned in classical texts. This choice takes on meaning or not depending on the type of archaeological source one refers to, whether to stones or to words. The nascent archaeology of the time had not yet taken the path it would later embark on,

and the words of ancient authors retained high documentary value, also because they did not require expensive excavation campaigns. When, during the Roman Empire, the *Campus Martius* ended its function of housing the roman militias, the area was transformed into a large monumental space to showcase imperial power and to offer parks and gardens for communal use. This programme was so majestic that the *Campus Martius* no longer seemed like a part of Rome; rather, Rome itself became a part of the *Campus Martius*, if we believe to Livy and Strabo as Piranesi did. The *Ichnographia* of the *Campus Martius*, on which Piranesi worked from 1757 to 1762, seems guided by an objective different from that of many other preceding or subsequent maps: it does not aim so much to restore the material ruins of antiquity, which are less frequent in this area, but rather to compose in a comprehensive and unified image the enormous quantity of monuments and buildings mentioned by classical authors, precisely and meticulously arranged by Piranesi and by those who assisted him in compiling the impressive catalogue [fig. 3]. It might even be said that the catalogue does not constitute the caption to the *Ichnographia*; if anything, the opposite is true: the *Ichnographia* produces a unified visual image allowing to understand at a glance the quantity of works that, according to the sources quoted in the catalogue, had to find a place in this part of Rome.

The name and number of the buildings are attested by written sources. The area of the city is delimited by the surrounding hills, and indeed is interpreted to its maximum extent. Certainly, the form of the buildings cannot be reconstructed except from the tiniest remaining fragments, but “with reasonable conjecture,” Piranesi can, or rather must, fit into this part of the city all the monuments attested for this area. It is possible that the depicted architectures may seem “invented at whim,” or distant from the “ancient manner of architecture,” or close to “the custom of our times,” but in the dedication of the volume, Piranesi rhetorically questions whether they are indeed more extravagant than what is observed in Villa Adriana in Tivoli, in the baths, and in the tombs outside Porta Capena. The *Ichnographia* is fundamentally a verification of the physical possibility of coexisting in the *Campus Martius* area all the works cited by ancient writers (Marletta 2016).



CATALOGVS
OPERVM
QVÆ IN MAGNA CAMPI MARTII
ICHNOGRAPHIA DESCRIPTA SVNT
Additis auctoribus, & monumentis, ex quibus
illorum notitia deprompta est.

A

Aedicula Capraria. *Sex. Rufus, & P. Victor Reg. Urbis* VII.
Alvei aquarum. *Vide*, Lacus.
Amphitheatrum Statilii Tauri. *Sueton. in Augusto* cap. 29. *in Caligula* cap. 18. *Dio lib.* 51. *Sex. Rufus*, & *P. Victor Reg.* VI. *Urbis*, Amphitheatrum hoc recenseur Cap. V. art. III.
Aqua Alexandrina. *Ael. Lamprid. in Alexandro Severo*. De hac vide Cap. VI. art. VII.
Ara Martis. *Liv. lib* 40. *Festus restituus a Scaliger in lege Numæ de spolis, lib.* 5. *Plutarch. in Marcello*, *Serv. in lib.* 8. *Aenid.* Recenseur Cap. II. art. I.
— Neptuni in Circo Flaminio. *Liv. lib.* 28. & 40. Recenseur Cap. IV. art. VII.
Ara duodecim Jano dicata in Regione XIV. five Transtiberina. *P. Victor ead. Reg.*
Area Martis in Vaticano. *Cic. ad Attic. P. Victor Reg.* XIV. *Urbis*.
— Septimiana. *P. Victor Region.* XIV. *Urbis*.
Arcus Divi Claudii. *Ex ejus ruderibus*, & *fragmentis marmoreis inscriptionis*, de quibus Cap. VI. art. II.
— Dacius aquæ Virginis. *Frontin. de aquaeduct. a Palma restituus* art. 22. Visuntur humi depressi cum monumento Claudii Aug. a quo restituti sunt locis iis, qui in Tab. II. notantur num. 29. in Tab. III. num. 31. 32. & 33. hisque numeris recenseuntur in Indice qui Tab. ipsam insequitur. Praeterea vide Cap. V. art. IX. & Tab. XX. in qua scenographice descripti sunt.
— Gordiani. *Sex. Rufus Reg. Urbis* VII. De hoc mentio fit Cap. VI. art. II.
— Gratiani, Valentiniani, & Theodosii. *Ex ruderibus*, & *inscriptione*, relatis Cap. VI. art. XVII. *restituus Martiano*, & *Nardino lib.* 6. *cap.* 8.
— M. Aurelii. *Ex ruderibus*, & *antiquitatibus*, *Alexandro VII. Pontifice*, *restituus loco*, qui Tab. VI. & indice eam insequente notatur num. 29. Recenseuntur autem Cap. VI. art. XI. & ostendunur scenographice in Tab. XXV.
— M. Aurelii, & L. Veri. *Sex. Rufus*, & *P. Victor Reg. Urbis* VII. Recenseuur Cap. VI. art. XI.
— Novus. *Sex. Rufus*, & *P. Victor Reg. Urbis* VII.
— Pompeii Magni. *Ex Pulvis*.
— Tiberii. *Sueton. in Claudio cap.* 21. Recenseur Cap. VI. art. II.

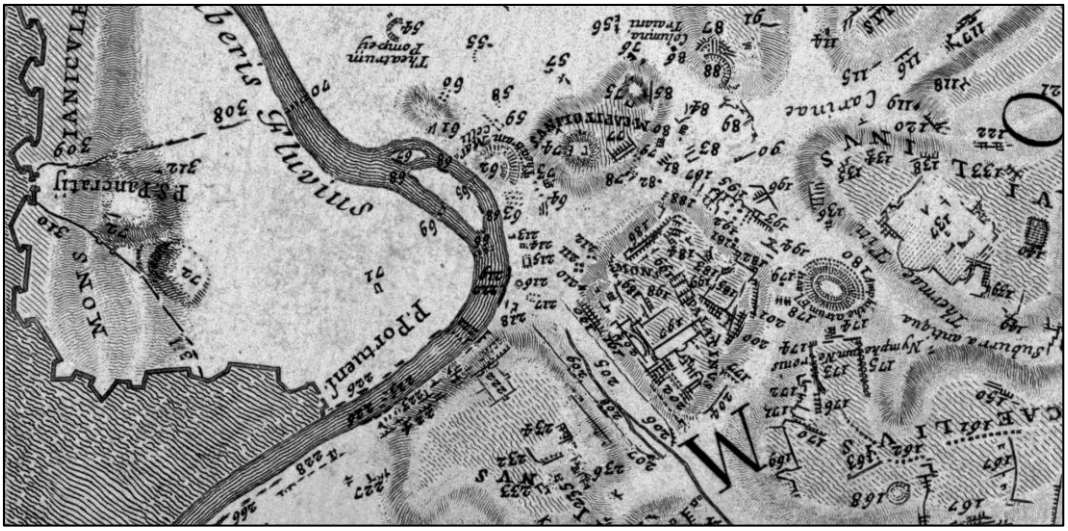
Argi.

Img. 3
G. B. Piranesi, "Catalogus operum quae in magna Campi Martii ichnographia descripta sunt", in Campus Martius Antiquae Urbis, Roma, 1762.

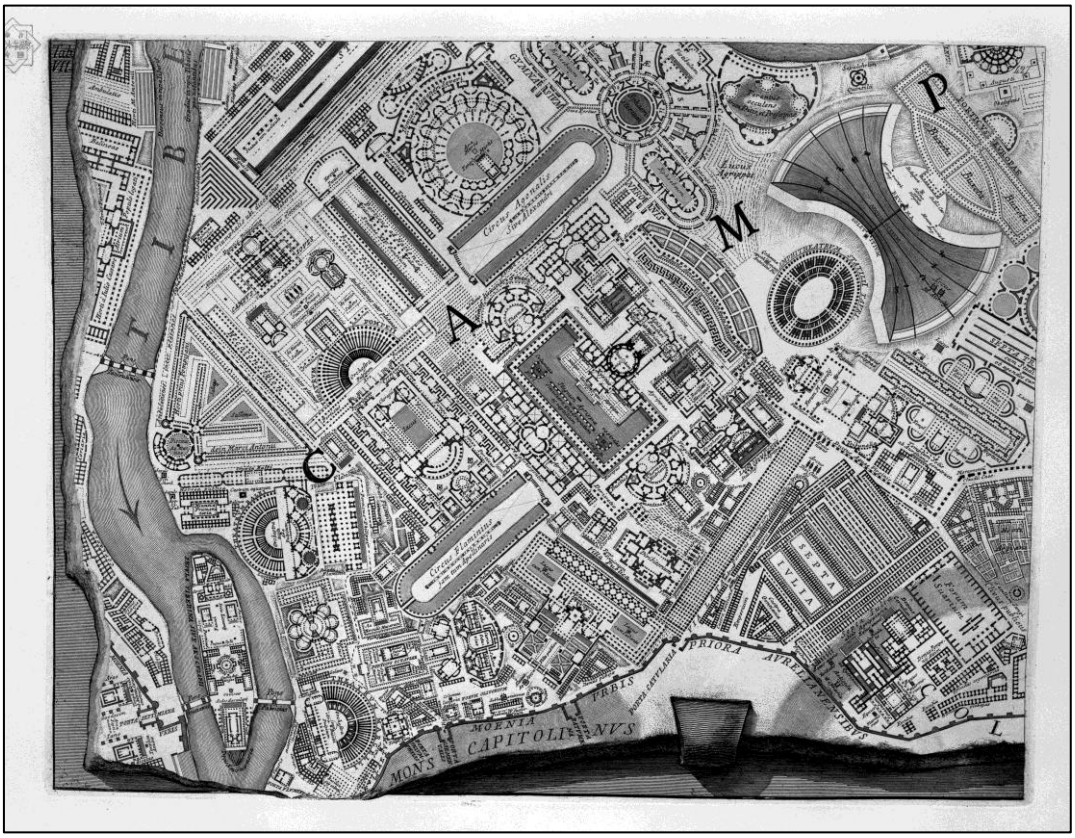
The necessity of integrating literary information, that derived from the few surviving remains, and many of the fragments of the Severan Marble Plan, leads Piranesi to make some forced interpretations. The most obvious is certainly the elimination of the layout of *Via del Corso* (Connors 2012), but - even in the face of errors that appear gross today - it is necessary to recognize a great precision in placing many of the monuments represented on the map, to the point that there are not infrequent cases in which it proves to be substantially correct (Connors 2012, Marletta 2016).

In the volume titled *Campus Martius Antiquae Urbis* of 1762, the catalogue of works is published, along with the *Ichnographia*, in both Italian and Latin versions. Here alongside is reproduced the catalogue in Latin titled: *Catalogus operum quae in magna Campi Martii ichnographia descripta sunt, additis auctoribus, & monumentis, ex quibus illorum notitia deprompta est*. Next to each architectural work mentioned, Piranesi indicates the names of the authors and the texts in which they are mentioned. In the same volume, another map of Rome appears, the *Topographia vestigiorum veteris Urbis et Campi Martii* (Table III, Img. 4), usually overlooked in favor of the more impressive *Ichnographia*. Those who criticize Piranesi's lack of archaeological accuracy should perhaps read the entire volume on the *Campus Martius* more carefully. In fact, the *Topographia* is precisely the archaeological map advocated by many critics, where the ruins and remnants of ancient Roman architecture are accurately indicated, accompanied here as well by an index of denominations, the *Index ruinarum Romae veteris et Campi Martii*. Despite the archaeological accuracy of this map, or perhaps precisely because of it, it is evident that it would not be possible to reconstruct a comprehensive map of ancient Rome based on such scant information. Starting from this path more attentive to the still-existing stones, Piranesi will publish in 1774 the *Pianta di Roma e del Campo*

*Ma*rzio [Img. 5]. In it, he will develop the work outlined in the *Topographia* by placing the ancient ruins, like Nolli, within the context of the modern city (Bevilacqua 2024). The *Ichnographia*, on the other hand, followed a different path, as its purpose was to provide a comprehensive, albeit hypothetical, image of how a portion of ancient Rome might have appeared.



Img. 4
G. B. Piranesi, "Topographia vestigiorum veteris Urbis et Campi Martii", in Campus Martius Antiquae Urbis, Roma, 1762, detail.



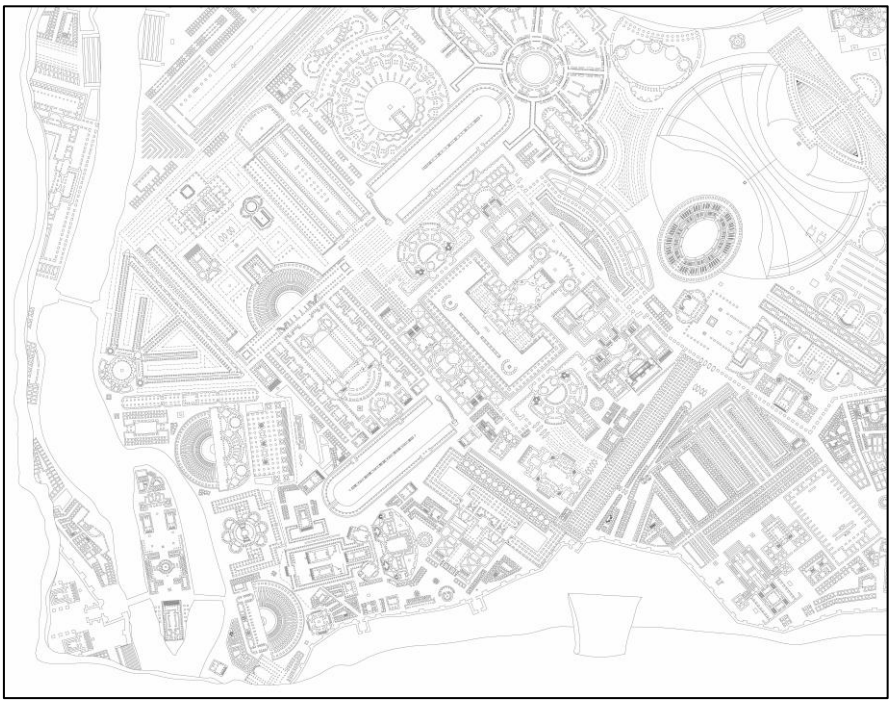
Img. 5
G. B. Piranesi, Campus Martius Antiquae Urbis, tav. VII, Roma, 1762, detail.

The idea of a comprehensive map probably derives from the impression that the view of the fragments of the old Severan Marble Plan must have produced. Even though the reassembly of these fragments remains an unachieved goal to this day, the very idea of a map of the entire city of Rome, sectioned at ground level, could not fail to fascinate.

Indeed, such a depiction of a city sectioned at ground level is quite rare in the history of architectural representation, although it seems that no one has noticed this aspect. A common thread could link together those works that have adopted this specific type of drawing: the Severan Marble Plan, the plan of the *Campus Martius*, and the plans of the cities of Venice and Rome published by Saverio Muratori in 1960 and 1963. The Severan plan distinguishes between simpler buildings, where the walls are drawn with a single line, and more complex buildings, where the thickness of the walls is represented. Piranesi depicts all structures in the same manner: the walls are always drawn with a double line, with no distinction between monumental structures and simpler urban structures (though rare, they are present in the map). In Piranesi each building contributes to the magnificence of the city. Muratori follows Piranesi's more accurate example. Yet, in his theoretical work, he seems to adopt from the Severan plan the distinction between 'basic building' and 'special building', which he places at the foundation of his work on the city. The relationship between these three representations of the city, although interesting, would deserve a more extensive discussion and cannot be fully explored in this short essay.

The *Ichnographia* is etched on 6 different plates and published in the volume on the *Campus Martius* from plate V to plate X. The overall measurement of the six adjoining plates is approximately 145 x 158.5 cm. In the top left corner, the graphic scale in Roman palms, *Regula Palmorum*, is indicated, while from the print, it can be deduced that the scale of representation is 1:2,500. In order to frame the *Campus Martius* better, the map is rotated 45 degrees relative to the north-south axis, so that the vertical is facing northwest. The name 'ichnographia' derives from Vitruvius, who used it to indicate the plan as a horizontal section of a building.

By examining each building, one can verify how much of the Ichnographia was invented by Piranesi and how much is the result of an archaeological–or otherwise 'scientific'–approach [Img. 6]. Of the 433 buildings drawn in the table, 271 appear in the catalogue, while only 162 are not present in it.The out-of-scale map reproduced here alongside depicts all 162 of these buildings. However, a notable 132 of them, despite not appearing in the catalogue, are named on the map: among them are also those buildings indicated by a generic denomination within the catalogue, such as the 39 tombs of illustrious men, *Sepulchrum Virorum Illustrium*, whose specific names are indicated only in the *Ichnographia*. If we were to subtract from this count the buildings that are named on the map, instead of 162 buildings, only 30 would remain: they lack a denomination both in the *Ichnographia* and in the catalogue and are indicated in the table with an asterisk. These are evidently buildings with a connecting function between different fragments, in order not to leave few empty spaces in an arrangement where almost everything is filled with constructions mentioned by ancient authors. The map presented here, reproducing the 162 buildings in question, provides a visual measure of how much within the *Ichnographia* can truly be said to be invented, while another even more diaphanous image, with only 30 buildings, would provide a measure of what finds no justification in classical texts [Img. 7].



Img. 6
M. Giannini, V. Pizzigoni, Campus Martius Piranesi's Map of Ancient Rome, Genova 2024, detail.

Img. 7
M. Giannini, V. Pizzigoni, "Buildings not listed in the Catalogus operum, as represented in the Ichnographia Campi Martii", in Campus Martius Piranesi's Map of Ancient Rome, Genova, 2024.

Piranesi adds a minimal number of buildings to those he found quoted as present in the *Campus Martius*. Their forms are plausible, especially when compared to the ruins of Hadrian's Villa in Tivoli. However, to determine how closely Piranesi adhered to the descriptions he had studied, and how much he diverged from them, further research is needed: it would be necessary to trace the written

passages quoted in the *Catalogus operum…* for each individual building, taking care to use eighteenth-century editions. This would allow for a comparison between the forms reconstructed by Piranesi and the sparse and often generic formal indications that classical authors sometimes included in their descriptions. If Piranesi indeed respected the generic formal indications emerging from the ancient texts, this would confirm his archaeological interest, albeit pursued with different means than those available later. But this will be the task of those who wish to continue this study.

The fact that even today there exists no comprehensive map of ancient Rome confirms the validity of Piranesi's approach. Even after the extensive excavation campaigns of the last centuries, the maps of Rome produced by Luigi Canina, Rodolfo Lanciani, Giuseppe Lugli and Italo Gismondi fall far short of providing a comprehensive image of the city like the one imaginable when looking at the fragments of the Severan Marble Plan. Instead of basing his reconstruction on scanty and fragmentary material data, Piranesi bases his map on literary sources: knowing that all the architectures mentioned by the ancients had to find a place in the area of the *Campus Martius*, he attempts to visualize the consequences. In this operation, knowledge related to ancient passages, surveyed ruins, and notations of the Severan Marble Plan intertwine, but formal, compositional, and typological considerations are also added, which are still a method of knowledge and which, if sometimes leading him to errors, other times allow him to place the works in a plausible position.

It is precisely the plausibility of this map that, in our view, Piranesi himself emphasizes insistently when he denies regarding it as a 'caprice': certainly, the ancient *Campus Martius* could have had buildings of different forms, but for Piranesi, it had to contain all those buildings mentioned and roughly in the positions and with the forms proposed by him.

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The possible Milan of Giuseppe de Finetti

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IUAV

ABSTRACT
Unrealized architectural projects often spark academic debate, yet they hold a unique potential: to evoke alternative visions of the built environment. Giuseppe de Finetti, for Milan, presents alternative visions that reveal reflections about urban form and development. The architect's early 20th-century proposals bridge architectural and urban scales, integrating public spaces and infrastructure. Instead of ring roads, he envisions main roads traversing the city, inspired by Roman principles to meet modern mobility needs. This approach is evident in many of his transformation proposals for Milan, such as the projects for Fontana and Beccaria squares, or the proposal La *strada Lombarda*. In his urban proposal, de Finetti blends the logical compositional principles of the Classic Era with the modern needs of the city. The proposal for the transformation of the *Arena Civica* and the surrounding area shows more explicitly how de Finetti links architecture and public spaces with infrastructures to connect the city's past and future. As a whole his vision offers practical design solutions that balance historical continuity with modern urban needs.

URBAN TRANSFORMATION | PUBLIC SPACES | UNREALIZED PROJECTS | GIUSEPPE DE FINETTI | MILAN

1. The de Finetti ideology

The construction of the city is the concept that moves the entire research about the work of the architect Giuseppe de Finetti. Through the analysis of his unrealized projects, it can be seized the architect's possible vision for Milan. This paper's objective is to provide an overview of how such vision can be inferred by taking into consideration works of de Finetti that allow to outline key concepts of the architect's vision and, at the same time, to illustrate key features of de Finetti's approach to urban composition through the analysis of relevant representative cases.

The architect is mainly known for several realized projects such as Casa La Meridiana in Milan and other interiors and exterior architectural works. However, de Finetti has also done extensive research on an urban scale for several possible proposals for Milan. One of his first projects is represented by the work, made with Club degli Urbanisti, for the Masterplan proposal competition of the 1926-27, in which it emerges an intellectual and clear position on the city's form composition. This proposal, titled Forma Urbis Mediolani, tries to define a new transport connection with a new stretch of road called Racchetta. This road, on the built environment, passes around the most central historic area of Milan and connects the streets passing by Porta Nuova and Porta Venezia (at north-east) with Corso Sempione (at north-west). The intention is to define a different way system of roads and public spaces across the city, so to transform the form of the city for its present necessities. The urban expansions made by Beruto and Masera across the 19th and the 20th centuries are omni-directional and conceive Milan as a monocentric core which can be perpetually expanded in every direction. De Finetti, instead, supports the idea according to which the expansion of the city needs to be realized in specific directions: the primary direction is the north-west and the secondary one the north-east. This vision, despite its relations with the Roman implant of Milan and its cardo and decumano, underlies the modern necessities represented by the mobility from and to the town. The clear image of cities defined by their defensive walls, over the natural landscape, was a typical European conformation until the industrial revolution. Since the 18th and 19th centuries, many of these city walls, like Milan's, have been demolished, changing radically their urban form. For de Finetti, the urban expansion for Milan cannot just be defined by a physical limit which does not exist anymore: what can define the future form of the city is the relationship between public spaces, the built environment and the landscape or, in other words, the construction of the city.

Img. 1
"La città possible di Giuseppe de Finetti".
An invented collage realized by Francesco Lucchi and created by re-drawing selected projects by the architect Giuseppe de Finetti.
Copyright: Francesco Lucchi

2. The construction of the city

Since its early history, Milan has been a hub for commerce and multicultural exchanges, earning the title "la città sulle vie delle genti" in literature. This romantic description underscores an important point, namely that urban mobility has consistently been a crucial theme in Milan's urban planning. De Finetti addresses this point through an approach that integrates architecture with mobility. The architect envisions Milan's development through the definition of public spaces that serve simultaneously as infrastructures for mobility and as defining elements of the city's architecture.

Organizing cities along major and minor axes offers a framework for urban planning, prefiguring public spaces that, as Aldo Rossi later observed, become a fixed backdrop for human life. De Finetti consistently emphasizes an architectural definition of public spaces, presenting a clear vision for the city rooted in 19th-century urban planning theories and specifically in Milan's 1807 master plan by the Commissione d'Ornato. In this plan, the urban axes traverse the consolidated city rather than circumventing it along its perimeter. In de Finetti's works, urban themes such as the "street," "square," and "urban block" holds the same relevance as in 19th-century urban theories: what distinguishes de Finetti's approch to these concepts, though, is that the architect adapts them to meet the infrastructure needs of a modern city through architectural design.

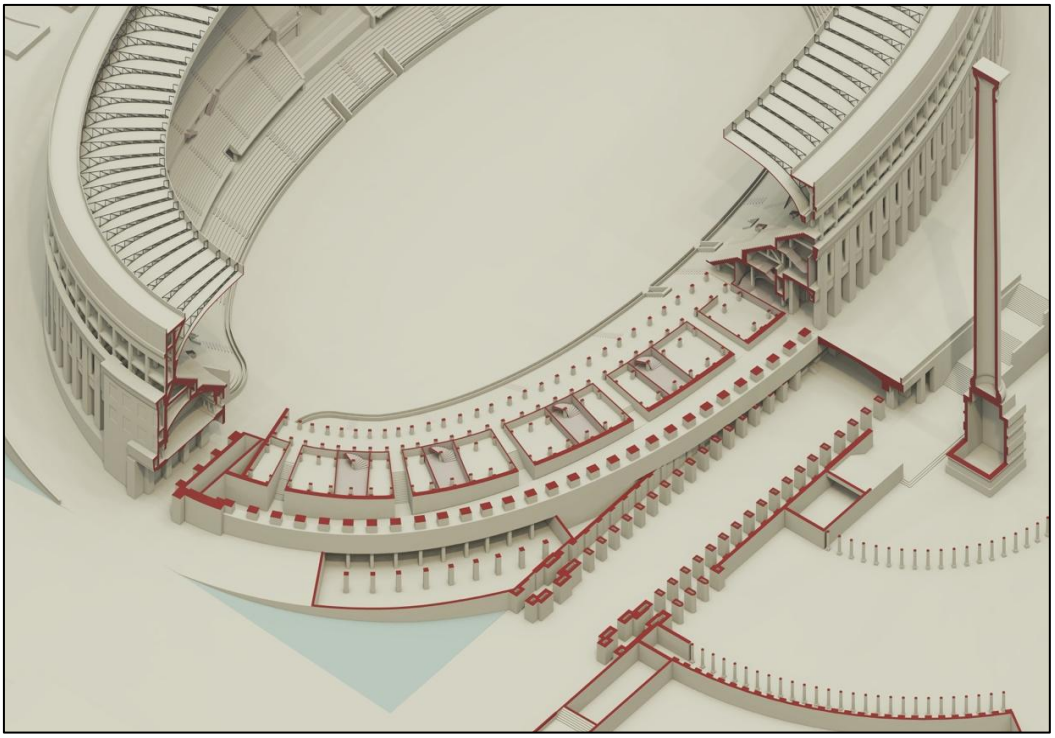
Such approach can be inferred through the analysis of numerous of his unrealized projects. For instance, in several of them the architect places train lines, metro stations, parking facilities, and various public services beneath public spaces. This approach reflects an urban mobility system that traverses the city, penetrating and intersecting its urban and built core. For this vision, the architect presumably draws inspiration from Milan's Classical heritage, including the city's Roman urban structure, as well as from the unrealized 1807 master plan. Additionally, he was most likely influenced by Leonardo da Vinci, another important figure for Milan during the 15th and 16th centuries. In fact, as Leonardo's interest in mobility led him to conceive multiple layers of transit at different elevations, de Finetti's vision of such concept influenced several of his proposals, such as his possible expansion plan for northwest Milan conceived in the late 1940s. For instance, in a notable project called by the architect "autostrada in trincea" (trench highway) de Finetti envisioned a high-capacity road traversing the city to connect with other infrastructures. This multilayered design, featuring both above and below ground levels, was intended to incorporate public spaces, squares, and potential architectural elements along its route. In his various urban and unrealized projects for Milan, de Finetti also demonstrates a hybrid approach that bridges classicism and modernity. He is deeply rooted in the urban and architectural culture of the 19th century, yet he embraces technological innovations and is well-versed in the European architectural landscape of his time. Above all, he recovers from the Classic Era a logical approach to problems to resolve contemporary needs. This modern yet classic attitude defines de Finetti: he is directly connected to the past, attentive to the present, and aims at proposing practical solutions for the future. Raffaella Neri's concept of "modernista classico" can be used to better understand de Finetti's approach. Although not directly connected to the architect, the term can be applied to him: in fact, his approach too goes beyond formalism and historicism as it aims at identifying a rational principle and a method for the project.[1]

De Finetti applies such an approach to the complex urban environment of Milan, envisioning the city's organization around primary, penetrating roads that extend in specific territorial directions:

[1] Neri, R., & Vigano, P. (2000). *La modernità del classico*. Venezia: Marsilio editori, p.17

north-west (cardo) and north-east (decumano). This vision guides the composition of his urban projects: the great importance represented by a penetrating axis (as in the past) and by technological mobility infrastructures finds in de Finetti a way through the definition of public and architectural spaces. His city planning concept unifies urban themes, architectural expressions, infrastructural needs, and technology to respond to a possible construction of the city, or more precisely, to the transformation of one of its parts. Most, if not all, of de Finetti's projects underscore the importance of these questions which are conceived at an intermediate scale, between urban planning and architecture.

This approach also anticipates themes later explored by Carlo Aymonino, who says that urban changes are not absolute innovations but rather reinterpretations of the existing built environment, integrating the city's historic memory. [2]



Img. 2
"Un grande stadio per Milano". Axonometric section. Re-drawing of the project "Un grande stadio per Milano" of Giuseppe de Finetti. Copyright: Francesco Lucchi

De Finetti's various unrealized designs from the 1940s for Fontana and Beccaria squares near the Duomo suggest that his vision goes beyond a simple spatial reorganization. Beneath the ground level, he incorporates public spaces and services, such as an underground square and parking facilities. This strategy is similarly applied in his project for "La Strada Lombarda", situated north of the Duomo. This project reconfigures an urban block, envisioning a potential train line beneath it that would connect east and west. Since elements of "La Strada Lombarda" evoke classical forms such as the Stoà of Attalus, the architectural vision at the core of this project attests too how de Finetti's projects tend to suggest analogies to and draw from the Classical Era. In the mentioned proposals,

[2] Aymonino, C. (1977). *Lo studio dei fenomeni urbani*. Roma: Officina, p. 130

de Finetti tries to define a possible built environment for some parts of Milan which, simultaneously, are subordinated to a specific idea: a city connected by main roads that pass through its urban core. In the Fontana and Beccaria square projects, for example, de Finetti diverges from the urban administration's plan, which bended a main road around an existing building. Instead, he proposes to demolish part of the same building to restore the road's linear alignment. This approach reappears in "La Strada Lombarda", where he tries to directly connect Piazza San Babila with Galleria Vittorio Emanuele II and the oval Cordusio square. Beneath this implant, he puts a train line, while overground he designs multiple levels of public spaces dedicated to pedestrians and slow-flow mobility. This reconfiguration of existing urban blocks also envisages additional public courtyards and squares, all defined by a rational and sometimes classically inspired architectural language. De Finetti's proposals are characterized as well by a rational and rhythmic articulation of facades and their compositional elements. Sometimes, precisely in specific parts representative of the collectivity, he even incorporates a more direct reference to Classical architecture such as classical orders with entablatures and giant columns with capitals and balustrades inspired by 15th-century Renaissance forms.

Reflecting on the city's architecture, Aldo Rossi conceives the city's image as a background for human life, a place that is not just a functional public space but rather an area with a sense of permanence and memory. According to Rossi, a space must be evocative, not merely functional and technically refined. In his projects, de Finetti achieves an analogous emotional and evocative quality by drawing on Classical architecture to create an image that communicates the civic character of public spaces: this perspective enables to seize a critical reason at the core of de Finetti's use of a rational composition interspersed with elements inspired by the Classica Era in several of his projects. Another example that illustrates this approach is the architect's proposal to transform the existing Arena Civica into a modern stadium. The Arena was designed by architect Canonica in the 19th century and is still located in Parco Sempione between the Castello Sforzesco and the Arco della Pace. The Arena has an oval plant with an athletic track 600 meters long and can accommodate approximately twenty thousand spectators. Entirely built overground, its stands are located on a stone terrace. Its principal axes are characterized by four architectural elements: the Pulvinare (and its honor tribune) which constitutes the entrance building; the Porta Libitinaria, a small access to the playing field for the athletes; the Porta Trionfale, which is parallel to Corso Sempione; and Le Carceri, a building constructed by architect Tazzini, who terminated the project of architect Canonica. This project represents for de Finetti a potential opportunity to reform some parts of this area of the city that he perceived as unresolved: indeed, he emphasizes the necessity for Milan to have a larger stadium capable of accommodating one hundred thousand spectators. For its renovation, he proposes to maintain only the existing stands and the playing field, while he plans to demolish all the other structures to build three overlapping tiers of stands, topped by a marathon track and covered with an iron roof supported by truss beams and to construct the remaining structural elements using

reinforced concrete. If considered as a whole, it is possible to seize how the transformation of the Arena was likely a pretext de Finetti used for reimagining and reorganizing this entire part of the city with numerous public spaces. For Parco Sempione, the architect designs an elevated square connected to the Arena by gently curved ramps and staircases. Below the square a new road called Corso Bonaparte passes through it along with a metro line and a station, as well as parking facilities. In the opposite direction of the Arena, de Finetti envisions a grand semicircular forum bordered by three buildings and centered on a monumental obelisk designed as a tall classical column on a plinth. The forum, like the square in front of the park, has multiple levels: a road level at -5.00 meters and a higher level at +5.35 meters. Behind the columns of the forum, at ground level, de Finetti plans additional public services and parking facilities. To maintain symmetry, he proposes to open a new road parallel to Corso Bonaparte, also incorporating a metro line. Along the major axis of the Arena, he defines additional public spaces, including two squares located in front of the new symmetrical triumphal entrances. To design this stadium and its internal routes, de Finetti draws inspiration from classical Roman amphitheaters, but mainly from contemporary examples such as the stadiums in Berlin, Vienna, Turin, Los Angeles, and others. Through the squares and the Foro, de Finetti introduces multiple access points at different levels and aims to design a large-scale urban and architectural infrastructure based on a specific vision of the city that takes into consideration both mobility and the definition of public architectural spaces.

Today, the triangular open space formed by Piazzale Biancamano and Piazza della Lega Lombarda still highlights relevant urban planning issues of this area. Borgo degli Ortolani and Rione Garibaldi, two neighborhoods located in front of the Arena, have indeed never been properly connected, resulting in a formless urban space. In his project, de Finetti reimagines the area by proposing a multi-layered road system to facilitate movement to and from this part of Milan. These systems are known respectively as the Sistema di Smistamento (from the city to the stadium) and the Maglia di Arroccamento all'Arena (connecting this area to other parts of the city). The project integrates hybrid public and infrastructural spaces, and through this architecture, seeks to reclaim the urban legacy of this part of Milan. In the same area, specifically in Parco Sempione, the architect Antolini proposed, at the beginning of the 19th century, an unrealized vision for a grand urban Foro, known as the Foro Antolini. At the time, Parco Sempione was a vast open space on the outskirts of Milan, and the Foro Antolini was intended to define a center for human activity around this part of the city. De Finetti, in a similar way, seeks to achieve the same vision, but with a response to the modern needs of the city. His multi-layered road system reflects the area's potential to attract people while facilitating movement to and from the site. In his proposal, such goal is achieved by blending public, architectural, and infrastructural spaces into a unified concept. The squares and roads transcend their basic functions, revealing an integrated approach to architecture and infrastructure that recovers the city's legacy while addressing current needs and future possibilities.

Img. 3
"La strada Lombarda". Public spaces. Image realized by Francesco Lucchi, obtained by re-drawing of the projects "La strada Lombarda" of Giuseppe de Finetti. Copyright: Francesco Lucchi

3. The legacy of de Finetti

In conclusion, the works of de Finetti, as demonstrated by the projects discussed and others not mentioned here, represent a concrete approach to reflecting on the tangible and intangible nature of urban space. For de Finetti, the relationship with the built environment is connected with a deliberate and clear intention: the construction of the city. This principle underscores a methodology that addresses the needs of the present while remaining rooted in an urban ideology connected to the past and grounded in logic. De Finetti's vision does not claim to represent an absolute truth but is rather an attempt to offer numerous concrete possibilities for the city through the practices of urban transformation and renovation. His projects often propose transformation to already built and consolidated parts of Milan, reflecting an active dialogue with the existing urban fabric. These unrealized proposals reveal their potential in presenting alternative visions of the built environment and show critical urban interpretations which ultimately are expressed through precise, concrete, and clearly articulated architectural projects.

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Imagination: public good is uberarchitecture

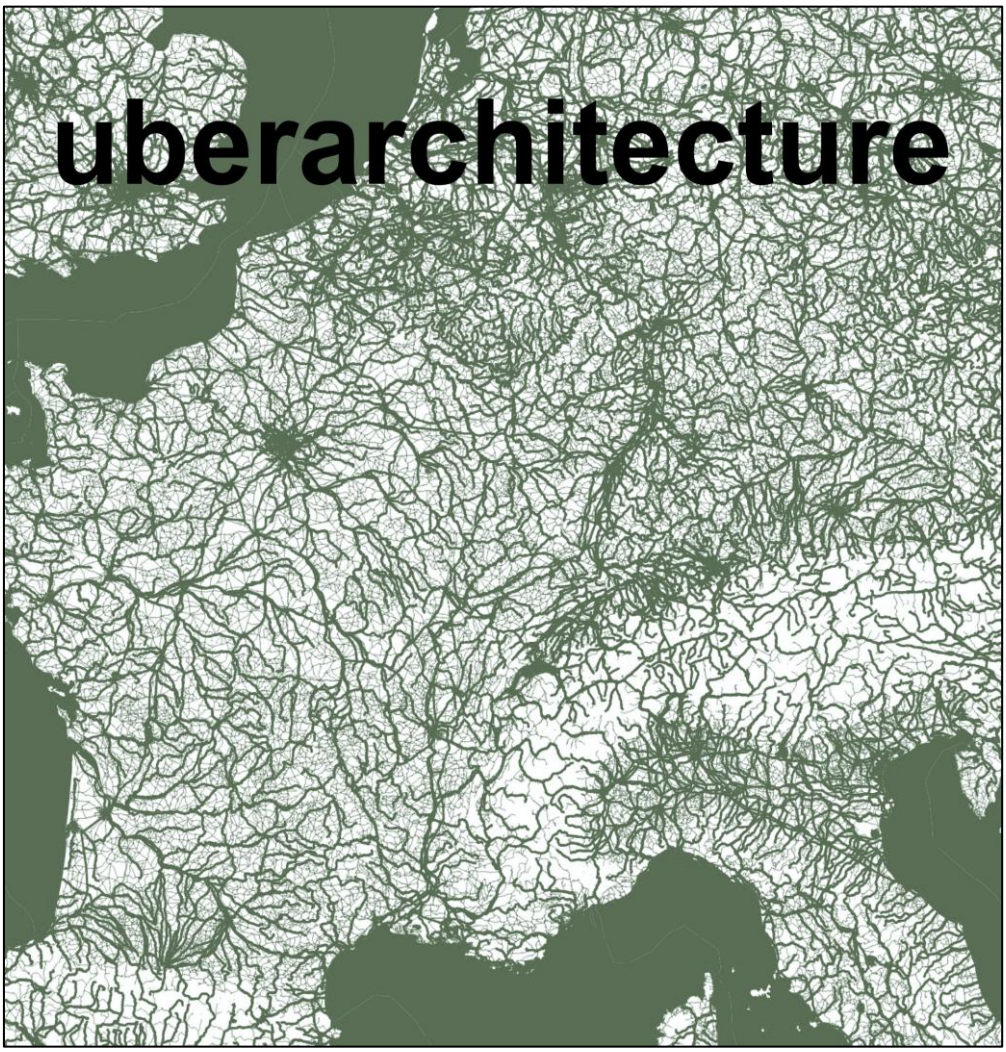
URŠKA KRISTINA ŠKERL

ABSTRACT

The paper introduces the concept of 'uberarchitecture', a malleable term that on one hand describes the top-down positions historically enforced and reproduced to the present state, such as politics, law and land registers—shaping the ground realities resulting in claimed delineations between private and public properties influencing social relationships, and shaping architecture as such. On the other hand, the term uberarchitecture holds a charge towards examining what these imposed civilizations' entanglements embed. The paper takes a methodological approach of speculative design and case studies, while it bases it on theoretical and practical research of the existing legislative instrument— 'public good'. Using the same 'uberarchitecture tool' that casted forces over ground, it overhauls its position and becomes self-surpassing by establishing a dynamic hierarchy more attuned to 21st-century discourse. Based on cadastral data and land use, a speculative international Public Good State is proposed. The paper uses correlating speculative projects, such as Constant's *New Babylon*, Doxiadis' *Ecumenopolis*, and Friedman's *Continent-City Europe*, which don't find their place beyond utopia, to justify and gain a base for enquiry and reopen the discourse to further it in the uberarchitecture reality.

UBERARCHITECTURE | PUBLIC GOOD | CRITICAL GEOGRAPHY | MEGALOPOLIS

1. Introduction



Img. 1
Public Good is Uberachitectur: Public good is invisible until made so. Map of public good based on European cadaster and land use. 2024, Urška K. Škerl

This paper invents the multifaceted term ‘uberarchitecture’, introduced to describe the top-down forces, civilization conventions, that shape realities, experiences, and materializations through their imposition on the ground—and uses them to invent *a better* uberarchitecture. It interrogates how these forces might be disentangled or transcended using a legislative frame. The prefix *uber-* relates to Nietzsche’s concept of the Übermensch (Nietzsche Friedrich 1961), signifying self-surpassing qualities. Despite acknowledging the superficial appropriation of Nietzsche’s term, its connotations of emancipation and agency align with the paper's inquiry into architecture's role in facilitating human existential engagement. As Markus Breitschmid (2007) notes, for Nietzsche, architecture as an art form, is tasked with crafting a veil over the metaphysical abyss—a notion that engages this paper to play with and look beyond, what uberarchitecture could be.

Uberarchitecture, in this context, questions the legitimacies embedded within the built environment, shaped by investment, law, and political power, and critiques the top-down imposition of architecture as a mode of control. Uberarchitecture engages critically with mechanisms rooted in land and capital

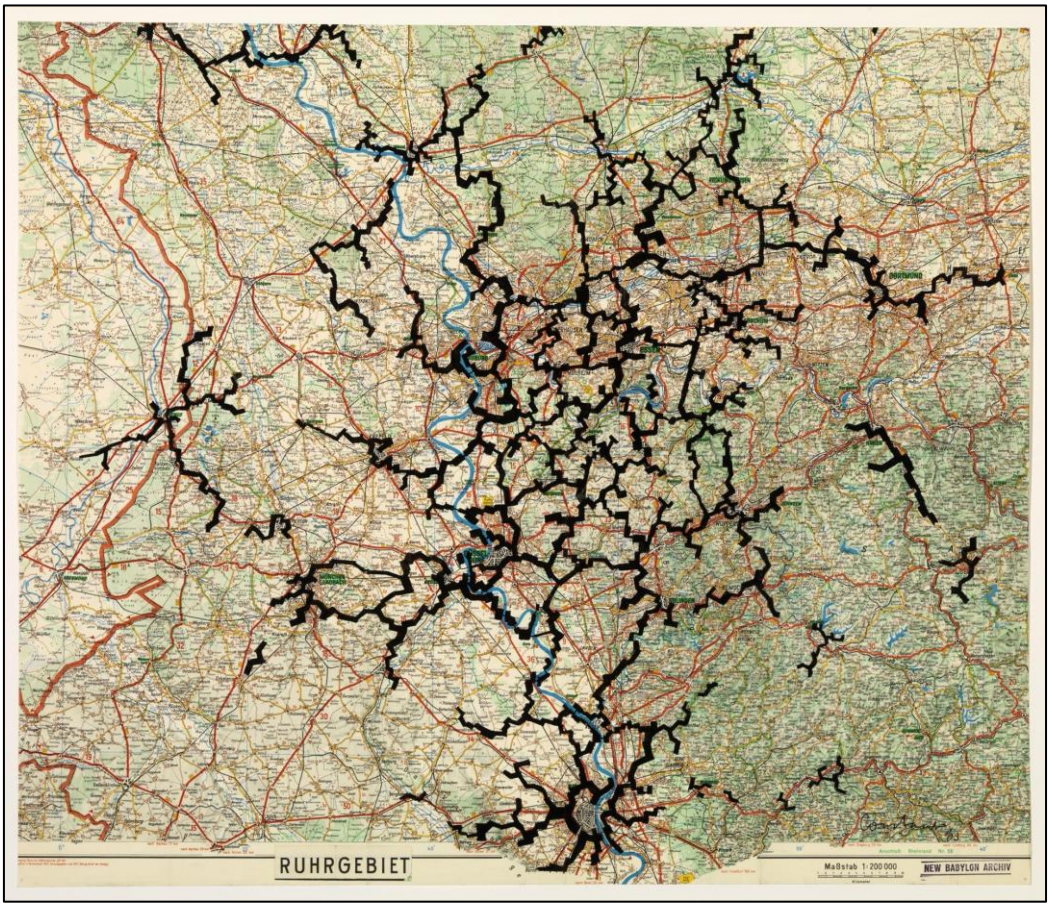
accumulation. These systems, historically predicated on dispossession and privatization, underpin the inequities of property rights and economic power. In this light, the study aligns with speculative architectural projects that advocate for collective ownership or the abolition of land commodification, put forth in speculative architecture projects from the 20th century, New Babylon, Ecumenopolis and Continent-City Europe. Yet what these projects lack is engagement with the real conditions obstructing their visions from overreaching utopian realms.

Thus, this paper singles out public good, an existing legislative concept and imports cadaster, land register and tools of critical geography to open the field for utopia positioning. The legal instrument of public good, assigned to public space, water beds and mobility infrastructures, is acknowledged in most European legislation systems based on Roman Law, as the actual and legitimate, yet invisible ground. Public good is the ultimate uberarchitecture, as it holds values attuned to future scenarios, the paper wishes to promote. It orders accessibility to *all* under *the same* circumstances, meaning the anonymous use of space and possibly its goods provisions. By using cadastral information to draw out the Public Good State, uberarchitecture becomes 'uber', meaning it uses its own tools to surpass itself. Public Good State is akin to and holds ground for the speculative projects visited below.

2. New Babylon

Constant Nieuwenhuys' *New Babylon* (1956–1974) is a series of artworks proposing what can become a future city of ephemeral, habitable structures perched above the ground. These structures are interconnected by aerial routes and 'socializing traffic lines', forming clusters of situations akin to the *dérive*, where play and creativity dominate the masses' everyday activities. New Babylon is governed by Unitary urbanism, "a very complex, very changeable, constant activity, a deliberate intervention … aimed at bringing our lives into lasting harmony with our real needs" (Wigley Mark 1988, p. 132).

In this idea, aligned with the Situationists' 'desire', the social space is the city's main character that supports psychological fulfilment. The future city, as Constant described, will likely "cover the entire surface of the earth" (Wigley 1988, p. 133) as humans acquire ultimate power over natural resources and exploitation of nature by unlimited development, resulting in technology replacing nature. Human life becomes an art form itself as automation allows for free time at one's disposal. Based on the society of freedom, Constant's New Babylon omits the given socio-economic conditions and land subdivision. As a prerequisite, the project "has been based on collective ownership of land" (Wigley 1988, p. 234).

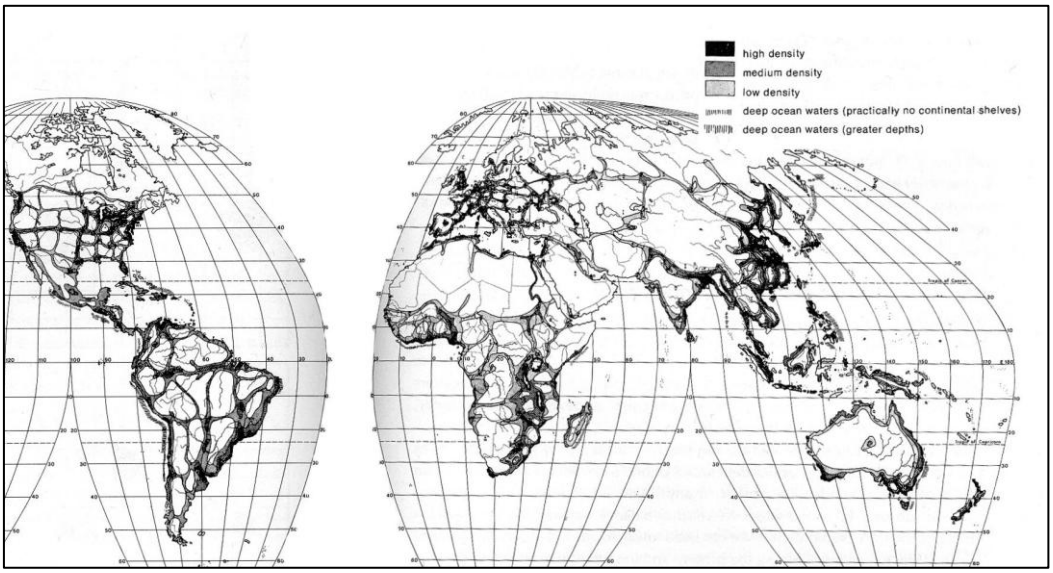


Img. 2
New Babylon over Ruhr Region (1963) by Constant Nieuwenhuys. Kunstmuseum Den Haag © Photo: Tom Haartsen. Image courtesy Fondation Constant

3. Ecumenopolis

Constantinos A. Doxiadis termed Ekistics as a new scientific field dedicated to the study of human settlements (Doxiadis Constantinos A. 1968). Exactly 30 years after the Athens Charter by CIAM, Doxiadis and Jaqueline Tyrwhitt gathered a group of acknowledged scientists from diverse fields, including Marshall McLuhan, Margaret Mead, Jean Gottmann—known for coining *megalopolis*—and Richard Buckminster Fuller among others, to participate in the Delos Symposium that continued annually for a decade (1963–1975).

What was needed in Doxiadis' view was a controlled urbanization of the inevitable urban growth resulting in Ecumenopolis, the worldwide city, a continuous city structure governed by all inhabitants via their 'television-telephones' (Perović Miloš R. 1978). Although the heterogeneous group had different views on some Ecumenopolis features such as the importance of planning the static versus dynamic electronic networks aligning to evolving technological means (Wigley 2001), they agreed on "general assumptions which might be summed up as: freedom of movement, absence of barriers, and a world that behaves in a rational manner" (Perović 1978, p. 30). Being aware that realities of politics and cultural patterns challenge Ecumenopolis, Doxiadis believed rational decisions to build common infrastructures by human interest might overcome tensions of national and territorial localities.



Img. 3
Ecumenopolis: 2060. Megalopolis as predicted by Doxiadis (1972). © Constantinos and Emma Doxiadis Foundation.

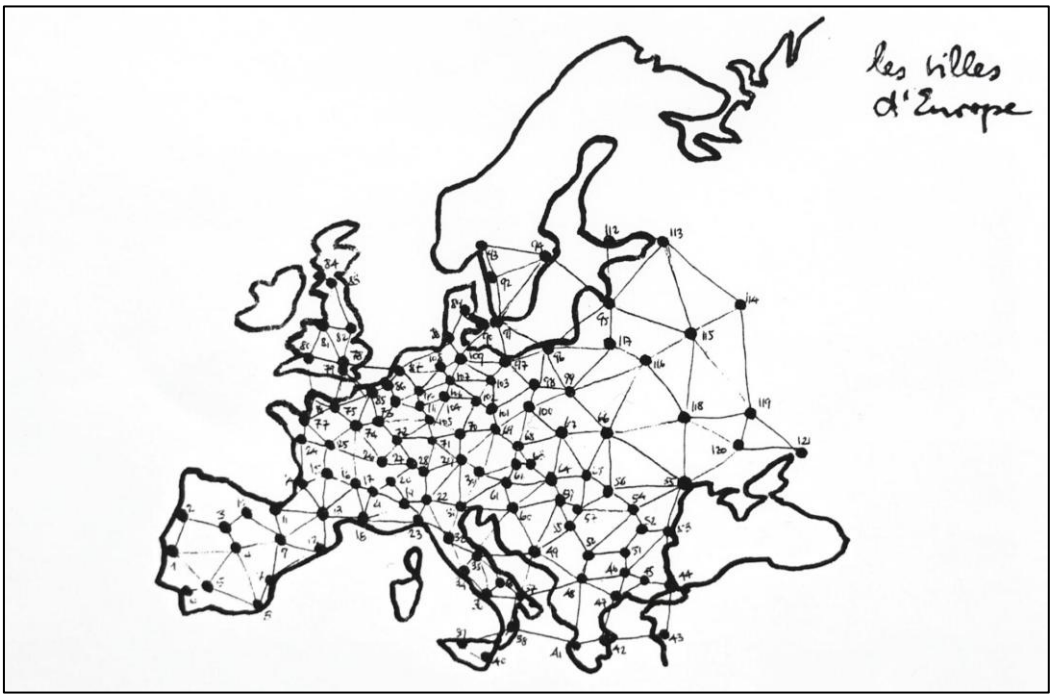
4. Métropole Europe

Yona Friedman's work is rooted in the principle of individual freedom, emphasizing the capacity of citizens to adapt and utilize urban environments according to their needs. Known for adaptable megastructures cast over cities in a manner of self-regulating systems as mobile architectures and spatial cities, Friedman searches for a 'feasible utopia', where city dwellers are authors and creators, acknowledged individuals.

One of his projects, the Métropole Europe (1960) or refined Continent-City Europe (1994), is described as "the biggest non-city in the world" (Friedman Yona 2011, p. 21). The Continent City uses the existing European train lines, which connect distant economies and emerge as "a network of existing large cities" (Friedman 2011, p. 34). Further, Friedman states that the Megastructure of the 21st century is continent-wide employed by remote work and hence without the need for the proximity of city centers, which "could lead to a new concept of living in nature" (Friedman 2011, p. 35). While not obvious that the idea could be built upon the legal concept of 'public or common good', which encompasses the railway system, Friedman is aware that this kind of solution is only realized by the will of politicians and economists as opposed to architects or urban planners.

Another curious example of Friedman's work in direct line with the presented article is Unicornia, a "proposal for turning certain territories in huge open-air museums" (Memorial da Resistência de São Paulo 2021). The Unicorn and Balkis dog are motifs in Friedman's work that take the form of large-scale drawings cast upon 'undetermined land', creating a boundary-that-is-not, to what seems a new, free territory and imaginative *cadaster art*.

No Man's Land is a Foundation in Pescara, Italy, to which Friedman was an honorary president. They aim to export the model of non-property and social and ethical change. During the 2017 workshop held there, Friedman stated that what he was trying to propose was "an operation of democratising the imagination" and that the No Man's Land "belongs to everybody" (No Man's Land Foundation 2016).



Img. 4
Continent-City Europe by Yona Friedman (1994). © Fond Denise et Yona Friedman.]

5. Public Good as a Tool for Megalopolis

While speculative future-city projects prerequisite the abolition of territorial boundaries, their structural focus lacks practical tools for implementation. As uberarchitecture encompasses everything in the fictitious realm that influences the ground, built reality, including abstract ideas, it takes presented case studies as possible uberarchitecture scenarios, and provides them a legal link to the ground, based on public land ownership. The case studies, in turn, help by sharing a worldview in common.

Joanna Kusiak (2021) advocates for 'critical legal engineering', urging legal geographers to repurpose law as a means for progressive social transformation. David Harvey (2012) describes land not as a mere commodity but as fictitious capital shaped by market speculation and deregulation. This 'fiction' extends to the design of private property, historically devised to facilitate taxation and control. On the opposite end sits public property. To imagine the process of recalibrating, the proposal works by pushing legislative frameworks into speculative futures.

The cadastral framework and encompassing legal instruments, while ostensibly invisible, exert a profound influence over how space is conceptualized and utilized, functioning as a top-down apparatus that defines land through the mechanisms of legal ownership. Such frameworks, with their attached data attributes—land use, easements, and infrastructural provisions—serve as instruments that delineate rights and obligations within specific national jurisdictions. Cadaster, therefore, can be understood as an unbuilt but pervasive condition that governs the land and, by extension, the built environment above it. This raises the provocative claim that 'cadaster, in its own right, constitutes a form of uberarchitecture—a spatial infrastructure of governance and control'.

One peculiar instrument in the European legislative system is 'public good', appointed to a particular cadastral lot and marked in the land register. Not to be mistaken for 'public goods' in terms of public services, public good[1] is a distinctive legal category crucial for the expression of individual liberties and includes properties such as roads, streets, train lines, parks, squares, seas and waterways, which are classified as 'non-rivalrous' and 'non-excludable' in contrast to more localized commons traditionally led by communities. By their designation, public good is accessible to 'everyone under the same conditions'[2]. Drawing from Roman legal traditions, public good is anchored in the concept of *res publicae* or *publica utilitas*, 'public things' and 'public use' (Menatti 2017). These properties were historically categorized as *extra commercium*, meaning that they could not be subjected to private proprietary rights. Roman Law thus established a clear delineation between properties governed by civil law and those under public law, foreshadowing modern interpretations of shared spatial resources. Each legislative system based on Roman law has its type of public good, *domaine public* in France, *Sachen im Gemeingebrauch* in Germany, *il demanio publico* in Italy, for example (Virant, 1990). What if all those public good properties connect into one, indivisible international 'public-good-land'?

Building on this foundational legislative understanding, the article posits a reimagining: an international 'Public Good State', conceived as one expansive territory where bodies of water, roads, streets and pathways coalesce into one seamless continuous corridor of green, blue, and brown infrastructure, 'available to all under the same conditions', engulfing private properties amidst. Public good sorts supremacy "of the public interest over the private one" (Menatti 2017), which is pivotal in the Italian documents from the Middle Ages, such as city planning.

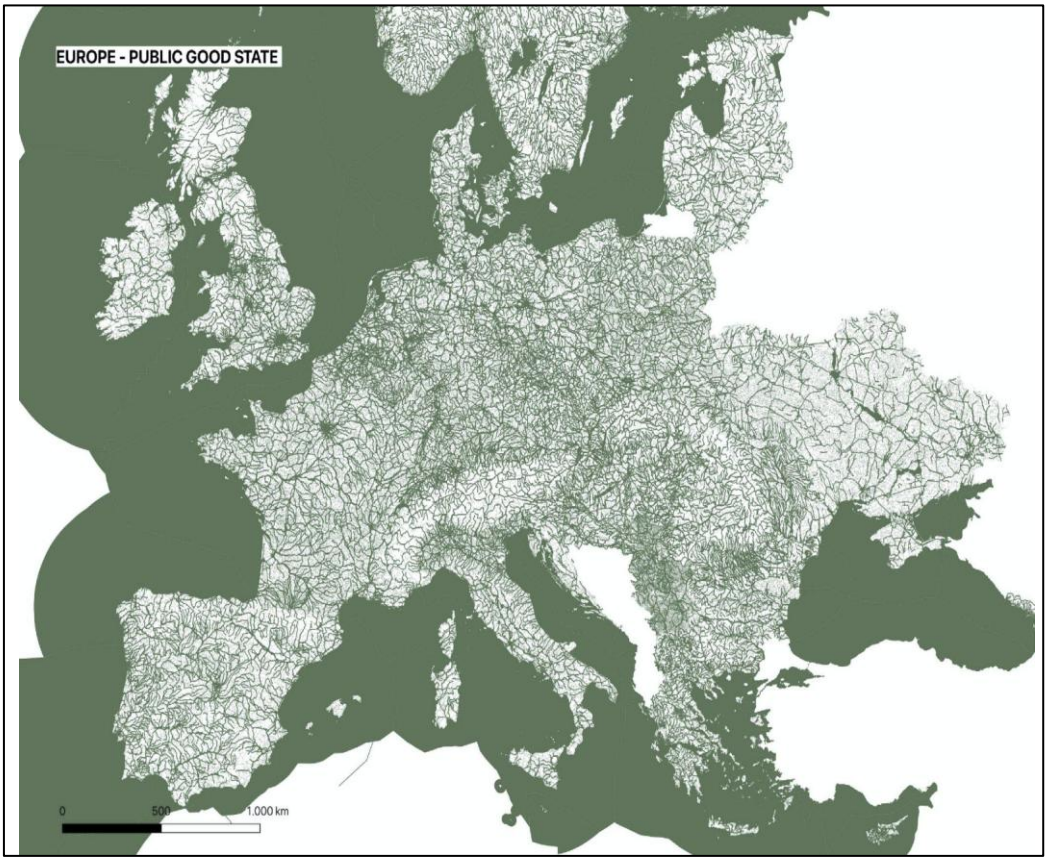
Public Good State is envisioned as universally accessible without the need to identify and legitimize its users, stretching internationally, challenging the spatial logic of enclosure and privatization. To this backbone of Public Good State, governed and managed internationally, clusters of local commons and public property attach. Public Good State provides accessibility to public goods such as food, water, transport, energy, education, and social services and also becomes a tool to exercise rights to a clean environment, multispecies justice and migration. As such, public good is the most advanced altruistic (not moral) legal concept Western society devised and should be exercised as a wholesome body instead of being limited to nationalities and localities. While programatically similar to Continuous Productive Urban Landscapes, Public Good State is nevertheless a political project. Global reach, as in Ecumenopolis, is at odds, as the limit of the Public Good State is legislation and its border's reach. National security, too, falls under public good provision and is in contrast to the

[1] Public good is not necessarily equivalent to public property, which can be excludeable. Yet, in my opinion, public good should capture most, if not all of public property and further, all of the public space.

[2] Direct translation from Slovenian legislation in depth researched by Gregor Virant who compared public good in legislation of Germany, France and Italy when Slovenia was gaining independence after Yugoslavia.

undeniable accessibility unless converted to the border-corridor. Public good must readdress *what* is good for *all*, and assert itself as a spatial, economic and social construct.

Yet, public good remains an abstract, intangible reality until rendered visible. Thus, mapping the layered uberarchitecture of public good becomes a critical tool for decolonizing within the colonial frameworks of land demarcation.



Img. 5
Public Good State: layered publicly available data of European seas, rivers, streets, train lines and city fabric, which become green, blue and brown corridors. This backbone of the international public good can be expanded by public property and local commons. Data source: https://www.copernicus.eu/en. 2024, Urška K. Škerl

The speculative projects from the past century in which authors refuse to position their visions among utopian scenarios in a strong belief that such changes are possible, even inevitable, without addressing the practical means for such conduct, to a certain degree, share the vision of the Public Good State.

In the recent movie *Megalopolis* (2024), directed by Francis Ford Coppola, the closing frame declares: “I pledge allegiance to our human family, and to all the species that we protect. One Earth, indivisible, with long life, education and justice for all”. As critically bad as the idea of a megalopolis is used in the film, it nevertheless holds a shift towards the awareness that most of the one-world-city ideas from the past century did not encapsulate. While the above-presented worldwide cities do not acknowledge the notions of climate change and the role of natural environments, resources and forces at large, they, however, hold a connotation of social justice and global governance, qualities nested in public good. In this repositioning, the ultimate uberarchitecture is Nature, and the megalopolis of the 21st century is the Public Good State.

6. Conclusion

The study takes a conceptual idea of a continuous accessible space and finds its relatives in architectural speculative case studies, while it tries to bridge the gap between the idea and spatial reality via a legislative framework of public good. In this way, it does not build or imagine an architecture, but draws out the invisible yet existing land in a form of *legal architecture,* resulting in the Public Good State. It offers a step forward from unachievable utopias, in denial that, at the same time, it renders an unattainable future, believing in its plausibility. The paper introduces the term 'uberarchitecture', which calls upon the invisible top-down forces and uses them to envision novel spatial arrangements. The paper addresses ideas as residing in the position 'beyond', releasing to the ground tangible imaginations, connecting the conceptual imaginative space inflicting its power over ground realities. Since imaginative ideas can become a reality, uberarchitecture urges us to envision better fiction.

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Exploring the Seasteading Hypothesis: A Floating Utopia for the Techno-Solutionist age?

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ABSTRACT

The paper focuses on the Seasteading movement's quest to build floating libertarian micro-nations in the High Seas, heralded by its proponents as a bold, 'offshore' solution to society's most pressing challenges. The article situates Seasteading within a broader reflection on the evolution of the floating city paradigm over the past century. It unpacks how Seasteading draws from some of its most relevant predecessors, re-signifying and incorporating elements of their technological, spatial, and rhetorical frameworks to construct a compelling market identity and legitimise its anarcho-capitalist agenda. This framing sheds light on the implications of the techno-solutionist form of territorialisation advocated by Seasteading, and the underlying planetary vision it implies.

FLOATING URBANISM | SEASTEADING | MARITIME URBANISATION | TECHNO-SOLUTIONISM

1. Introduction

In light of the growing interest in floating cities as a potential response to some of the most pressing effects of the current polycrisis, the article explores one of the most recent (and controversial) iterations of this seemingly alternative form of urbanisation: Seasteading. Framed within a broader exploration of society's evolving relationship with the urbanisation of maritime space over the past century, the article critically unpacks how some of the most relevant socio-spatial models have informed the Seasteading vision. These models offer a privileged viewpoint onto the specific challenges of their respective historical contexts and the mindsets that shaped their socio-political aspirations. This framing contributes to develop a critical reflection on the broader implications of Seasteading's conceptualisation of an inhabited maritime planet.

2. The Seasteading hypothesis

The Seasteading movement can be broadly described as the convergence of marine anarcho-secessionist ideals and the 'resortification' of floating urbanism, heralded by its proponents as a bold, 'offshore' solution to society's most pressing challenges. The term itself – a *portmanteau* word of 'sea' and 'homesteading' – was coined by Wayne Gramlich to describe an affordable path for individuals to colonise the High Seas, in analogy with the colonisation of the American West. Gramlich – together with Patri Friedman, grandson of leading libertarian economist Milton Friedman – founded The Seasteading Institute (TSI) in 2008, thanks notably to substantial funding from Silicon Valley magnate Peter Thiel. TSI's stated mission is of "building startup communities that float on the ocean with any measure of political autonomy" (TSI n.d., *About;* Steinberg *et al.*, 2012).

Seasteading's socio-political vision[1] combines libertarian anarcho-capitalist ideals with techno-solutionism. Seasteading originates from a deep dissatisfaction with democracy, believed to be an inefficient and costly "geographically segmented monopoly" (Friedman & Gramlich 2009, p. 21). Conversely, it presents the High Seas as the natural frontier to escape land-bound juridico-political systems, to reappropriate the political agency granted by freedom of movement and to unleash hyper-capitalism. It envisages a post-democratic 'seavilization' based on a constellation of self-ruled libertarian micronations. Navigable housing units would enable each individual to easily move from one micronation to another: you vote by moving your house. By detaching citizenship from fixed territoriality and framing it as a free market value, Seasteading aims to concretise what is presented as a Copernican revolution of the Nation-State paradigm. In this worldview, marine micronations would compete to attract inhabitants, the possibility to choose juridical system would minimising conflict, and deregulation would foster entrepreneurial innovation and prosperity. Heralding a privatisation of space-making on a territorial scale, Seasteading emerges as the marine

[1] While the Seasteading movement groups a range of different spatio-political visions, the current analysis is based on the materials produced by The Seasteading Institute.

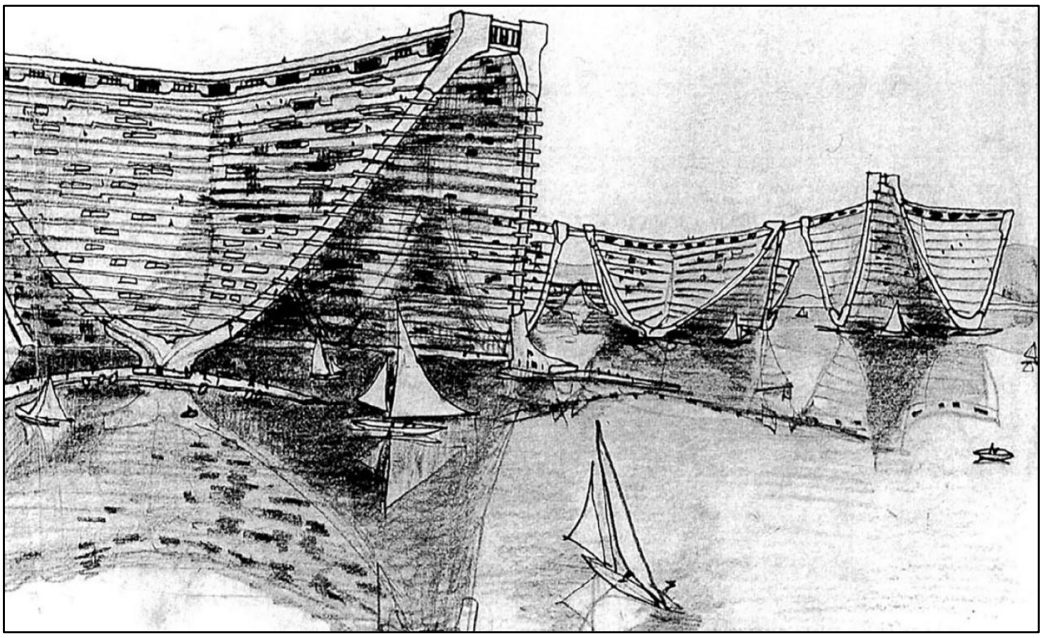
"extrastatecraft" (Easterling 2014) by excellence, combining the appeal of the luxury resort and of the offshore financial centre (Quirk & Friedman 2017; Steinberg *et al.* 2012).

Seasteading inscribes itself within a long lineage of radical socio-political endeavours which have turned to the sea to concretise their vision. Driven by distinct visions and stakeholders' interests, each experiment engages with the revolutionary implications of inhabiting the sea from a different perspective, translating into distinct forms of socio-spatial organisation. The article explores how Seasteading draws inspiration from various maritime experiments conducted over the past century, re-signifying and incorporating some of their characteristics within its proposed production of space.

3. Metabolism – the megastructure as 'machine sociale'

Arguably, one of the major catalysts and testing fields for the floating city typology was the wave of proposals to urbanise the Bay of Tokyo (1957-1961), as Japan navigated the tension between post-catastrophe reconstruction and rapid economic expansion. This endeavour occupied a central place in the international architecture discourse, yet its main resonance was at the national level. It contributed to shape and crystalise the ideology of the Metabolists – a Japanese avant-garde movement created in 1960 by architects and intellectuals part of Kenzo Tange's *entourage* (Kikutake, Kawazoe, Otaka, Maki & Kurokawa 1960).

As architectural historian Maurizio Vitta observes, Metabolism "wasn't an architectural theory, but a critical theory of society seen from an architectural perspective" (Kikutake & Vitta, 1997, p. 17). At its core is a conceptualisation – drawn from ecological metaphors – of spatial models not as fixed forms, but as 'regenerative' frameworks able to adapt organically to their inhabitants' evolving demands, granting a plurality of possibilities. Inspired notably by Buddhist philosophy and Marxist ideals, the production of space is envisioned as an act of symbiosis which transcends dualisms (such as technology vs. tradition; nature vs. man etc.), enabling a more egalitarian, ordered and harmonious *Urbs* and *Civitas*. This strive for symbiosis is well illustrated by Kurokawa's renders for his *Floating City Kasumigaura* (1965) project. *[Img. 1]*



Img. 1
Noriaki Kurokawa, Floating City Kasumigaura project render, 1965 (Japan).

The central spatial expression of the Metabolist approach is *artificial ground*, primarily megastructures (a term coined by the Metabolist Fumihiko Maki), which serve as infrastructural and service backbone for modular 'capsules'. Collectively owned artificial ground is proposed as a solution to bypass the liabilities which were heavily hindering Japan's reconstruction, including lack of buildable space, land ownership fragmentation and vulnerability to natural disasters (Kikutake, Kawazoe, Otaka, Maki & Kurokawa 1960; Kikutake & Vitta, 1997; Lin 2010; Koolhaas & Obrist 2011). The sea, a fundamental element in Japanese imaginary and culture, is portrayed as a natural frontier to unfold the Metabolist' spatial and societal agenda (Lin 2010, pp. 109-111). This line of thought is particularly embodied by Kiyonori Kikutake, widely recognised as the godfather of marine architecture. In his presentation of the *Ocean City* in the Metabolist manifesto (1960, pp. 20-21), he thus argues that "the civilization of continents was an accumulation of bloody struggles of human relations established on limited land, so it was a history of endless wars"; while "the sea is awaiting a new discovery which will promise true happiness for human beings. It is just a matter of time that the civilization of continents hands over its part to the prospective civilisation of the sea commenced by Marine City".

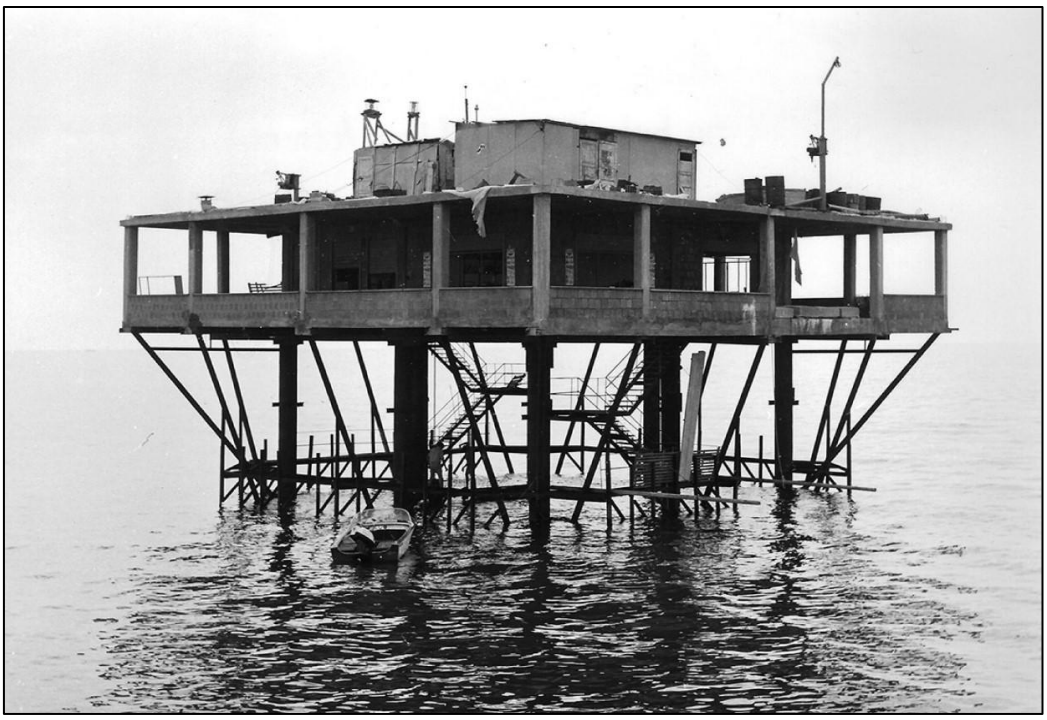
The typology of floating urbanism envisaged by the Metabolists can be broadly divided into two main categories. The first one can be described as a *hybrid* model, which extends land-based infrastructure (notably transport) onto the sea, combining it with technology and modularity specific to floating urbanism. It thus seeks to transcend the functional limits between land and sea, centre and periphery, envisioning a theoretically ever-expandable model. In addition to Otaka, Kurokawa and Kikutake's proposals for the Tokyo Bay masterplan, some examples include Kikutake's Disaster Prevention City (1961) and Shallow Sea-type community (1963). The second category centres on a territorial-scaled, self-contained *floating archipelago* model. It envisages a form of territorialisation entirely independent from the land, spatially governed by its own metabolic cycle. This category includes most of Kikutake's Marine and Ocean City projects (Lin 2010; Koolhaas & Obrist 2011 pp.

354-59; Nyilas 2016). While none of the Metabolists' floating projects saw the light of the day (exception made of Kikutake's Aquapolis, 1975), they spurred considerable technological innovation, largely thanks to Japanese and American government funding.

Examining the relationship between Seasteading and Metabolism reveals a significant conceptual shift. Rather than evolving from Metabolist ideology, Seasteading merely appropriates some of its visual language as a reassuring aesthetic, suggesting that a self-sustaining, adaptable urban system at sea is viable. While Seasteading, similarly to Metabolism, envisages a systemic and dynamic infrastructuralisation of maritime space – one that notably aims to foster individual mobility and empowerment, framed as key preconditions for socio-economic progress – pertinent similarities largely end there. While current prototypes of 'seasteads' function as floating *habitats*, their classification as constitutive element of a floating *city* remains, at present, tenuous.

4. Maritime anarcho-secessionism - the self-made platform and ship

In the same period as Metabolism burgeoned, an entirely different form of marine cities attracted significant investments and public attention. Namely, the short-lived wave of anarcho-secessionist maritime micronations in the 1960s and 70s. These experiments are widely disparate, as their socio-political agenda and spatial embodiments are moulded by the vision of the charismatic leaders promoting them. What they share is a desire to capitalise on the deregulation of the High Seas to enact Libertarian ideals; and a rather picturesque drive to affirm their institutionality through the creation of flags, currencies and post stamps. It is hard not to feel the anticipatory echoes of the interest in Bitcoin and metaverses that would appear only decades later. These experiences can be classified in more 'piratesque' endeavours – led by a small group of people with minimum funding – and more structured ones. The first category groups for example *L'Isola delle Rose* (1968) – a DIY platform near Italy which takes its name from its founder, Giorgio Rosa, and operated mainly as a touristic attraction *[Img. 2]*; and *Sealand* (1967 – today) – an ex-military platform near the UK governed by the pirate radio broadcaster Roy Bates and his descendants (though it wasn't used for this purpose). The latter was even the unlikely object of a daring *coup d'état,* which included kidnapping and a government in exile. The second category groups more ambitious endeavours, backed by solid funding, for example *Operation Atlantis* in its various tentative incarnations as a custom-built ferro-cement boat, reclaimed island and oil rig (1968-73), brainchild of millionaire and Ayn Rand enthusiast Werner Stiefel. In a contemporary reinterpretation of Plato's *Atlantis*, all these micro-nations (except Sealand) either sank or were dismantled militarily by nearby states after only a few months of existence (Graziani 2015, pp. 32-52; Kaji-O'Grady & Raisbeck 2005, pp. 470-74).



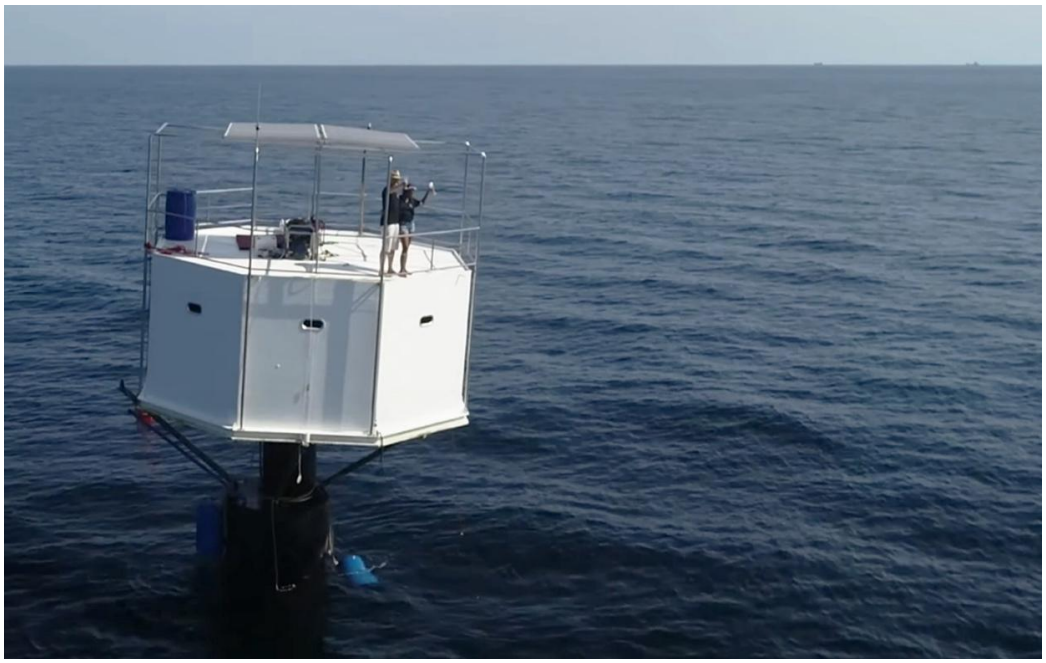
Img. 2
L'Isola delle Rose micro-nation in 1969 (offshore, near Rimini, Italy).

Though not constituting floating cities from a strictly typological perspective, these experiments constitute a non-negligible part of its imaginary, inspiring various books and films and successive secessionist endeavours. While successive endeavours, for example the *Freedom Ship*, never saw the light of the day due to unsustainable costs and timelines, Seasteading emerges as the most tangible and ambitious successor, aiming to systematise this model. All the aforementioned micronations are explored in dedicated sub-chapters of Friedman and Garmlich's 2009 book "Seasteading: A Practical Guide To Homesteading The High Seas". It is, then, perhaps not a coincidence that early attempts at Seasteading associated with The Seasteading Institute (TSI) used the same spatial expedients, namely self-made platforms and repurposed boats.

The first (and at the time of writing only) inhabited Seastead to be stably deployed in international waters was a DIY platform off the coast of Thailand in 2019 [img03]. It had to be precipitously abandoned by its two inhabitants after only two months when Thailand intervened militarily declaring it a threat to its sovereignty. The episode is recounted in epic tones in a Youtube series titled *The First Seasteaders*[2], directed by the TSI's current president. The same firm, Ocean Builders, relocated to Panama. In 2020-21, on the wake of the pandemic, its three founders saw the opportunity to repurpose a cruise ship, the MS Satoshi, into the heart of a Bitcoin-shaped "coastead", a Seastead located in Panamanian territorial waters. Despite garnering a non-negligeable interest from prospective inhabitants, it had to be sold before it came into use because of prohibitive insurance costs. Ocean Builders, which have now distanced themselves from TSI, are developing various models of a luxurious brand, the SeaPod, whose *Alpha Deep* version is deployable in deep water

[2] https://www.seasteading.org/facing-the-storm/

[Img. 4] (Elmhirst 2021; Simpson, 2021; Yarm, 2025; Ocean Builders, n.d.). The SeaPod – similarly to TSI-related designs conceived for shallow waters, such as Arktide's *Coquina* (n.d.) and CSTM's *Arkhaus* (n.d.) – seems to evoke an elite getaway for high-net-worth individuals rather than any sense of urbanity. These navigable pods emerge as the first steps towards the 'you vote by moving your house' ideal: the spatial manifestation of an atomised and individualistic society brought together by temporary interest. As argued by Simpson (2021, p.72), the seastead is as much an infrastructural device as a rhetoric one: "the [performative] construction of the seastead as a space of freedom, and of freedom as a product that could then be marketed and sold.



Img. 3
Ocean Builders, the First Seastead in 2019 (offshore, near Phuket, Thailand).

5. Design Science set sails – neo-liberal speculative coastal experiments

In more recent years, as the implications of climate change – notably in terms of vulnerability to sea level rise, natural disasters and resource scarcity – have taken centre stage in the urban planning and political discourses, amphibious and floating urbanism are increasingly emerging as the 'go-to' solution (Steinberg 2011). Ongoing experiments and visions align with a supposedly post-ideological interpretation of Design Science, tracing back to Buckminster Fuller's legacy. This approach frames spatial design as a neutral, problem-solving endeavour, sidestepping deeper political and economic considerations.

On the one hand, the most prominent contemporary projects draw heavily on the spatial (modularity, scalability and adaptability) and technological (complex buoyancy, metabolic self-sufficiency) concepts underpinning the 1960s and 70s marine megastructures. On the other, as climate adaptation intersects with real estate dynamics, the typology and its strongly evocative imaginary become convenient vehicles to unfold oversimplistic and marketable narratives of sustainable development, romanticised through the 'living in harmony with the sea' trope. This novel capitalist-

driven version of floating urbanism tends to blur the line between sensationalist ‘resortification’ and testing ground for alternative resilient urban models.

Img. 4
Ocean Builders, Alpha Deep SeaPod prototype in 2024 (offshore, near Linton Bay, Panama).

Two examples of modular coastal extension projects well illustrate this trajectory: *Oceanix City* and *Oxagon*. They share a similar spatial model – based on modular floating units that maximise valuable waterfront real estate – and narrative, using compelling videos and renders promising a “trail-blazing” sustainable urban model and vibrant lifestyle (NEOM n.d.; Oceanix n.d.;). *Oceanix City*, designed by the blue tech company OCEANIX and Bjarke Ingels Group, is the perfect embodiment of the typology’s institutionalisation. It has been heralded as “the definitive blueprint for a sustainable marine metropolis” in the framework of the UN-Habitat Roundtables on Sustainable Floating Cities. A prototype meant to house 12,000 people is currently being developed in Busan (South Korea) with the support of UN-Habitat [img05] (idem; UN Habitat 2022). *Oxagon,* on the other hand, is the octagonal-shaped port and ‘4.0’ industrial city proposed as part of Saudi Arabia’s NEOM megaproject. In its promotional video[3], it is presented as a “the largest floating structure in the world, creating a new paradigm for living and working on water”, notably thanks to automation, AI and Internet of Things.

[3] https://www.youtube.com/watch?v=V_p3kl6FHDY&t=4s

Img. 5
OCEANIX and BIG, Oceanix City Busan, expected completion in 2030 (Busan, South Korea).

These projects aren't entirely dissimilar from a full-fledged Seasteading real estate development for shallow waters ('Coastead'). As both models evolve and become more normalised, the boundary separating them is likely to become increasingly blurred. Both present themselves as environmentally friendly (e.g. net-zero energy, zero waste) and eco-restorative (e.g. biorock as building material, algae farming) solutions to often oversimplified discourses on 'environmental refugees' and climate change (see notably Hodson & Marvin 2010). The TSI narrative, outlined in its 'Eight Great Moral Imperatives' (n.d.; Quirk & Friedman 2017), goes one step further, decisively embracing techno-solutionist rhetoric. Both, however, manifest as globalised sea-oriented enclaves, loosely connected to their territorial hinterland, intended communities, or marine surroundings – treated as interchangeable. As such, they can be read as the latest development in juridic-spatial forms of extraterritoriality which blur the distinction between logistic, productive and leisure spaces. Variously combining a strategic position in global flows, fiscal and legislative exemptions, and an appealing coastal leisure environment, these forms of infrastructuralised territorialisation systematise corporate-run space-making which dilutes socio-environmental accountability and reinforces existing power structures (notably Easterling 2014, Farinella 2024 and Abrahamian 2024).

6. Conclusion

Seasteading emerges as the extreme manifestation of Western extractivist and functionalist conceptualisation of the sea as a blank canvas onto which to project yearnings for territorial expansion, affirmation of individual freedom and deregulation. By framing Seasteading within a trajectory of radical floating socio-spatial models, the article highlights how Seasteading incorporates elements of their technological, spatial, and rhetorical frameworks to construct a compelling market identity and legitimise its anarcho-capitalist agenda.

In a historical moment where *extrastatecraft* has become a key driver of territorialisation within and beyond our planetary confines, enjoying a pervasive level of connivance with governmental institutions (notably Eastering, 2014), the Seasteading hypothesis warrants closer examination. It reveals the underlying implications of many “techno-solutionist” visions that have emerged over the last decade catalysing substantial funding, centered on the conquest of ‘otherworldly’ environments, whether distant celestial bodies or extreme terrestrial environments (Abrahamian, 2024). These visions offer a common response to the epochal polycrisis, namely a form of land-based escapism where proposed self-sufficient ‘islands of security’ carve out new geographies of in/exclusion on an unprecedented scale. Taken to their ultimate conclusion, these visions draw legitimation from postulating a future state of permanent catastrophe, “the Future” being reserved for those few that will be in a position to afford it.

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An interdisciplinary model for the next nature-based city

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ABSTRACT
Climate change and the increase in frequency and intensity of catastrophic environmental phenomena closely related to it are problems we must begin to deal with. The design of the city represents a field where it is essential to intervene. However, the starting point for a successful action can only be a utopian project.
Considering the relevance of the current emergency, this contribution investigates the possibility of outlining a theoretical and practical intervention model. This will be developed from Pierre Donadieu's utopian proposal for the urban countryside and designed by drawing on knowledge from different disciplinary fields to respond to the urgent requirements of today's city.
Certainly, the city is now at the centre of all social, environmental, architectural, and economic considerations, but it is essential to revise its conventional paradigm by recognising the urban organism within the natural environment along with everything else connected to it.
Through the critical analysis of some integrative theoretical, methodological, and design components of the French architect's utopia, this paper aims to enhance the dialogue on potential future urban scenarios.

CLIMATE CHANGE | URBAN COUNTRYSIDE | AGROECOLOGY | INTERDISCIPLINARY MODEL

1. Introduction

It is undeniable that the unsustainable and uncontrolled development of cities is one of the main causes of the worsening environmental disasters, most notably climate change and all its consequences. In this regard, numerous experts from international observation programs, such as the European Copernicus project[1], are publishing worrying scientific data.

Therefore, the authorities seem to be mobilising, urged by the worrying future scenarios and the escalating frequency and intensity of disastrous events, often related to hydrogeological and meteorological issues or, more generally, to water management.

It is pertinent to mention - by way of example but not exhaustively - the recent flooding phenomena and landslide movements that strained Emilia-Romagna in May 2023,[2] as well as the destructive flood that affected Spain and caused irreversible harm to part of the Valencian Community's land in October 2024[3].

This contribution aims to overcome the division between theoretical frameworks and practical applications in urban development by synthesising insights from various disciplines such as urban planning, architecture, sociology, economics, and environmental studies. By integrating diverse perspectives and methodologies, we can develop a comprehensive intervention model that not only addresses the immediate challenges posed by unsustainable urbanization but also promotes sustainable growth for future generations. Although acknowledging that this concerning climate situation is a global phenomenon, we have decided to focus on the geographical area of Europe to define a scope of application with at least comparable economic, social, and cultural characteristics. Additionally, according to Lewis Mumford[4], the urban organism is the space in which the greatest social, economic and territorial problems emerge. However, as several current urban planners suggest, this necessary transition must be approached optimistically and constructively, trying not to be enchanted by the mirage of an absolute good, but pursuing a relative one (Granata 2019, p. 116). To achieve this, while an admirable, visionary and creative utopia like Pierre Donadieu's does not claim to be accomplished, but it is useful as a driving force to start foreshadowing a better future scenario.

2. Materials and Methods

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[1] Official website: https://www.copernicus.eu/en

[2] A divulgative but complete reportage in terms of data and photographic documentation can be found in the book: Raggini, A. (2023) *Il tesoro sommerso: storie tra fango e speranza nell'alluvione del 16-17 maggio 2023 in Emilia-Romagna*. Modena: Artestampa.

[3] At the time of writing this text, the damage has not yet been quantified, but several local Spanish newspapers have published videos and articles presenting the gravity of the situation. To mention one: Levante El Mercantil Valenciano, official website: https://www.levante-emv.com/

[4] Mumford, L. (1985) *The City in History*, Vol. 3 *From the Court to the City invisible*. Milan: Bompiani.

Reflecting on Donadieu's well-known utopian and desirable urban countryside model as a starting point, the topic of discussion is how to enforce it for research and practical purposes in the current situation.

With an innovative stance on city planning, this architect offers a unique solution that combines social and environmental factors. He presents a vision where urban development is not hindered by green belts but is instead rooted in agricultural spaces, considering peri-urban landscape as an urbanisation tool capable of sustainably organising the city.

An important initial consideration should be that a single-discipline solution is no longer feasible. The complexity of the treatment and the need to necessarily consider the individual connections between the various parts of the overall system do not allow it (Secchi 2015).

To make this model more tangible, three different components will be explained below. It would at least be desirable to develop these in greater depth to comprehensively define the founding characteristics of a prototype intervention project. These are:

1. The theoretical component for supporting the base knowledge required to outline the model.
2. The methodological component to understand the best ways of investigating the territory, defining a site-specific model.
3. The project-comparative component, presenting one or more cases of application of similar territorial interventions.

2.1 Theoretical component

Although Pierre Donadieu's thoughts are extensively treated both by other intellectuals and reviewed by himself several times[5], additional points can be highlighted.

Firstly, the necessary rebalancing of the natural and anthropic landscape demands a new mindset focused on designs that acknowledge the site's malleability. The imposition of a technocratic power is not a solution that seems to be able to respond to the complexity of the situation by itself: this issue is so relevant that even a public figure like Pope Francis spoke clearly about this in 2015[6]. He highlighted the need to resort to a model of social ecology, attentive to the whole ecosystem as a system of relations between the different living and non-living elements.

A similar concept is expressed in both the writings and projects of Gilles Clément and especially in the emblematic case of the "Jardin en mouvement" (Clément 1990).

Clément's work represents, by way of simplification, a re-evaluation of the 'friche' and its ecological-landscape potential. From this premise, he explains the metamorphosis of the project as a certain

[5] To explore this issue further, see for example: Donadieu, P. (2012). *Paesaggio agriurbano un'utopia realista?* Modena: Consorzio per il festivalfilosofia; Benyoucef, A. et al. (2009). Paysage et projet de territoire: théories, méthodes, exemples. Des bilans français aux projets maghrébins. *Projets de paysage*. https://doi.org/10.4000/paysage.28450

[6] Papa Francesco (2015). *Laudato Sì*. Milano: Edizioni Paoline.

number of human-controlled actions - just to ensure safety, in cases such as the Parc André Citroën in Paris - and heavily related to the natural course of events.

We cannot think of applying such a paradigm to a mobile infrastructure or architecture. However, by incorporating this principle into future planning, we can consider again natural and man-made landscapes as interconnected and interdependent as they existed in the past.

This approach should always be supported by specific knowledge of natural laws so that they become tools for ecological design. In case of a huge emergency, such as in water management, being able to propose solutions that retain it within a given environment seems to be more significant than ever.

Delving into these issues, it emerged that several recent studies have identified permeable soil as one of the most important resources for climate change mitigation (Pileri 2022, p. 30). This topic is extensively dealt with by Professor Paolo Pileri[7], whose education has consisted of "soil protection engineering and land use planning". It corresponds to current environmental engineering. In particular, he studies the conformation of the soil, the causes and consequences of its uncontrolled use. In a sometimes-emphatic form, he gives us an undeniable truth: the less you work, move, and change the soil, the better it is for the ecosystem.

If construction is indeed necessary, it must be done by seriously assessing its environmental impact and resorting to preventive ecological compensation measures[8], which establish a new balance in the environment that has been affected.

It is well known that caring for the soil was one of man's priorities in ancient times before he found other forms of livelihood. However, the intensive forms of agriculture developed following the Industrial Revolution have changed the organisation of the land and impoverished the lands. This is why there has recently been talk of the so-called circular agroecology[9]. It is a transdisciplinary and complex concept that intends to deal with the issues of food security, biodiversity reduction and the establishment of sustainable food systems. The idea of circular agroecology surfaced due to this newfound awareness, promoting a range of practices aimed at minimising permeable soil consumption and fostering diverse polycultures to enhance biodiversity.

The emergence of organisations - especially at the European level - for the protection of food and agriculture, such as the FAO (Food and Agriculture Organization of the United Nations),[10] certainly demonstrates a growing awareness of the importance of this issue. Indeed, even in recent academic

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[7] Another remarkable work of Paolo Pileri are the volumes: Pileri, P. (2024). *Dalla parte del suolo. L'ecosistema invisibile*. Milano: Laterza; Granata, E., Pileri, P. (2012). *Amor Loci. Suolo, ambiente, cultura civile*. Milano: Raffaello Cortina Editore.

[8] On this topic, consult the book: Pileri, P. (2007) *Compensazione ecologica preventiva. Metodi, strumenti e casi*. Roma: Carrocci

[9] Gentili A., Zampetti G. (ed.) (2021). *Agroecologia circolare. Dal campo alla tavola. Coltivare biodiversità e innovazione.* Milano: Legambiente; Ambiente.

[10] Established in 1945 and whose role is becoming increasingly significant within the most important global discussions, official website: https://www.fao.org/home/en/

literature[11], the difficulty and necessity of integrating the agricultural system with the actual urban organism are underlined.
As the well-known Professor Sébastien Marot reminds us in his work and reiterates in his latest book published in 2024[12], reviewing the relationship between architecture and agriculture seems to be a necessary condition to establish the next scenarios of the future city.
Human responsibility in overcoming global phenomena defined in the scientific world as 'planetary limits' is undeniable. However, even if it may seem impossible to completely reverse the planetary damage, it is still possible to mitigate the issue in the long run for future generations.

2.2 Methodological component

Concerning the explanatory potency of Donadieu's utopian vision and the theories that have been advanced to complement it, it is equally crucial to delve into a significant methodological aspect.
To obtain a credible interdisciplinary model for the future city, it is also necessary to define a schematic protocol of investigation. In summary, it is a matter of identifying several survey practices - or favourable combinations of them - that will make the subsequent planning and design phase easier. It is also imperative to understand the real problems and potentialities of the local context.
A similar approach to the project had already been envisaged in Italy by the IBC (Institute for Artistic, Cultural and Natural Heritage) in Emilia-Romagna. The method they proposed involved the critical analysis of cartography, supported by dedicated photographic campaigns and on-site experiences to verify the real status of places.
This idea was pursued by the Italian geographer Lucio Gambi - a staunch supporter and member of the IBC group - whose considerable contribution, also social and political, to the picture of Italy's transformation is well known.
A work of systematic explanation and definition of correct methods of investigation, followed by subsequent application to a practical case, was also done by geographer Eugenio Turri. He is an important scholar of anthropological changes in the territory and their effects on the landscape over a long period. The basis of his didactic intention towards individuals responsible for overseeing, constructing, or dwelling in a certain territory lies in his background. (Turri 2002, pp. 7-9).
Furthermore, Turri underlines the importance of a survey that is supported by historical and recent photographic documentation and their comparison. This is a practice shared by both the Italian and French schools of landscape architects and architects, which have initiated several collaborative projects, including public ones[13].

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[11] Zaffi, L., & D'Ostuni, M. (2020). Città metaboliche del futuro. Fra agricoltura e architettura. *AGATHÓN –International Journal of Architecture*, Art and Design, 08, 82–93.

[12] Marot, S. (2024) *Prendre la clef des champs. Agriculture et architecture*. Marseille: Wildproject.

[13] For example, the photographic and artistic mission carried out between 1984-1988 by the Délégation à l'aménagement du territoire et à l'action régionale (DATAR) to represent the state of French territory is well known.

The last element to be included in this research approach is the anticipation of potential future scenarios. This brings us back to the central core of this paper, which is that a utopian representation is one of the fundamental steps towards achieving certain urban, socio-economic and cultural objectives. A design exercise widely employed by the famous Secchi-Viganò research and design group is trying to understand the reactions in the macrosystem of certain proposed choices.
It is not guaranteed that forecasting a scenario will generate complete endorsement for a specific current. This is demonstrated by Arturo Lanzani examining seven different scenarios for the Italian landscape (Lanzani 2003). He theorises that pursuing purely ideal plots is impractical, advocating instead for hybridized solutions to overcome inherent weaknesses.

2.3 Project-comparative component

A final detail to note about the methodological component is the importance of acquiring one or more project-comparative case studies. This separation allows for a more in-depth analysis of the specific case study, providing a detailed examination of the factors at play and the outcomes observed. Additionally, by explicitly stating the reasons for including a comparative case study, we can justify our methodology and demonstrate the value of this approach in enhancing the overall research findings.
Considering similar practical cases is necessary at some point in the project development process. It can become a reference from which to understand the results to be achieved and those to be avoided.
A model of considerable relevance, as it is aligned with the features enumerated above, is the blueprint for the “Continuous Productive Urban Landscape”, developed by the English architectural firm Bohn & Viljoen[14].
Originally proposed as a theory, it was subsequently used to handle specific spatial scenarios within the Greater London Area (GLA), including the famous Thames Gateway, in which some feasibility studies were made for the future expansion of the area in question.
There are many points in common between Donadieu's utopia and this case. The English architects group proposes a continuous system of permeable areas to produce food for the local community. This new urban design closely aligns with the system, positioning it as the primary organizer of both natural and man-made surroundings.
Their aim is achieved by particularly insisting on two fundamental aspects that are only marginally covered by the French architect. The first is the impossibility to remove the existing urban fabric, but it is necessary to carve out space for such interventions in the interstitial landscape voids, or in certain areas to be re-planned anyway. The second practical aspect concerns the importance of

[14] For further information on their work, see the official website: https://bohnandviljoen.co.uk/

providing for the reclamation of the land where intervention is to take place, whose magnitude is certainly underestimated.

In addition to this, the founding themes of the project that are identified are food security, the benefits of social growth associated with it, and the use of nature-based methods such as permaculture to achieve ecosystem-friendly results.

It seems appropriate to point out that this continuous urban farming system must be supported and monitored by local authorities.

The benefits of this case study lie in the fact that it presents several adaptive solutions that can be easily extrapolated and reported elsewhere.

3. Discussion and conclusions

The utopian blueprint outlined throughout the aforementioned different components is certainly complex, but not unrealizable.

Its interdisciplinary approach - appropriately premised at the beginning of the contribution - has also been proved in the essay. The explored model is composed of parts defined by architects such as Pierre Donadieu, landscape-biologists such as Gilles Clement, but also geographers such as Lucio Gambi or Eugenio Turri. It is also proposed to employ cartographic, bibliographic and photographic sources on the same level of relevance, and in this aim can be found one of the innovative concepts of the model presented. A properly researched photograph of the territory can tell the micro-history of a transformation better than any other source.

Only through the use of multiple methods it is possible to fully understand the current European agro-urban context and intervene appropriately. After this first phase, the idea emerged to reorganise the landscape starting from the natural-agricultural part and assuring the increase of permeable parts and the use of nature-based systems - both for water management and for other natural resources - reviewing the present natural-anthropic balance. To this purpose, soil has appeared as an endangered tangible/intangible resource on which to operate. As early as 1986[15], Bernardo Secchi warned of the risk of not giving the soil project sufficient importance.

The serious planetary problem we deal with is proving difficult to solve. However, there is a twofold way forward: on one hand, working with municipalities to integrate methods of studying and designing the land as presented more in management plans than in urban planning. On the other hand, we can make the population more aware of what is happening, including intangible issues, in their local area and in the city.

Going back to the theme of the congress, the positive side of the utopia is that it imposes a propulsive critical confrontation with the present and its history (Secchi 2005, p. 65).

[15] Secchi, B. (1986). Progetto di suolo. Casabella, 520–521, 19–25.

It seems, therefore, even more fundamental for the present moment of environmental and social difficulty, to begin from a critical analysis of the current environment, through utopia, identifying what the priority problems are and optimistically trying to solve them.

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[In]tangible connections

projects involving local communities, the aim is to show how public spaces can be transformed into drivers of sustainable development, transformation and invention. These actions could respond to the needs and aspirations of those who live in these places, overcome inequalities and social exclusion, and enhance the quality of urban life and the expression of differences. Critically questioning public space means reflecting on the responsibilities of urban design and policies in making plural forms of coexistence in urban and territorial space visible, practicable and lasting.

A first thematic area that emerged from the selected contributions addresses public space as a place for the construction of collective identity and as a field of tension between community practices and dominant institutional models. In this case, public space is not considered as a simple container of functions, but rather as an active device, loaded with political, symbolic and relational meanings, in which power relations, forms of belonging and conflicts (latent or manifest). The three articles question this dimension by highlighting how the materiality of public space is deeply intertwined with immaterial processes of identity,
recognition, narration and collective appropriation.
This approach reveals an interpretation of public space as a relational environment in constant transformation, in which practices of use, urban policies and design devices intertwine, producing often provisional and negotiated arrangements. The focus is therefore less on the formal outcomes of interventions and more on the processes that generate and traverse them, highlighting the role of local actors and modes of everyday appropriation in constructing the meaning of collective space. Public space is configured as a place where the project is not exhausted in the act of design, but is continually confronted with social practices, conflicts and adaptations that redefine its uses and values over time.

Cannata's contribution analyses the phenomenon of unfinished public works as a tangible expression of an institutional and democratic crisis, reading these suspended spaces as the outcome of interrupted political and administrative processes and, at the same time, as potential places for civic reactivation. Through a critical reinterpretation of the concept of public space in the light of theories on power and the commons, the author shows how bottom-up spatial approaches and practices can transform these artefacts from symbols of failure into material infrastructures for a deeper and more participatory democracy. The temporary, performative and collective actions described highlight the role of space as a threshold, capable of reconnecting communities and institutions and reorienting the public meaning of the unfinished towards new forms of shared use and future planning. A second interpretation emerges in the article by Amatori and Varini, which addresses public space in historic villages as a fundamental habitat for the construction of a sense of belonging and as a terrain of conflict between local identities and processes of consumption and touristification. Through the example of Borgo San Giuliano in Rimini, the article highlights how the progressive transformation of collective space into consumer space leads to a loss of social relations, a weakening of shared memory and the marginalisation of long-standing residents. Co-design and community design practices are interpreted as tools capable of re-semantising places, restoring centrality to inhabitants and reactivating the link between the material dimension of space and the immaterial dimension of identity. Public space can thus become a field of mediation, a place where the project acts as an open and inclusive process, aimed at countering dynamics of exclusion and standardisation. In the third contribution, Saladino shifts the focus to marginal, hybrid and peri-urban contexts, investigating local development tools and practices, such as maps and community cooperatives. In this case, public

space and territory are read as complex systems of material and immaterial stratifications, in which the community itself operates as an intangible infrastructure that can activate processes of enhancement, narration and shared management of resources. The experiences analysed show how the production of participatory maps and cooperative action contribute to strengthening local identity and social cohesion, making visible values and meanings that are often absent in institutional representations. Nevertheless, the contribution also highlights the limitations of such practices in the absence of integrated territorial policies, emphasising the need for a more structured dialogue between grassroots initiatives and planning and programming tools.

These first three contributions offer a detailed and complementary reading of public space as a place of intersection between tangible and intangible dimensions, highlighting the role of participatory practices and community enhancement processes in redefining the uses and meanings of collective space. Although operating on different scales and in different contexts, the contributions converge in recognising the central role of public space in the construction of identities, the management of conflicts and the promotion of more equitable and inclusive models of development, opening up critical perspectives on the relationship between design, urban policies and community life.

The second thematic area consists of three contributions that investigate the design of public space as a practice capable of promoting forms of inclusion and integrating social, environmental and cultural dimensions. These contributions also lead to an important reflection and critical analysis of the role and methods of intervention of architects and designers in relation to the urban community within complex projects for the revitalisation of public and collective spaces.

Yu Chen's article, integrating theories and methods of urban design and social sciences, analyses the contribution of Nature-based Solutions (NbS) to sustainable urban development, highlighting how urban public spaces can become strategic locations for green actions and solutions aimed not only at environmental outcomes but also at social inclusiveness. The study shows that NbS foster relationships between people by creating opportunities for social inclusion and community involvement. While most NbS projects focus primarily on environmental outcomes, Yu Chen's research investigates the intangible dimensions of urban space by analysing, through the collection and analysis of good practices, how different NbS contribute to social inclusiveness and can be useful in the creation and transformation of inclusive public spaces.
The work of Manfroni and Priola, on the other hand, explores the importance of community-based design practices as a response to contemporary socio-environmental issues (global uncertainties, pollution, climate change and biodiversity loss), highlighting the great potential of collaborative and “symbiotic” design approaches in encouraging and promoting the spread of a “collective ecological consciousness”. The research therefore investigates the contribution of design in creating networks of collective knowledge through the adoption of “rhizomatic” processes, communicative approaches and local ecological practices. This leads to the emergence of new forms of civic action that are useful for promoting a sense of ecological citizenship and community. Through the analysis of case studies and the use of the *Circular Value Framework*, design is studied as a force capable of triggering positive changes that can transform everyday practices and individual and collective behaviours into concrete actions oriented towards “*co-futuring*”. The adoption of different collaborative and relational approaches encourages the identification

of appropriate responses to environmental challenges to bring benefits on different scales, from that of communities of citizens to that of ecological environments and society. Some of the case studies examined, relating to formally structured communities, highlighted the potential offered by contributions arising from dialogue between designers and communities of citizens, who were able to tackle and overcome challenges in a dynamic and cooperative manner.
Finally, Montanaro's contribution offers an interpretation, based on ethnographic research, of the process of constructing the Community Centre in the village of Zhaoshan, in Hubei province, China. The author critically analyses top-down narratives of the transformation of public spaces, specifically investigating the interaction between material and design choices, the relationships between stakeholders and the socio-economic consequences of the construction phase of the Community Centre. The architectural realisation process is read and analysed as a “cosmogram” based on the close intertwining of design, local economies, bureaucratic and legislative frameworks, and the distribution of benefits. The study of the interaction between different construction systems has, for example, highlighted how technologies influence the relationships between the parties involved, local economies, and the impact on the community. The contribution also highlights how the constraints imposed by institutional frameworks and procurement standards have favoured replicability over the satisfaction of local needs and the achievement of community objectives within rural regeneration practices. The research reveals an expanded role for the architect as a mediator between political mandates and community objectives, in order to enhance socio-economic dimensions that are often neglected. In the context of investment in public spaces, the contribution seeks a response to the need to bridge the gap between the construction market and the public interest of the community.

Compared to previous contributions, the research by authors Fangyu Chen, Erdmann-Goldoni and Zhengzheng stands out for its highly methodological and operational approach, aimed not only at understanding urban phenomena, but above all at constructing analytical tools, decision-making models and conceptual platforms capable of providing concrete support for public space planning processes. In these works, public space is interpreted as a complex system, where physical and measurable dimensions are constantly intertwined with intangible components, such as social practices, cultural values, community relations and the temporal dynamics of urban use.
Fangyu Chen's research specifically addresses the issue of health equity and accessibility to services for the elderly population in the Chinese urban context, taking the Wenjiang district in Chengdu as a case study. Through the integrated use of GIS analysis, accessibility, and location gravity models, the research highlights how the spatial distribution of elderly care facilities produces significant inequalities in access to care services. The adoption of an improved analysis model overcomes the limitations of traditional measures based exclusively on proximity, integrating factors such as service capacity, elderly population density, and walkable distance thresholds. In this way, accessibility is interpreted not only as a technical variable, but as a key indicator of social equity and urban quality of life, demonstrating how location and infrastructure choices directly affect social relations and well-being opportunities for the most vulnerable groups.
Erdmann-Goldoni's article takes a broader, more theoretical approach, proposing *Public Scape* as a data-driven platform for the regeneration and revitalisation of public spaces. The contribution responds critically to the limitations of traditional approaches to urban planning, which are often based on fragmented data and focus primarily on the tangible aspects of space, such as infrastructure and environmental

parameters. *Public Scape*, on the other hand, is an integrated environment that combines spatial data, socio-economic information, environmental indicators and community feedback, promoting more inclusive, transparent and participatory decision-making processes. The use of advanced GIS tools, predictive analytics and post-intervention monitoring systems allows top-down and bottom-up perspectives to be combined, enhancing the role of users and local communities in defining the meaning and functions of public space. In this sense, the platform explicitly recognises the value of intangible dimensions, such as cultural identity, collective memoryand social involvement, considering them essential elements for the long-term sustainability of urban regeneration processes.
Zhengzheng's work completes the picture by proposing a *task list* of space-time components as an operational tool for optimising public open spaces. The research starts from the recognition of the dynamic nature of urban space, whose use varies throughout the day, the seasons and over the long term of urban transformation. Through the integration of spatial and temporal dimensions, this innovative task list provides a structured guide for systematically addressing issues related to accessibility, safety, environmental comfort, social interaction, cultural dimension and urban aesthetics. The proposed model stands out for its ability to translate abstract objectives – such as urban identity, social cohesion and environmental sustainability – into operational indicators and design strategies that can be adapted to different types of public spaces, from historical contexts to contemporary commercial areas.

Taken together, these contributions demonstrate how advanced analytical tools, spatial models and integrated digital platforms can become fundamental levers for effectively addressing the challenges of equity, sustainability and urban quality of life, offering concrete support for decision-making processes in the field of planning. At the same time, the authors emphasise the need not to reduce public space to a mere sum of technical or performance parameters, but to recognise and value its social, cultural and symbolic complexity. From this perspective, the integration of quantitative data and intangible dimensions emerges as an essential condition for developing fairer and more inclusive urban policies, capable not only of improving the efficiency and performance of spaces, but also of responding flexibly and sensitively to contemporary urban transformations and the diverse needs of the communities that inhabit them.

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From public space to consumer space, or vice versa? Re-semanticizing places through design

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ABSTRACT
This paper analyses methodologies and approaches of transdisciplinary design and identifies co-design practices and processes of re-establishing communities' sense of belonging to representative places for public life, encounters, collective experiences, debates, and protests within villages. Historic villages are currently facing significant depopulation phenomena which, in rural and inland areas, can be attributed to the lack of job, relationship opportunities, essential services, and tiring or often unremunerative agricultural or craft activities. But in urbanized villages, what could be the cause of the abandonment of residents? The Borgo San Giuliano in Rimini exemplifies some of the dynamics that underlie it: once a vibrant fishing-artisan community, it has transformed into a space dominated by tourism, eroding local identity. This shift highlights public spaces no longer as resources of the local community, but as consumer goods, increasing gentrification and loss of social ties. Strategic and community design plays a critical role in re-establishing a balance between inhabitants and place, enabling participatory processes that make residents protagonists in the shaping of their environment.

CO-DESIGN | SYSTEMIC DESIGN | HISTORIC VILLAGES | LOCAL IDENTITY

1. Habitat and sense of belonging

Public space is crucial habitat for the educational, evolutionary, and social life of communities, whether within large or medium-sized urban centers or in more circumscribed contexts such as historic villages[1]. In the latter, even if the number of inhabitants and places of aggregation is reduced, a cohesive community is more likely to be found, which identifies itself in collective spaces –natural and artificial– of daily attendance. This community is deeply rooted in the immaterial dimension of the relationship between the human being and the place and expresses itself in social moments – for instance pagan or religious rituals– in which essential, voluntary and social activities combine to give a soul to the village (Gehl 2012; Sennet 2020). Often deprived of some important primary facilities and socio-economic opportunities, the Italian 'borghi' have arisen public interest and posed complex challenges for researchers, attracting more and more funds for the reactivation of local micro-economies and to stop depopulation phenomena, which impact on both isolated villages and those incorporated into cities: historically defined as autonomous organisms, with unique landscape, environmental, structural, social and cultural characteristics, they are now experiencing a loss of community identity, often due to tourism-led gentrification (Cristiano & Gonella 2020).

Emblematic in this sense is the Borgo San Giuliano in Rimini, built as a village of fishermen and artisans 'extra moenia' (Ghirardelli, Pasquinelli, & Spadoni 2008). From being a neighborhood of popular extraction with a strong community vocation based on skilled trades and age-old traditions especially linked to the sea, in the last fifteen years, it has become a place of a frenetic and monocultural consumption aimed at the exclusive needs of the tourist, rather than those of the community-inhabitant who feels slowly rejected by the place having lost its landmarks. This functional shift is the involuntary consequence of an initial positive phase of redevelopment and regeneration of the area, followed by a deleterious phase of widespread and undifferentiated aggression and replacement by the feverish offer of new commercial activities or events with an impersonal and globalized aspect, often patronized by the Municipality (De Vita 2021).

Since the social space represents essentially that characteristic and emblematic place of the community that inhabits it, perceiving it as its own authentic common good, what occurs when the threshold space, between the public and private realms transforms into a commodity and a possession of a few, homologated and exclusively functional to the tourist economy? If the tourist-led gentrification uproots residents from their places of living, erasing intrinsic affective ties and social values, how can design contribute to restructure a sense of community and belonging, preventing the loss of identity? Can design work transversally by re-conceptualizing the environmental, social, and economic dimensions of public space in an inclusive manner among all user categories?

On one hand, the importance of methodologies for the enhancement and revitalization of villages in rural areas through cultural and design projects has been highlighted, with public space serving as

[1] The term "village" refers to those urban organisms that in Italy are also known as "borghi".

the focal point for reactivation efforts (Brignoni, Gasparotto, Dall'Osso & Varini 2023). On the other hand, while the depopulation of urban villages and the loss of their identity are often analyzed in relation to the impacts of tourism, less attention has been given to the resistance practices that emerge in response to the rising tourism-driven gentrification (Iovino 2016; Cristiano & Gonella 2020; Basso, Fava & Fregolent 2023). Even more complex is finding examples of how design can return public space to its community, avoiding identity loss and preventing the phenomenon of tourism-led gentrification.

Hence, the present research aims to move in this direction establishing the Borgo San Giuliano as the crossroad for interdisciplinary experimentation and contributing to a broader body of work conducted by the Community Design Research Unit of San Marino University.

In particular, in the following pages, some worthy case studies will be listed, in order to represent and certify an intangible heritage to be preserved and protected.

2. Methodology

The contribution constitutes the starting point of a two-year-long search, aiming to be accomplished in September 2026 during the 'Festa De' Borg', the biennial neighbourhood event that preserves the traditions and history of this area. In this initial phase, outlined within a roadmap [Fig. 1], the study has primarily been conducted through a desk research, on-site visits, and informal interviews with some key stakeholders.

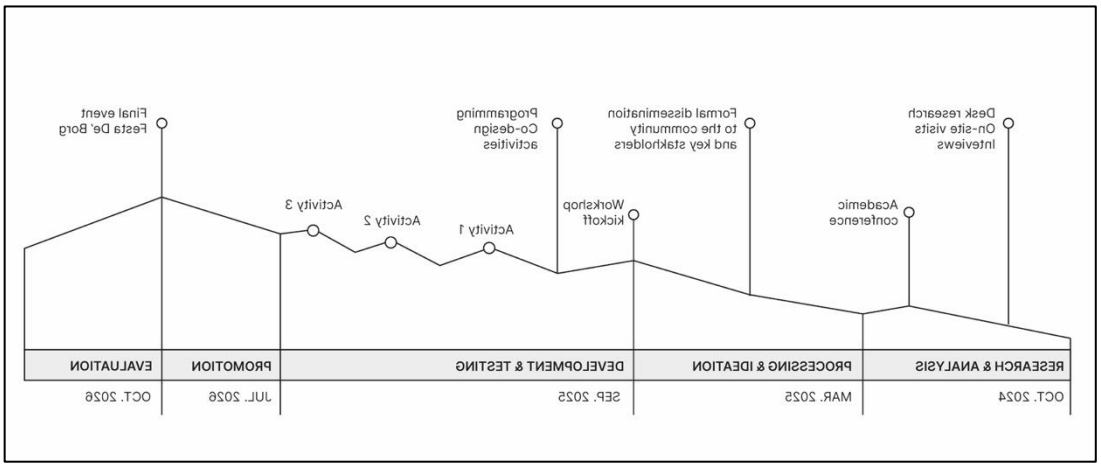

Fig. 1
Roadmap of key activities planned for the research project (credit: C. Amatori, 2024).

In order to define the project framework, it was examined the scientific literature on the enhancement of community identity and sense of belonging within historic villages mainly through co-design practices. Based on approximately 100 case studies[2], two relevant projects were identified. These were selected according to the project promoter, differentiation and number of stakeholders involved,

[2] It was mainly used the database of the research project 'Stretch the Edge: Design Driven Processes for Reactivating Small Walled Towns and Inland Areas', conducted by the Design Research Department of the University of San Marino and Bologna that define an operational taxonomy of best design practices (UNIRSM 2023).

the level of the community engagement, the use of collaborative processes, main activities, design disciplines involved, as well as the project's duration, outcomes, and impact. For this purpose, the focus was projected on two Italian realities located in places - Calabria and Sardinia - that even if differ to the Borgo San Giuliano in Rimini, proved to be functional to better investigate the correct indicators to correlate with the contingent situation in Romagna. 'BelMondo' project guided by the association 'La Rivoluzione delle Seppie', aimed to re-imagine and revitalize the historic center of Belmonte Calabro, and give the community the opportunity to appropriate the public space basing on collective and emerging social needs. Born from a research group of the London Metropolitan University in 2016, still active, the project aims to gather national and international professionals, academics, local institutions, and inhabitants in order to experiment urban and social reactivation through participatory workshops, informal meetings and cultural exchanges, focusing on the local human and entrepreneurial capital [Fig. 2] (Adamo 2022; La Rivoluzione delle Seppie n.d.).

Born in 2016, 'Restart. Innesti Urbani' is part of an ongoing research project taking place in the historic Oliena city center, in Sardinia Region. Through the definition of a shared language and practices between locals and professionals, the implementation of a series of events, such us workshops, exhibitions, round tables, the project aims to generate an experience which would allow local inhabitants to recognize the value of their tangible and intangible cultural heritage, building meaningful scenarios in the contemporary and future culture and uses, and encouraging the formation of a sense of belonging to the community [Fig. 3] (Boi, Camocini, Daglio, Mazzarello & Podda 2018).

Alongside the methodological framework, an historiographical investigation was undertaken using bibliographic sources, cartographic materials, and photographs related to the Borgo San Giuliano. The documentation was primarily gathered from the archives of the Gambalunga Library in Rimini, which holds the largest collection of documents related to the city. Moreover, an informal interview was conducted with Tommaso Panozzo editor, collecting texts on the history and culture of Rimini since 1981. In addition, various documents and digital platforms were examined, including the Open Geo Data and the Interactive Maps Portal of the Municipality of Rimini, the general urban planning regulations, and the Airbnb platform. Through this documentation and many on-site explorations, a mapping of local services has been designed, covering commercial enterprises, hospitality services –e.g., restaurants, accommodation–, cultural centers, social spaces, educational and healthcare institutions, and sports facilities. This effort led to the creation of a territorial map through Google My Maps, used to analyze how the area has been developing during the last decades, and facilitated the identification of key stakeholders and the assessment of their prospective involvement in the project.

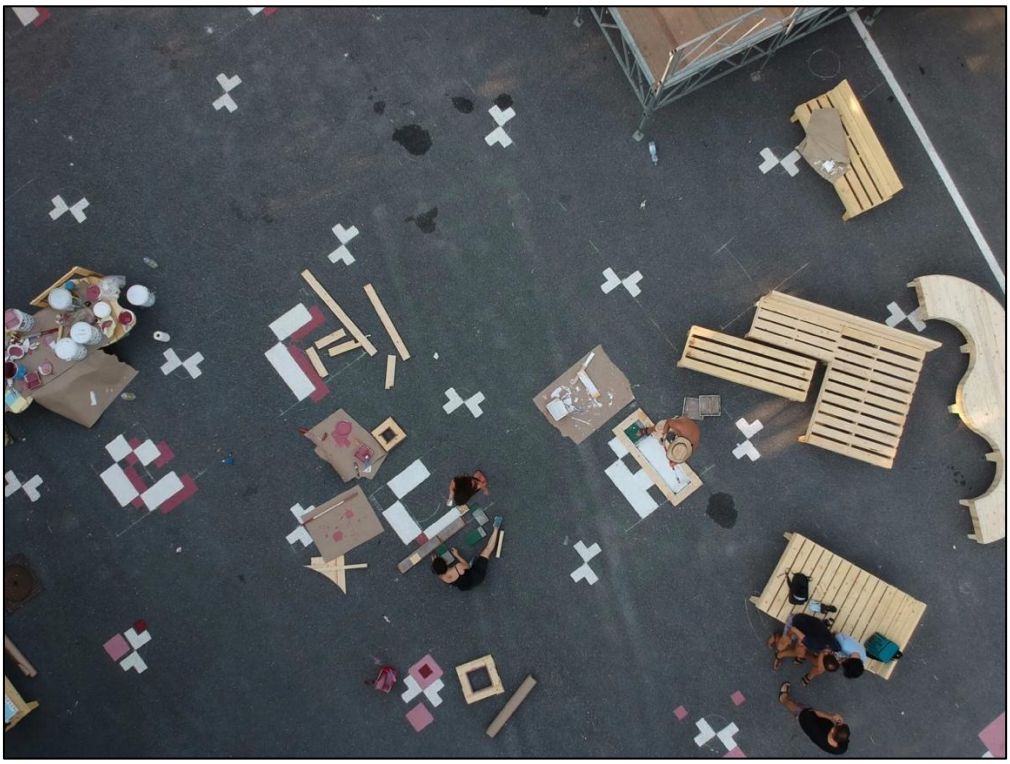

Fig. 2
Crossing 2022 workshop organised in Mercato Marina, located in Belmonte Calabro (credit: La Rivoluzione delle Seppie, 2022, https://larivoluzionedelleseppie.org/galleria/).

Fig. 3
Visit to the site-specific installation in Oliena in 2018 (credit: Daglio et al. 2020)

3. From depopulation to tourism-led gentrification

The Borgo San Giuliano, established during the Middle Ages as village outside the city walls of Rimini by the Marecchia River, was predominantly inhabited by fishermen and sailors (Conti & Pasini 1982). Over the past century, it has experienced cycles of depopulation and repopulation, leading local politicians, and administrators to recognize its potential. Ghirardelli & Pasquinelli (2013) describe how the collective awareness of community life in the post-war period was evident in the active participation of residents in the Communist Party and the founding of the 'Primo Maggio' Circle. "Mainly composed by sailors, factory workers, carters, coachmen, manual laborers, railway workers, and some shopkeeper" (p.6), the community underwent a transformation during the economic boom and the rise of a tourism-based economy. Many residents moved to residential neighborhoods and

public housing, and local businesses and craft shops ceased to exist, while commercial activities along Viale Tiberio, the main thoroughfare, became more dominant. This initial depopulation was interrupted by the first 'Festa De' Borg' in 1979, which marked the regeneration of the Borgo values and identity [Fig. 4] (Ghirardelli et al. 2008). Between 2011 and 2021, the municipal administration promoted a further transformation in the Borgo, with new commercial and social entities and residents establishing themselves.

Fig. 4
Procession organised during the 4th Festa De' Borg in 1984. People occupy the public space with tables and chairs. (Credits: Archivio fotografico-Biblioteca civica Gambalunga, Rimini)

Fig. 5
On the left, some children play in Gabena Square in 1974. On the right, the same square enclosed by stalls and occupied by cars nowadays. (Credit: Archivio fotografico-Biblioteca civica Gambalunga, Rimini)

Through the new urban planning regulations and the management of European Union funding, Rimini initiated a long-term urban redevelopment project, making the Borgo increasingly attractive (Giuzio 2024).

It has been observed that Airbnb activities have tripled over the past ten years, as have the prices of real estate and hospitality services. The public space, which 30 years ago was a meeting and discussion area for the residents, has progressively lost its social function and transformed into a parking lot for cars and a space for outdoor dining activities [Fig. 05]. The historic village bakery, a traditional habitat for the cultivation of fruitful transgenerational neighborhood relationships, has been replaced by the aseptic and impersonal business of a multinational fast-food chain. The change, progressed after the Covid pandemic, also involved the removal of some stalls and benches created by the Ci.vi.vo group[3], which had been used as social spaces. The growing tourist interest, the abandonment and disappearance of residents from their activities, and the privatization of public spaces for the benefit of a few led to the formation of a Committee of Borgo residents in 2016, who felt the urgency to oppose the massive transformation the area wasundergoing.[4]

4. Design practices for re-establishing community identity

Based on the analysis, the inhabitants are losing their sense of belonging as expressed by Granata (2024), the place begins to lose its intrinsic value, “authenticity and uniqueness, quality and distinction, in favor of conforming to a single model of easy and ready-to-use tourism, identical in every location” (p. 7).

Both case studies –BelMonte and Restart. Innesti Urbani– offered valuable insights into how strategic design and co-design practices can help address this phenomenon. Their analysis was guided by a framework that synthesizes key factors relevant to the research [Fig. 6]. Both initiatives, originated within university research groups, have been affected by design in managing different approaches provided by the interdisciplinary leader group, engaging local citizens in co-design activities, fostering the knowledge exchange through workshops that resulted in tangible results and different outputs, such as setting design and exhibition, re-discovering the design potential of shared immersive experience and narrative tools, helping to interpret the local historical heritage with a new perspective that includes new behaviors and innovative uses. Through a program of interventions and initiatives alongside the local community, villages progressively rebuilt their unique identities. The local community reclaimed public space, new social dynamics emerged between old and new residents, and a network of relationships with stakeholders at various levels was established. Social, cultural, and economic impacts are visible thanks to projects’ longevity that also allowed to build

[3] The City Council of Rimini approved, with resolution no. 282 of 2011, the ‘Regulations for the conduct of civic volunteering activities’, to enhance a new civic engagement through the direct involvement of citizens in solving problems and fostering the awareness that public spaces belong, above all, to citizens (https://www.civivo.it).

[4]

credibility among stakeholders and a high degree of territorial and extra-territorial dissemination (Boi et al. 2018; Adamo 2022).

5. Re-composition

Depopulation phenomena in villages within rural territory has been analyzed along the last decades. Many academics, practitioners and public administrators studied and designed methodologies, tools, and laws to enhance and reactivate public places. Less effort has been spent for resolution of depopulation phenomena within urban villages, largely driven by tourism-led gentrification, which have prompted local populations to migrate towards more livable environments.

Cases such as San Gimignano in Tuscany or the Cinque Terre in Liguria illustrate how tourism has never been properly regulated, and how political agendas have often promoted a growth-oriented vision without adequately considering the potential harms to local communities and the environment (Mura 2024; Allegri 2020). As noted by Cristiano & Gonella (2020), “when the side effects of over tourism become mainstream, it is often too late to intervene, and emergency policies are therefore implemented, for example through special or urgent laws, which are scarcely democratic by definition” (p.2).

	BELMONDO	RESTART. INNESTI URBANI
LOCATION	Belmonte Calabro (Calabria)	Oliena (Sardinia)
INHABITANTS	> 2000	> 2000
ACTIVATOR	La Rivoluzione delle Seppie London Metropolitan University	Design Department (PoliMi) ABC Department
TIMEFRAME	2016-ongoing	2016-2019
TARGET	Children, asylum seeker, students, academics, professionals in the creative fields, elders	Local citizens and associations
KEY STAKEHOLDER	Orizzontale, Comune di Belmonte, Arts of the Working Class, Cheap, Ex Convento, London Metropolitan University	Fondazione Sardegna, Tianjin University (China), Sassari University, Cagliari University, GAL Barbagia, Oliena Municipality, Oliena Centro Association, OICE, Presting S.r.l.
FUNDING AGENTS	Regional and private contributions, E.U. funding	Regional and local funding
MAIN ACTIVITIES	Co-planning, remote working, widespread hospitality, regeneration of underused and abandoned spaces, creation and development of businesses and innovative start-ups, creative workshops, round tables	Round tables, students' projects exhibition, setting design event, interdisciplinary group workshops
DESIGN DISCIPLINES INVOLVED	Exhibit Design, Interaction design, Design strategy, Design for social Innovation, Critical Design, Co-Design, Design thinking	Exhibit Design, Interaction design, Design strategy, Design for social Innovation, Participatory Design, Co-design
MAIN RESULTS AND IMPACT	1) More appreciation of the territorial potential and creating new points of view within the local community in their hometown; 2) Research and feeding of the culture of own community, with shared goals; 3) Cultural occupation generates attraction to the territory for a possible repopulation, even if temporary but constant; 4) Collaboration between the global and local reality to configure a powerful agent for affirming the empowerment of local actors and maintaining culture, even in areas lacking the offer; 5) Creating a new international community capable of collaborating to conserve and develop culture can bring economic well-being and society to marginal realities like urban areas.	1) Increased the sense of awareness about the relevance of local historical heritage and of ownership of the place, witnessed by the creation of the Oliena Centro association; 2) Reaction to cultural and territorial isolation, tracing meaningful connections with other homogeneous realities; 3) Deep involvement of local community, stakeholders and visitors.

Fig. 6 The framework synthetizes the main indicators of the case studies of BelMonte and Restart.Innesti Urbani (credit: C. Amatori, 2024).

After experiencing periods of depopulation and repopulation, the Borgo San Giuliano is still under the spotlight of public administration, which continues to promote actions and interventions aimed at its redevelopment, but homologation and gentrification impoverish and aggravate the marginalization of its residents. It thus seems worthwhile to explore design practices to halt this process and recreate a sense of belonging for the local community to the place.

Many are the experiences where design functions as a mediating tool that bridges the intangible dimension of community memory with the recontextualization of the tangible culture. It serves as a facilitator of processes, reinterpreting contextual and situated elements to cultivate a renewed identity within spaces. This approach engenders new functions conceptualized by the residents themselves, fostering relational dynamics among individuals and between individuals and the

environments they inhabit. Playing a supportive role in the construction of a balanced ecosystem of relationships between the local and the global, it generates processes of sharing visions for the reactivation of the common good, rediscovering, or recreating systems of proximate relations, while expanding and strengthening networks of stakeholders who reclaim local microeconomies (Manzini 2015).

If a community survives over time only if it is intrinsically determined to regenerate, coexist, merge, and interact with its internal and external differences, then there is reason to hope that this moment of self-critical transition for the Borgo will lead to the birth of new and unexpected opportunities for immaterial re-composition between place and inhabitants, perhaps starting from the reopening of a neighbourhood bakery.

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The Unfinished as Commons: material conditions for a deeper democracy

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ABSTRACT
Within the framework of the relations between public space and the various powers that shape it, this article begins with unfinished systems of traces left behind when political and administrative processes abruptly halt. Since the 1950s, Italian governments have invested public funds in the construction of transport infrastructure, hospitals, schools. Far from being a contingent approach, the following decades revealed it as a constant 'deviation' – especially in the Mezzogiorno – where hundreds, if not thousands of these works have been left unfinished. The scale and spread of the phenomenon of unfinished public works in Italy display the failure of these policies, emerging as a tangible form of a broader crisis that involves public institutions. New spatial and curatorial practices brought life into unfinished spaces, activating them for the first time through performance and civic participation. We discuss these practices – and their spatial and material characteristics – marking the passage from a state of suspension to long-term transformations. Finally, these practices are seen through the lens of the Commons to bridge them with each other and highlight their emancipatory and deeply democratic nature.

POWER | UNFINISHED PUBLIC WORKS | COMMONS | CONSTRUCTION SITE

1. Power and public space: unfinished visions

Since the 1980s, influenced by Henri Lefebvre's concept of 'Droit à la ville' and Michel Foucault's intuitions on the intersection between space, knowledge and power, the importance of public space as a political arena has been explored. Specifically, research has delved into the spatialization of forms of power (Raffestin 2022), along with the understanding of the urban process as a complex social interaction, where different spatial agencies collide (Harvey 1989).

Territory and community are now seen as engaged in a close socio-spatial dialectic (Soja 1989), and space is understood as a repository of traces left by different and often conflicting powers – officially recognized, subversive, or criminal – that have shaped it (Weizman 2010, Tesoriere 2023a).

When the ongoing urban processes, along with the forces that set them in motion, suddenly halt, what remains is a system of signs that displays the interruption of complex processes – political, economic, technical, bureaucratic and social – through a tangible form. As 'ruins in reverse' (Smithson 1967), unfinished public works promoted by institutional powers testify to interrupted ideas of progress and visions of the future, standing as failed embodied politics.

This is most evident in the utopian-totalitarian 20th-century regimes (Troiani & Dawson 2020), where the suppression of individual initiative was replaced by pervasive and violent state intervention. The unfinished projects of countries such as the former Yugoslavia, Romania, and Cuba, or the incomplete projects as the Deutsches Stadion in Nuremberg, the Palace of the Soviets in Moscow, or the Fascist EUR in Rome[1], clearly embody the ideology of these regimes and their downfall.

These material legacies are closely tied to the myth of the 'strongman' and served as a propaganda tool: space, form, and language were devices through which the authoritarian and anti-democratic powers controlled, surveilled and represented themselves. In contemporary democracies, the phenomenon of unfinished public works persists, though it has altered in form and scale, shifted in meaning, reshaped in language, and reoriented in its aims, reflecting the different types of power that molded it [Fig. 1]. In recent years, growing interest in Italy's unfinished public works across institutions, academia, art, and pop culture have highlighted their unique characteristics, unlike those of other European countries. Emerging within a broader European institutional and democratic framework, Italian unfinished public works mirror the complexity and multifaceted nature of its current economic, social, and political context. But how do unfinished public works appear in a democratic landscape?

[1] Albert Speer's Deutsches Stadion, designed for 400,000 spectators, was abandoned at the foundation phase, now hidden by trees. The Palace of Soviets project halted during WWII; the Cathedral of Christ the Savior was rebuilt on its site. The E42 district, renamed EUR, was completed and repurposed for post-war use.

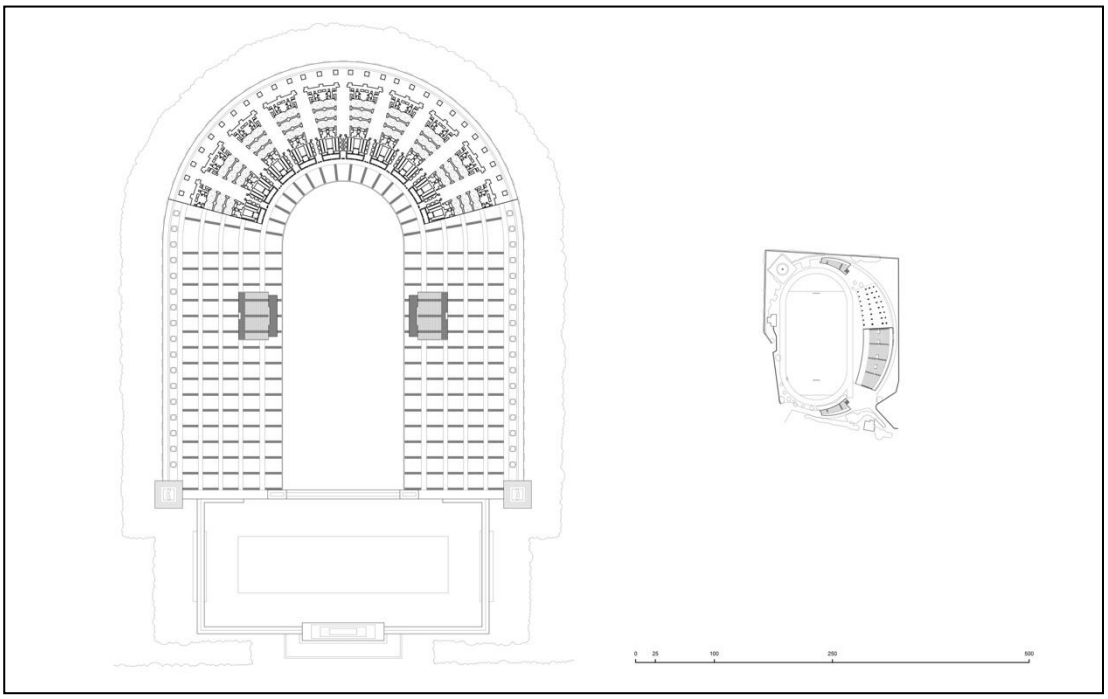

Fig. 1 Albert Speer's Deutsches Stadion vs Unfinished Polo Stadium in Giarre (CT). [credits: Image elaborated by the author].

2. An unfinished form of democracy

In Italy, the phenomenon of unfinished public works has developed unique traits, both because of the political context where it occurs and its widespread distribution across the whole country. Since the 1950s, successive governments of the Italian Republic have invested public funds in modernizing the country through the construction of transport infrastructure, hospitals, schools, etc. Despite these initial intentions, in the following decades this approach, far from being an exception, unfolded as a praxis, and the 'irresistible infrastructural deviation' became, on the contrary, a 'prerogative of underdevelopment' (Becchi 1990). This trend exacerbated the gap between the South and the rest of the country, resulting in oversized works, barely useful, or completely useless projects, hundreds (possibly a thousand) of which have been left unfinished.

In 2011, the Italian government established the Elenco-anagrafe nazionale delle opere incompiute (National Registry of Unfinished Public Works) and, in 2013, the Sistema Informatico Monitoraggio Opere Incompiute (SIMOI, Information System for Monitoring Unfinished Public Works) under the Ministry of Infrastructure and Transport (MIT). These tools were thought to facilitate the monitoring, collection, processing, and coordination of data on unfinished public works at national, regional, and local levels, ensuring a uniform presentation of the results in table-based formats.

In parallel – since 2007 – the artist collective Alterazioni Video (AV)[2] has explored this phenomenon through a visual investigation.[3] Its work consists of photographic reportages, maps and a catalogue,

[2] AV is an art collective founded in 2004 by Paololuca Barbieri Marchi, Alberto Caffarelli, Matteo Erenbourg, Andrea Masu, and Giacomo Porfiri.

[3] Under a Critical Heritage Studies' perspective (Arboleda 2017), AV attitude tends to 'historicize' the phenomenon, that they call "the leading architectural style in Italy since World War II" (Alterazioni Video & Fosbury Architecture 2018, p. 15), questioning its heritage nature and promoting its resignification through performative and artistic actions.

summarizing the phenomenon's main features in their 10-bullet-point Incompiuto Manifesto (Alterazioni Video & Fosbury Architecture 2018). According to ministerial data published in 2023 (MIT 2023), Italy has 373 unfinished public works, with 70% located in the southern regions and, particularly, in Sicily, which accounts for 37% of the total. Nevertheless, this figure is likely underestimated: ongoing research based on a spatialized approach (Cannata 2023), indicates that the actual number of unfinished public works only in Sicily is at least 259[4] [Fig. 2], revealing discrepancies between the existing records and highlighting their incomplete and fragmented nature [Fig. 3].

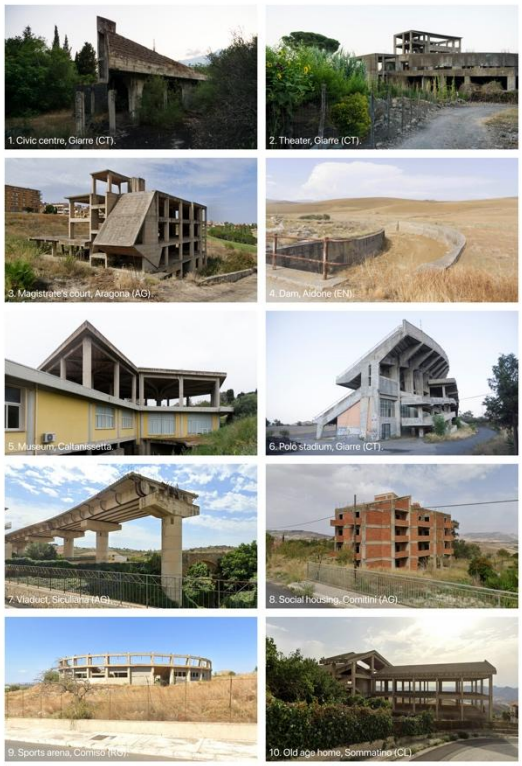

Fig. 2
Selected views of unfinished public works in Sicily. [credits: Photographs 1–6 by the author; images 7–10 sourced from Google Street View.]

The justification for these projects lies in their supposed *publica utilitas*, a goal that, due to their incompleteness, has never been achieved. As Ada Becchi sharply pointed out in 1990 already, the presence of such works is not a random fact but an endemic issue, driven by political interests, profit-oriented motives, and even criminal activities, rather than addressing the real needs of the community. Thus, unfinished public works demonstrate not only a prematurely halted construction but also incomplete administrative and political processes, a tangible form of a broader crisis within public institutions and democracy. In this framework, they remain incapable of embodying the values

[4] The category of unfinished public works is vast and heterogeneous: although transport infrastructure is the most prevalent category in Sicily (23%), public buildings are also numerous, including sports facilities such as arenas, stadiums, and swimming pools (20%), as well as service structures like elderly homes, markets, and cemeteries (14%).

of the public and display the failure of the institutions to govern political and spatial transformations (Tesoriere 2023b). Consequently, communities lose both the physical spaces needed for public life and the opportunity to engage in democratic practices: the civic role of these communities is weakened, leading them to a distorted performance of democracy.

Building on Bruno Latour's 'Dingpolitik' (2005, pp. 14-43), what material and spatial conditions enable democracy, and how can they be fostered? How can we subvert negative values associated with unfinished public works? How can we reorient their meaning, imagining alternative futures?

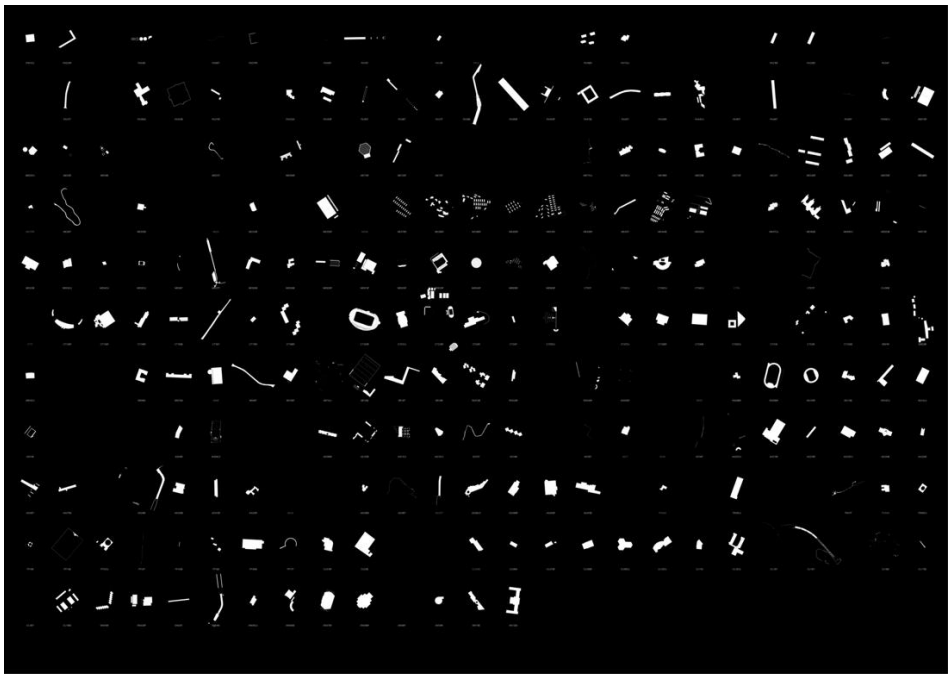

Fig. 3
Redrawing of the plans of unfinished public works in Sicily, 2024. [credits: Image elaborated by the author.]

3. Setting up the construction site

In recent decades in Italy, several bottom-up and participative initiatives have emerged in different cities, demonstrating that civic engagement with unfinished public spaces can bring new life and meaning to them. Spatial and curatorial practices, led by artists and designers, acted as a tool for the co-construction of public spaces, reclaiming public spaces that have been inaccessible for decades. Among the numerous actions, notable examples include the Festival dell'Incompiuto Siciliano in Giarre (Catania) in 2010, curated by AV with StudioNOWA; the Leggermente Party! in Matera in 2019, curated by AV and Fosbury Architecture, in collaboration with Architecture of Shame; Uccellaccio in Ripa Teatina (Chieti) in 2023, curated by HPO and Claudia Durastanti and presented at the 18th Venice Architecture Biennale; and, in the same year, Grande Teatro in Gibellina Nuova (Trapani), curated by Progetto Materia [Fig. 4].

The incompleteness of these projects leads to recurring conditions, such as site inaccessibility, presence of debris, and the need for authorizations, along with the desire to make them accessible and usable.[5]

Facing recurring conditions, these actions 'carved a trench' activating unfinished spaces by designing spatiotemporal events that serve as models for a systemic approach. The step-by-step design and low budget interventions aim to make unfinished spaces habitable for the first time, ensuring their safe usability and leading to some constants in design and material solutions.

The reclamation of these spaces begins with the removal of access barriers, followed by mowing, brush clearing, and cleaning operations to free the site, sometimes employing rented machinery for earthmoving and debris removal.

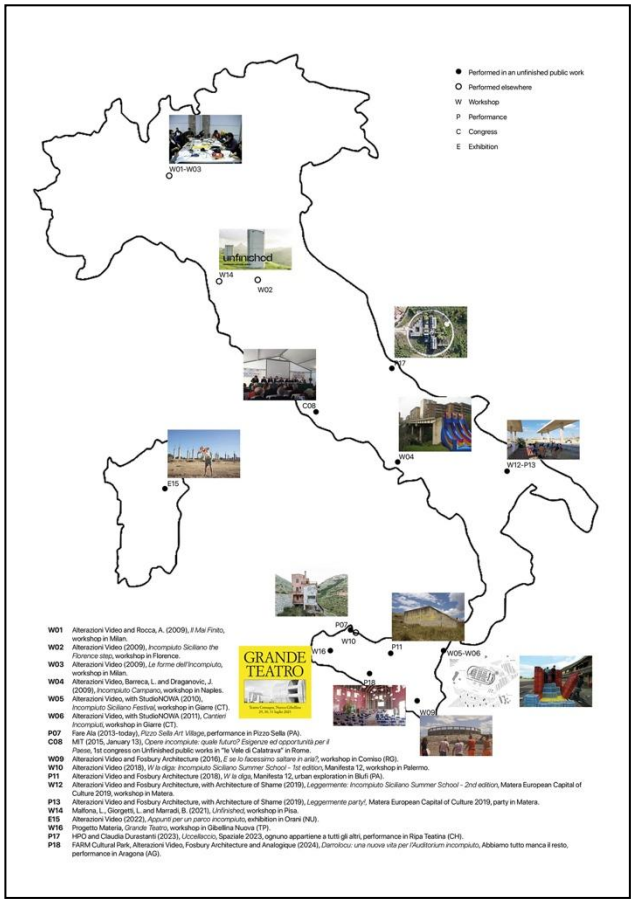

Fig. 4
Activating Unfinished: map of spatial and curatorial practices in Italy, 2024. [credits: Image elaborated by the author.]

Next comes securing the site – treating it as a construction site – by installing wooden railings, nets (anti-fall, dust-proof, fiberglass), and protective caps for exposed rebar.

Demolition work is reduced to the bare minimum to ensure safety and lower the costs, and limited paintings mark the intervention. If the building's utilities are unusable, portable generators are used to provide electricity, and portable toilets are rented and installed.

[5] Demolishing all unfinished works isn't viable, nor is it possible to activate and transform them all. Building on the concept of 'curated decay' (Desilvey 2017, Arboleda 2017), Alterazioni Video suggested other forms of (non)intervention, considering entropy and 'active' arrested decay as possible operations.

The new setups reinvent common objects, used as furniture or supports: barricades or stretched plastic films reorganize the internal space, redefining pathways; lightweight concrete blocks or fruit crates become modular, composable furniture; wooden, aluminum, or steel tubular uprights serve as supports for exhibition installations. Finally, potted plants, screens, musical instruments, and ribbons are arranged for the inauguration event.

The use of raw construction materials, reinterpreted to meet new needs, explicitly evokes the construction site landscape – ephemeral, transitional, and necessary – here reorganized a posteriori: a transient architecture, contaminated by Land Art, Ready-made, and Arte Povera techniques, that displays the everyday life of a construction site.

As the most recent of these interventions, the activation of the unfinished Municipal Auditorium of Aragona in Agrigento serves as a pilot project, defining a protocol applicable to various contexts and scales. The project started with an agreement between the municipality and four agencies[6] that allowed reappropriation of the unfinished space, initiating the cleanup and safety efforts. At its inauguration on June 21, 2024, a cultural program featuring debates, installations, and performances attracted significant public participation. The next phase will involve designing a transformation project with minimal interventions and a radical reconsideration of the use of space [Fig. 5]

[6] Farm Cultural Park, Alterazioni Video, Fosbury Architecture, and Analogique.

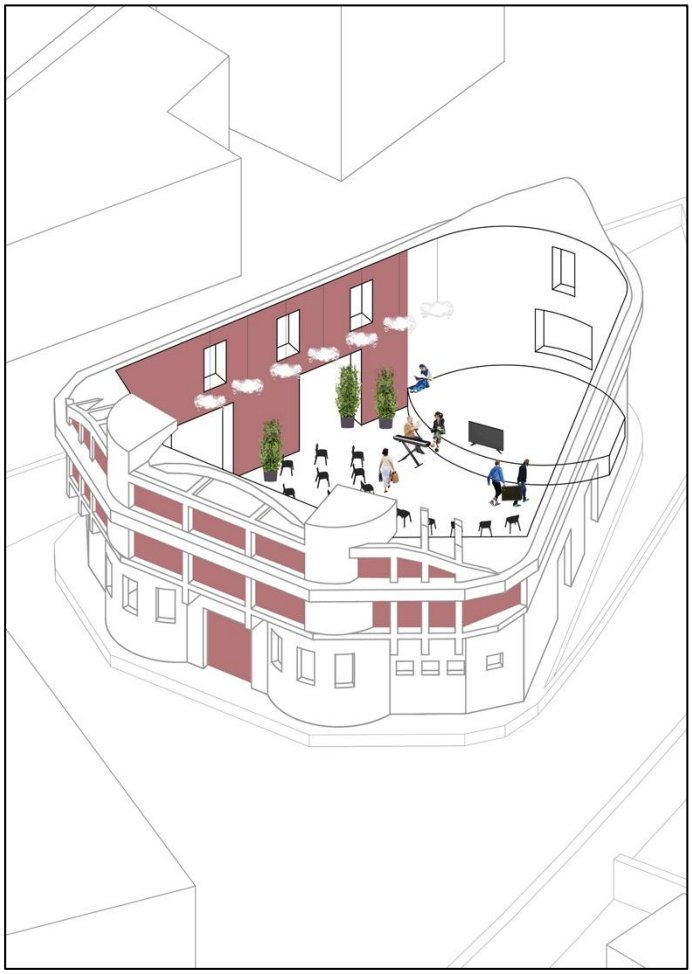

Fig. 5
Axonometric view of the inauguration of the unfinished Municipal Auditorium of Aragona (AG) on June 21, 2024

4. Unfinished as Commons: a bridged archipelago

According to Massimo De Angelis' definition (2021, p. 643), Commons are social systems constituted of three strictly related elements: a commonwealth (as a material or immaterial set of resources), a community of commoners (to hold, manage and govern them) and the praxis of commoning (namely, the act of producing and reproducing forms of social labour and cooperation).

In Italy, the concept of *beni comuni* (common goods), revitalized by the Rodotà Commission (2007–2008),[7] is rooted in Roman law through the notion of *res communes omnium*.[8] This concept is strictly related to *actio popularis*, a Roman legal notion that (as an ancestor of contemporary commoning practices) allowed an individual citizen to act in defense of public rights on behalf of the people (Settis 2010, p. 118).

[7] The Rodotà Commission, established at the Ministry of Justice from 2007 to 2008, proposed a redefinition of the taxonomy of public goods, dividing them into 'sovereign goods of necessary public ownership' (beaches, road networks, airports), 'social public goods' (hospitals, schools, universities), and 'productive public goods' (a residual category that can be sold or managed by public entities using private law instruments).

[8] Literally 'things common to all', in Roman law they were understood as natural resources, such as air, the sea, and coastlines.

As a topical debate in Critical Spatial Practices (Jaque 2024, pp. vii-ix), the theme has been explored through the lens of commoning practices in relation to social housing complexes, contested streets, and occupied squares. These spaces, both spontaneous and envisaged as commons, underscore the emancipatory potential of Commons (Stavrides 2016) and highlight the possibilities of architecture in transition towards a non-destructive, non-extractive form of planetary life (López-Dinardi 2024), as an alternative to contemporary capitalism based on mutual aid, solidarity and cooperation. [9]

Following Giorgio Agamben's theory of the 'State of exception', Stavros Stavrides describes the contemporary city as an archipelago of enclaves, where enclosed urban islands adhere to internal laws, protocols and behaviors imposed by the authority.

Commoning practices aim to 'perforate' the material and immaterial boundaries of enclaves, while common spaces act as spatial thresholds that separate yet simultaneously connect, shaping the transition from an inside to an outside (Stavrides 2016).

Similarly, unfinished works can be described as enclosed spaces where public authorities force a permanent state of suspension through control devices – fences, gates, locks, sealed openings, surveillance systems, but also prohibitions, service orders, the necessity of permits and inspections – that inhibits human presence.

As seen before, new spatial and curatorial practices, performative and participative, promoted the reappropriation of these spaces, prompting the re-signification of unfinished public works, subverting and reorienting their meaning towards renovated public values. They also tested participatory processes that address community needs, challenging traditional notions of ownership, maintenance, and care and addressing future long-term transformations. Additionally, they foster collaboration between designers, institutions, and communities, offering a new perspective on public assets that shifts the focus towards common goods and community-based management.

Unfinished spaces, understood as Commons, can connect separated parts of the contemporary city: spatial thresholds through which full citizenship rights to the city can be reclaimed. Commons act as bridges, connecting isolated unfinished enclaves, facilitating the transition from a suspended, enclosed and exclusive space to a vital, porous, and inclusive one: a bridged archipelago where a deeper and more participative form of democracy can take place [Fig.6].

Following this bridge metaphor, commoning actions would serve as the centerings for constructing and shaping our bridge: transient uses – cultural, social, and ecological – are essential temporary structures to build long-term transformations and to address contemporary needs.

[9] Within Political Theory, the concept of common goods has been developed in contrast to commodities. For a discussion on this opposition and the distinction between the user as a consumer or a commoner, see De Angelis 2021, pp. 647-648.

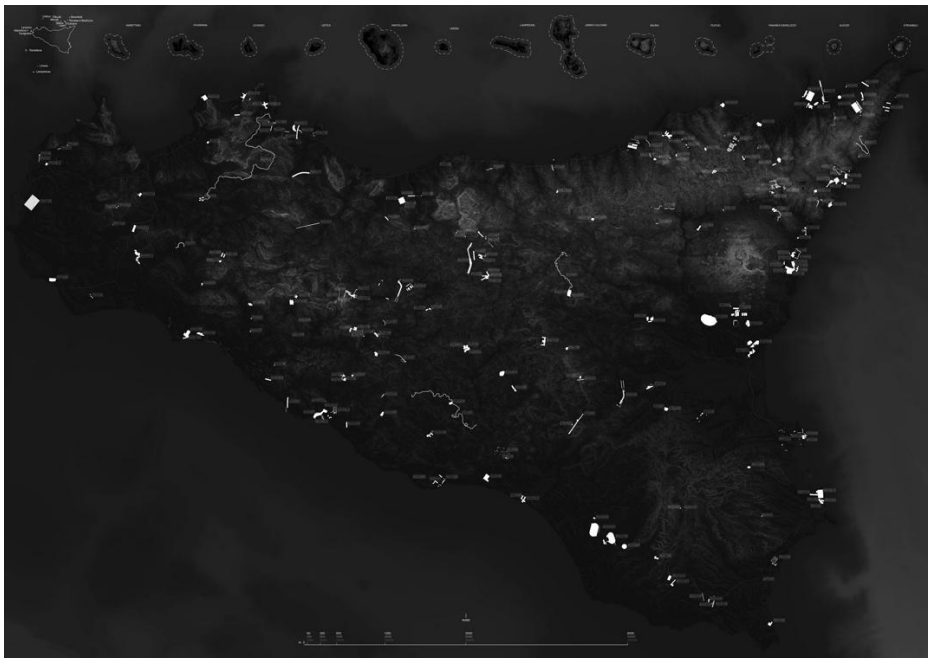

Fig. 6
Unfinished Archipelago: spatialized visualization of unfinished public works in Sicily, 2024. [credits: Image elaborated by the author.]

The metaphor unites unfinished public spaces with actions, emphasizing their emancipatory and transformative potential when seen collectively and in relation to each other. This allows us to view them from a transscalar perspective, unifying isolated interventions and addressing the phenomenon on both a national and local scale.

The recognition of unfinished public works as common goods certainly goes beyond the scope of this article and primarily belongs to the realms of Jurisprudence and Political Theory. Here, the focus has been limited to highlighting the existence of spatial practices that have been bringing new life to unfinished spaces across Italy, interpreting them through the 'Commons lens' for connecting them.

The possible contribution of architecture – understood, in its broadest sense, as a practice of spatial transformation where humans and non-humans coexist – lies in learning from these alternative ways of togetherness, re-interpreting and re-designing unfinished public works. As briefly shown, the recurring challenges can help to develop a model for reactivating unfinished works and addressing future transformations through a systemic approach. Hence the need for a transscalar, step-by-step, and commons-based approach that involves local communities, institutions, and designers, embracing planning based on publica utilitas and new priority criteria for transforming unfinished public works.

With the general aim of transforming them into significant public buildings shaped by renewed civic values, transient uses serve as rite of passage, achieving short and mid-term goals for activating, cleaning, taking care of, and inhabiting these spaces for the first time.

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Assessment and Optimization of the Layout of Community Elderly Care Facilities from the Perspective of Health Equity

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ABSTRACT
As China's population continues to age, the importance of senior care facilities for the elderly is becoming increasingly apparent. However, the elderly face spatial inequalities in accessing health and care services. This disparity not only reduces their quality of life but also underscores the intricate relationship between the physical layout of public spaces and the intangible fabric of social relations. Therefore, this study takes Wenjiang District in Chengdu, China as a case study, employing the ArcGIS geospatial analysis and the improved potential model to assess the walking accessibility of community facilities for the elderly. Furthermore, the spatial optimization of existing community facilities for the elderly is conducted using a location-allocation model. The objective of this study is to compare the current status of the accessibility of community facilities for the elderly with the changes in accessibility after adding new facilities. The results explore how the physical spatial layout shapes intangible social relationships and health equity by evaluating walking accessibility, providing new insights for the optimization of elderly care facility layouts.

HEALTH EQUITY | COMMUNITY ELDERLY CARE FACILITIES | ACCESSIBILITY | IMPROVED POTENTIAL MODEL

1. Introduction

According to the seventh national census, individuals aged 60 and older made up 18.7% of China's population, with projections reaching 35% by 2050 (United Nations, 2019). This demographic shift underscores the urgent need to improve elderly care services. In Chinese cities, these services primarily rely on family- and community-based models (Chen & Han, 2016). However, disparities in spatial accessibility to community elderly care facilities present significant challenges. Functional limitations and socioeconomic inequalities exacerbate disparities, affecting elderly quality of life and highlighting the connection between physical space layouts and social relationships. Therefore, achieving spatial equity in public facility distribution is crucial for promoting active aging (Hu et al., 2019). Extensive studies have examined the distribution and utilization of public facility resources, including supermarkets (Niedzielski & Kucharski, 2019), transportation infrastructure (Vecchio et al., 2024), and elderly care facilities (Sun et al., 2024).

Health equity, defined by World Health Organization, refers to eliminating unfair health differences, particularly for marginalized groups (World Health Organization, 2025). Health equity ensures everyone can achieve full health potential by eliminating unjust disparities rooted in structural inequalities, systemic discrimination, and unequal living conditions (Braveman, 2022). In this study, health equity refers to older adults' equitable access to community-based eldercare facilities. Therefore, accessibility is central to measuring health equity, achieved by ensuring equitable access to elderly care services across all populations. Research on accessibility originated in the 1950s (Hansen, 1959), describes the ease of reaching essential services. Traditional accessibility measures often focus on proximity but neglect factors like income, service capacity, and mobility (De Luca et al., 2024). The two-step floating catchment area (2SFCA) method is widely used to assess accessibility (Blumenberg et al., 2023), but it lacks consideration of distance decay. The potential model, which incorporates additional factors such as population and service capacity, has been used to better assess accessibility for medical facilities (Rong et al., 2020) and aged care institutions (Wang & Geng, 2024).

Nonetheless, research addressing community elderly care facilities remains insufficient. Therefore, this study uses an enhanced potential model to assess the accessibility of community elderly care facilities, incorporating factors such as population and service capacity. A location-allocation model is applied to optimize the spatial distribution of existing facilities, comparing current accessibility with potential changes following new facility additions. The study also explores how the physical layout of spaces influences social relationships and health equity through accessibility evaluations.

2. Data and Methodology

2.1. Data collection

Wenjiang District, located within the central urban area of Chengdu, China, covers a land area of 277 km2 (Fig. 1). Wenjiang has a permanent population of 967,868, with 146,096 individuals aged 60 and above (15.09%), and 107,624 individuals aged 65 or above (11.12%) (Wenjiang Municipal Government, 2021). As a designated demonstration area for smart healthy aging in China, Wenjiang serves as a significant research case. Data on 83 community elderly care facilities were collected, including information on location, building area, and other attributes.

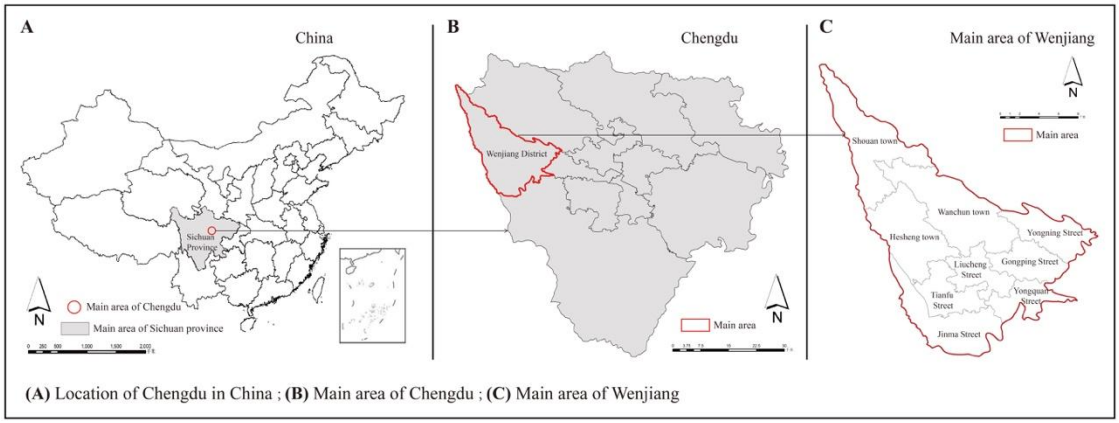


Fig. 1 Study area in Wenjiang District, Chengdu, China.

Additionally, data from 788 residential sites were gathered, covering location and the population of the elderly. Road network data were sourced from the 2020 traffic map. Administrative division data were derived from 2020 records. All data were standardized to the WGS84 coordinate system using ArcGIS.

2.2. Improved potential model

The improved potential model was derived from gravity model. Hansen proposed using the gravitational model to measure accessibility (Hansen, 1959), as shown in Eq. (1). Weibull added the population scale factor V_j to reflect the competition of the potential demand population around the supply point j for its resources (Weibull, 1976), as shown in Eq. (2):

$$A_i = \sum_{j=1}^{n} A_{ij} = \sum_{j=1}^{n} \frac{F_j}{D_{kj}^{\beta}} \quad (1)$$

$$A_i = \sum_{j=1}^{n} \frac{F_j}{D_{ij}^{\beta} V_j} : \; V_j = \sum_{k=1}^{m} \frac{P_k}{D_{kj}^{\beta}} \quad (2)$$

where A_i denotes the accessibility of demand point *i*; F_j denotes the service capacity of supply point *j*; D_{ij}, is the cost of traffic distance between the suppliers and demanders; *β* is the impedance coefficient; P_k denotes the population of demand point *k*; and D_{kj}, denotes the cost of the traffic distance between point *k* and point *j*. The traditional gravity model does not set the limit distance for residents to choose facilities. Thus, the improved formula introduces the comprehensive service capacity factor M_j, this factor adds the impact of socioeconomic factor to

the accessibility calculation. And the scale grade coefficient R_{kj}, of limit travel distance is added (Tianyan et al., 2022), as shown in Eq. (3):

$$A_i = \sum_{j=1}^{n} \frac{R_{ij}M_j}{D_{ij}^{\beta}V_j} : \ M_j = f(w_t X_t), R_{ij} = 1 - (\frac{D_{ij}}{D_j})^{\beta}; \ V_j = \sum_{k=1}^{m} \frac{R_{kj}P_k}{D_{kj}^{\beta}} \quad (3)$$

where M_j, represents the comprehensive service capacity factor. In this study, M_j signifies the construction area of community pension facilities; R_{ij} denotes the scale grade coefficient of community elderly care facility *j*; and D_j, is the limit travel distance of facility *j*. If $D_{ij} \geq D_j$, let R_{ij} = 0, indicating that facility *j* is no longer attractive to demand point *i*. In addition, *b* is affected by factors like facility type and service population, often between 1 and 2. The *b* value in this study was 1, as reported in a previous study (Wang & Geng, 2024).

2.3. Location-allocation model

At this stage of the location-allocation model, the road network system of Wenjiang District must first be constructed in ArcGIS software, with existing community elderly care facilities and residential areas incorporated. The network analysis tool is employed to configure impedance weight attributes and values, facility quantity, impedance cutoff, and problem types for location-allocation models, encompassing seven distinct types (Karim & Awawdeh, 2020). This study adopts the minimum facility point model and the minimum impedance model, enabling the calculation of candidate locations for the minimal number of community elderly care facilities while meeting the needs of the maximum number of residential areas within the service coverage.

3. Results

3.1 The spatial distribution of community elderly care facilities

In this study, nine streets in Wenjiang District were coded as S1 to S9. Community elderly care facilities are primarily concentrated in S1 Street, which is situated in the central urban area. In contrast, facilities in the outer suburbs are dispersed across various communities. Using the kernel density analysis method in ArcGIS, we calculated the spatial distribution of community elderly care facilities. The analysis reveals a relatively even distribution, as shown in the spatial distribution map [Fig. 2A]. However, while S1 Street exhibits a high density of facilities, the overall pattern follows a

trend of “dense in the south, sparse in the north.” The building area of these facilities also varies significantly (Fig. 2B).

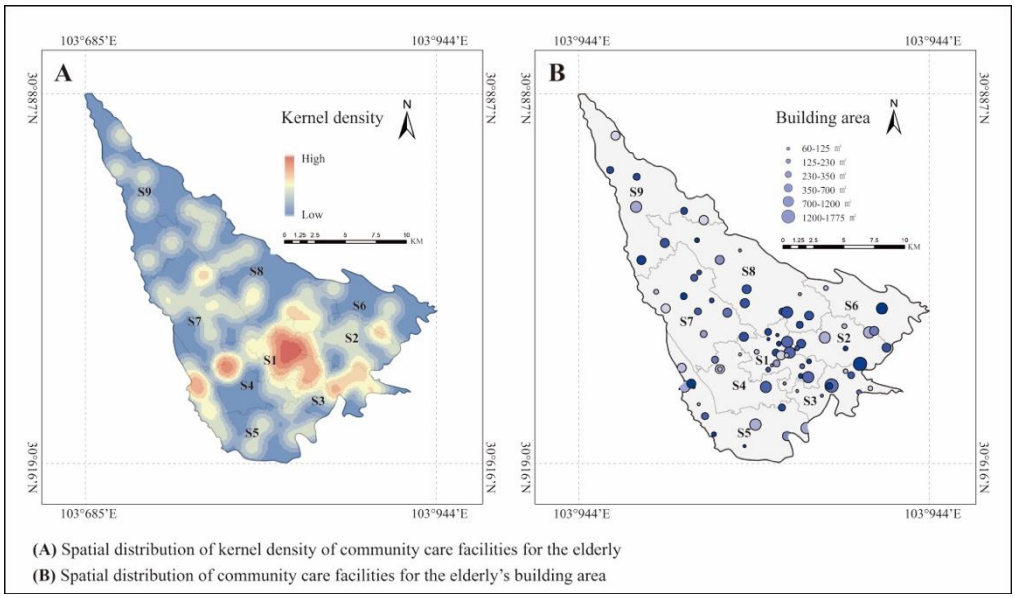


Fig. 2
Spatial distribution of community elderly care facilities.

a. Evaluation results of walking accessibility of community pension facilities

The accessibility of community elderly care facilities was determined using Eq. (3) and the Kriging interpolation method in ArcGIS, with walking accessibility illustrated in Fig. 3. The following results were observed:

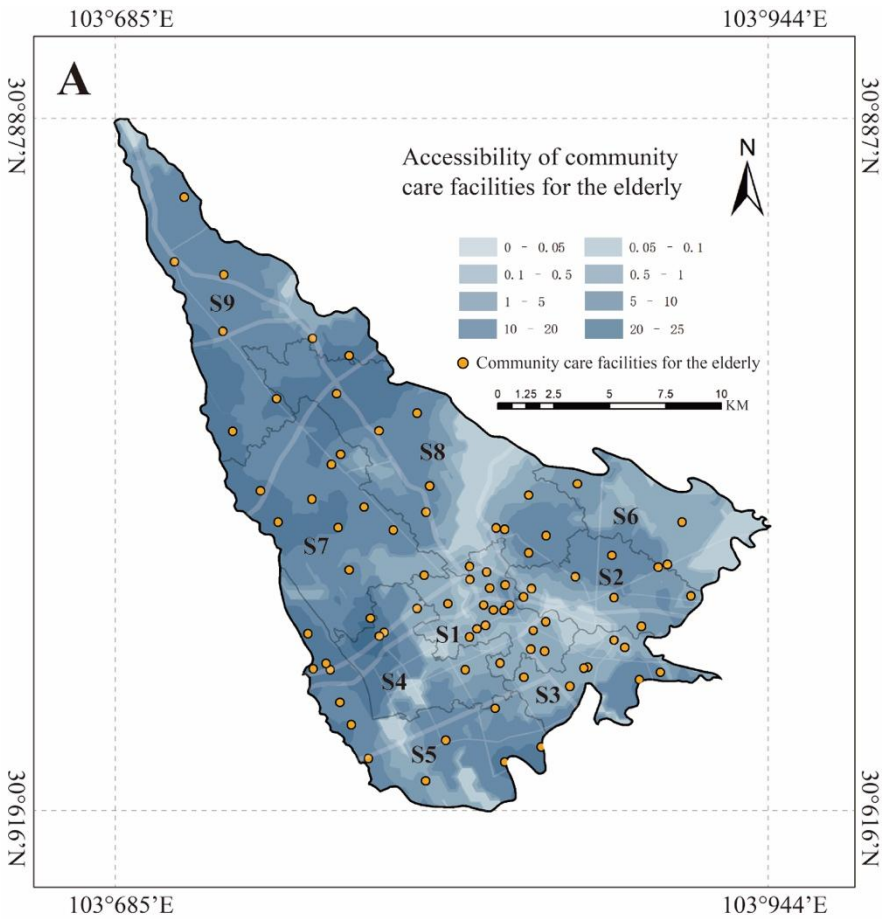


Fig. 3
Accessibility of community elderly care facilities.

1) Average accessibility values for each street were calculated by overlaying residential area accessibility (**Table 1**). Streets such as S1 (0.521) and S2 (0.520) showed moderate accessibility, whereas S5 (4.545) in the southern region had the highest average value.

2) Accessibility disparities were influenced by factors such as facility distribution, road network development, and other spatial variables. Facilities near S1 Street exhibited a trend of increasing accessibility towards neighboring areas.

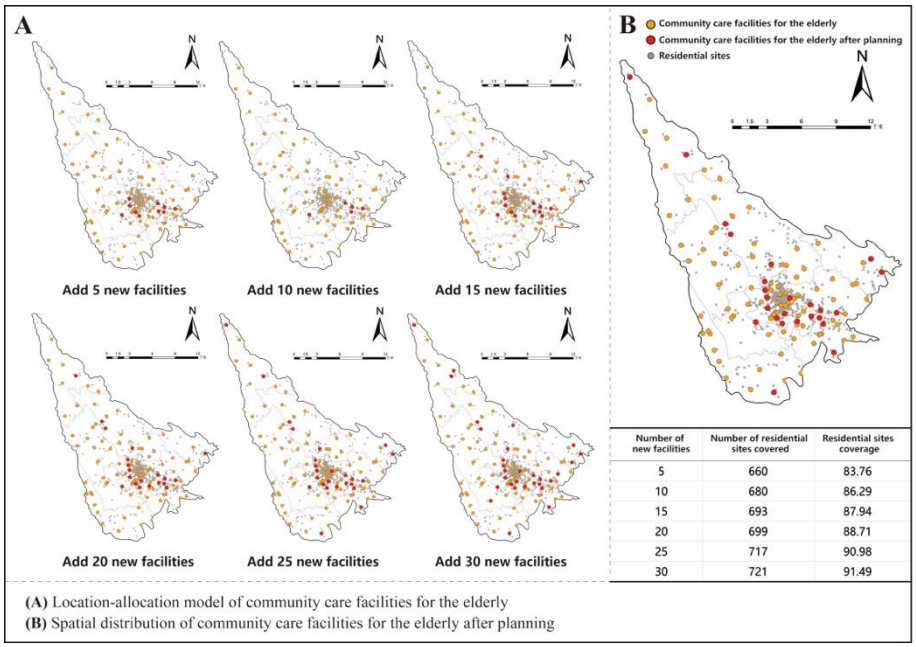
3) Streets with high accessibility were mainly located in peripheral regions. This phenomenon is attributed to the proximity of facilities to residential districts in the suburbs, where fewer residents reside. Conversely, the central urban area, despite having dense residential zones, demonstrated relatively lower accessibility due to insufficient facilities.

Table 1. Accessibility of community pension service facilities in each street.

Street name	S1	S2	S3	S4	S5	S6	S7	S8	S9
No. of residential areas	432	88	50	23	35	33	34	74	19
Accessibility average	0.521	0.520	0.367	2.885	4.545	0.694	3.713	1.492	3.167
Accessibility minimum	0	0	0	0	0	0	0	0	0
Accessibility maximum	9.850	5.814	14.167	22.727	17.011	3.453	22.003	21.948	7.963

3.3 Evaluation results of walking accessibility of community pension facilities

Considering the current accessibility challenges in Wenjiang District, additional facilities were proposed to enhance spatial equity. The location-allocation model was applied to optimize the placement of new facilities. By incorporating 25 additional community elderly care facilities, over 90% of residential areas could be covered, as illustrated in Fig. 4A and Fig. 4B.



Number of new facilities	Number of residential sites covered	Residential sites coverage
5	660	83.76
10	680	86.29
15	693	87.94
20	699	88.71
25	717	90.98
30	721	91.49

Fig. 4
Location-allocation model of community elderly care facilities.

Using Eq. (3) and Kriging interpolation, accessibility was re-evaluated for 788 residential areas. The optimized plan achieved a 90.98% coverage rate of residential areas, indicating significant improvement in accessibility Fig. 5.

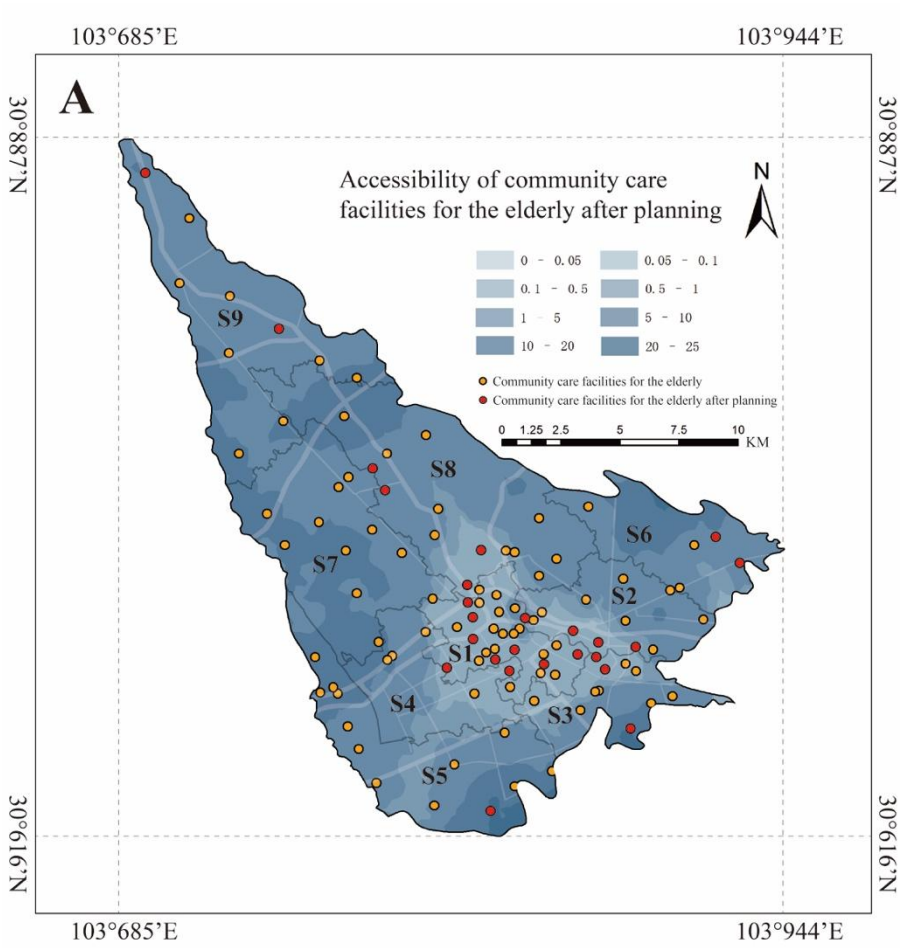


Fig. 5
Accessibility of community elderly care facilities after planning.

3.4. Spatial efficiency analysis of the community pension facilities after planning

This section analyzes the spatial efficiency of community pension facilities after planning through trends in accessibility, trends in the number of residential areas covered, and trends in the number of elderly people covered.

1) Trends in accessibility:

   Fig. 6A demonstrates substantial improvement in accessibility following the addition of facilities. The maximum accessibility reached 24.889, an increase of 2.162 from the current level. Although the accessibility of community elderly care facilities varied significantly, the uneven distribution improved compared with the current situation; however, the accessibility of Wenjiang district's central urban area remained somewhat lower than that of the outlying suburbs.

2) Trends in the number of residential areas covered:

   As shown in Fig. 6B, after the planning, the rate of residential areas covered by the community pension facilities ranged from 76.5% to 103.7%. Streets such as S1, S3, S6, and S9 achieved full coverage (100%), with most streets exceeding 80%. Overall, elderly individuals can easily enjoy pension services.

3) Trends in the number of elderly people covered:

   Fig. 6C highlights notable improvements in the coverage of the elderly population. The overall coverage rate increased from 92.0% to 101.0%, with significant enhancements observed in central urban and southern regions. The optimized distribution achieved better alignment between elderly population density and facility resources, particularly in S5 Street, where the coverage rate rose by 71.0%. The coverage rate in S1, S2, S3, and S6 was 100%.

4. Discussion and conclusion

This study emphasizes the critical role of public spaces in urban development, particularly in promoting health equity for the elderly. As a core component of the urban built environment, the planning and equitable accessibility of public spaces critically shape health equity among older populations—particularly when environmental sensitivity intersects with structural disparities in resource allocation (E et al., 2024). In addition to the regular life scenes of the elderly group, the pandemic significantly reduced medical visits among the elderly, vulnerable individuals, and high-risk groups. Numerous elderly care facilities temporarily ceased operations. This situation has raised concerns about the optimal placement of community facilities. The pandemic has highlighted the need to enhance the quality of life for elderly individuals at home through community services, which should be integrated into future facility planning (Li et al., 2024). This study uses the improved potential model to assess accessibility and guide layout planning for non-epidemic periods. By optimizing the layout, we can reduce walking distances, lower infection risks, and integrate the concept of a “compact city” (Mouratidis, 2022) into retirement community planning.

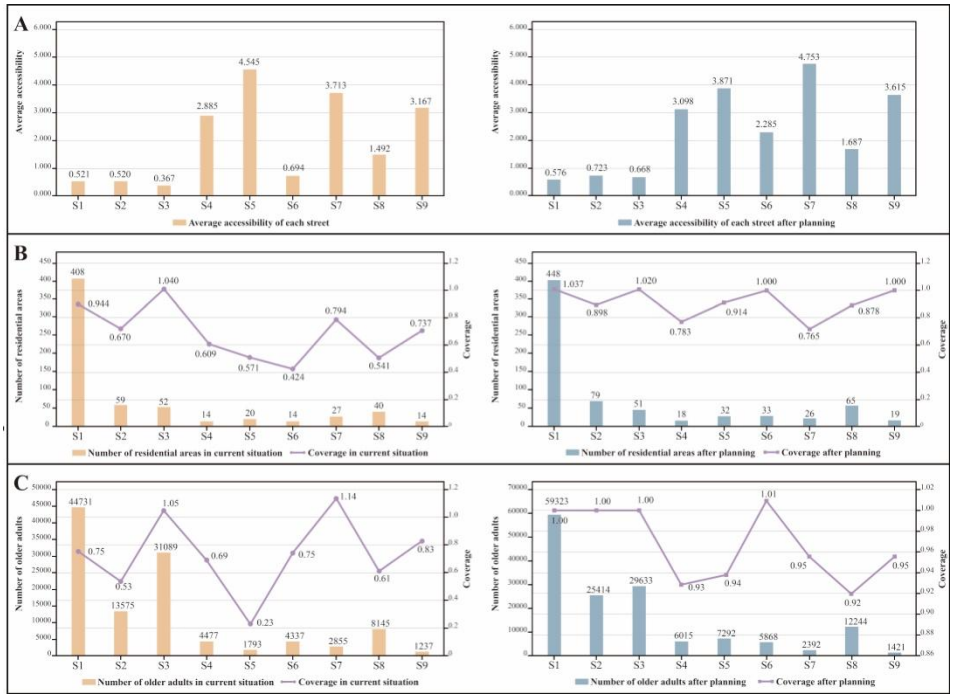


Fig. 6
Changes in spatial efficiency of the community elderly care facilities.

Focusing on community elderly care facilities in Wenjiang District, this study evaluates their walking accessibility and spatial distribution. It identifies issues like uneven facility distribution in certain regions. And a location-allocation model was developed to analyze current distributions and predict optimal facility placements. This model offers a dynamic plan for balancing facility layouts with the elderly population's density. Although the improved potential model provides valuable insights, it has limitations. It currently considers factors like distance, population, and service capacity but lacks intangible elements such as socioeconomic variables (e.g., income, health status, education). Future research can improve the model by incorporating these factors for a more comprehensive view. Despite these limitations, this study offers a realistic assessment of accessibility for elderly individuals and valuable insights for optimizing the spatial layout of multi-level elderly care facilities.

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Inclusive Urban Space Design through Nature-Based Solutions: Reflections and Insights

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ABSTRACT
Public spaces play a determining role in daily engagement and can be regarded as important criteria for measuring the quality of urban life. In recent years, cities have actively adopted promising approaches in pursuit of sustainable development. In this context, Nature-based Solutions (NbS) have emerged as a mainstream approach or concept in sustainable urban development, effectively and adaptively addressing societal challenges. Research has shown that public spaces are increasingly seen as significant sites for implementing these green strategies. However, there is currently a gap in research on the implementation of NbS. Most NbS projects focus primarily on environmental outcomes, with less attention paid to how these solutions can create socially inclusive spaces. This paper investigates the intangible aspects of urban space and analyzes how different NbS contribute to social inclusivity by collecting best practices of NbS. By integrating theories and methods from urban design and social sciences, this paper offers reflections and insights for urban planners and designers aiming to create or transform inclusive public spaces.

INCLUSIVE DESIGN | PUBLIC SPACE | NATURE-BASED SOLUTIONS | SOCIAL BENEFITS

1. Introduction

Traditional public spaces, such as squares, parks, and urban streets, have long been places where people engage in individual and collective public social activities (Han et al., 2022). However, with accelerated urbanization and the growing diversity of social needs, the definition and functions of public spaces are undergoing profound changes. These spaces are no longer viewed merely as physical locations; they are increasingly regarded as "third spaces" in addition to the home and office (Finlay et al., 2019). These spaces not only serve social and recreational purposes but have also become key venues for fostering community interaction, and cultural exchange, and enhancing the overall quality of life (Aelbrecht & Stevens, 2023). Therefore, public spaces play a determining role in daily engagement, and furthermore, they can be regarded as important criteria for measuring the quality of urban life (Bambó Naya et al., 2023). According to United Nations Sustainable Development Goal (SDG) 11, the quality of the built environment closely depends on urban green infrastructure (Goal 11 | Department of Economic and Social Affairs, 2015).

However, with the continuous expansion of urban development, the appropriation of large amounts of land has led to ongoing environmental degradation and exacerbated social inequalities. In response to these challenges, urban planners and policymakers are actively seeking solutions that balance economic growth with social equity and environmental protection (Garau & Pavan, 2018). In this context, Nature-based Solutions (NbS) have emerged as a mainstream approach or concept in sustainable urban development. NbS are defined as “actions address environmental, social and economic challenges simultaneously by maximizing the benefits provided by nature…inspired by, supported by, or copied from nature” (European Commission. Directorate General for Research and Innovation., 2015). These solutions provide not only environmental benefits but also intangible social value in public spaces through tangible interventions such as green corridors, rooftop gardens, and parks, which improve health and well-being (Kabisch et al., 2017). For example, many NbS projects involve local communities in the design process and the implementation of community gardens. This co-design method fosters a sense of belonging among diverse residents, promotes social cohesion, and simultaneously creates environmental benefits that enhance urban life quality.

Inclusive public spaces are fundamental to participation and inclusion in society, as they provide shared environments where individuals from diverse backgrounds can equally utilize them, thus contributing to the strengthening of social ties. Research has shown that various factors can affect the sense of inclusivity, such as gender, age, ethnicity, religion, cultural background, and socioeconomic status (Simões Aelbrecht et al., 2022). Although these factors share common design criteria for inclusive public spaces, such as accessibility, safety, and the presence of a variety of activities, there is currently a gap in research on the implementation of NbS that considers these relevant design criteria (Qi et al., 2024). For example, in urban areas, safety concerns and the threat of gender-based violence may discourage women and girls from using green spaces such as urban

forests and parks for outdoor recreation, thereby limiting their access to the social and health benefits provided by these spaces (Integrating Gender and Social Inclusion in Nature-Based Solutions: Guidance Note | GFDRR, 2023). Furthermore, most NbS projects focus primarily on environmental outcomes, with less attention paid to how these solutions can create socially inclusive spaces (Lafortezza et al., 2018).

This paper seeks to address this gap by investigating the intangible aspects of urban space and analyzing how different NbS contribute to social inclusivity by collecting best practices from NbS implementations. By integrating theories and methods from urban design and social sciences, this paper offers reflections and insights for urban planners and designers aiming to create or transform inclusive public spaces.

2. Materials and Methods

The overall conceptual workflow of this study is shown in Fig. 1 and consists of three main phases. Phase 1 involves the collection of NbS projects implemented in public spaces, particularly those prioritizing inclusivity, using the “URBiNAT” (NBS Catalogue, 2018) and “Urban Nature Atlas” (Urban Nature Atlas, 2017) databases. “URBiNAT” is an open platform repository that shares NbS projects co-selected and co-created by citizens. “Urban Nature Atlas” serves as a knowledge base showcasing the diversity and value of NbS implemented in cities worldwide. Although other databases, such as Oppla (Case Studies, 2023), also exist, they were excluded from this study due to the lack of specific filters related to social challenges. In Oppla, relevant cases must be identified through manual keyword searches, which may compromise the precision and relevance of the results. In contrast, the selected databases offer targeted filtering options that address social dimensions, making them more suitable for the aims of this research. In addition to database searches, a manual review of existing literature was conducted using several academic research engines, including Science Direct, Scopus, and Web of Science. The selection of case studies was based on the following criteria: (1) explicit integration of public participation in the design and/or implementation processes; (2) inclusion of multiple spatial scales, ranging from the building scale and neighborhood scale to larger urban contexts; and (3) successful implementation with documented evidence of delivering social benefits, particularly in terms of enhancing social inclusivity. Phase 2 analyzes the outcomes from Phase 1, categorizes the different NbS options first, and describes their implementation activities and how NbS interventions contribute to social inclusivity in urban public spaces. Finally, Phase 3 provides reflections and insights based on the results of Phase 2, offering practical recommendations for urban planners and designers.

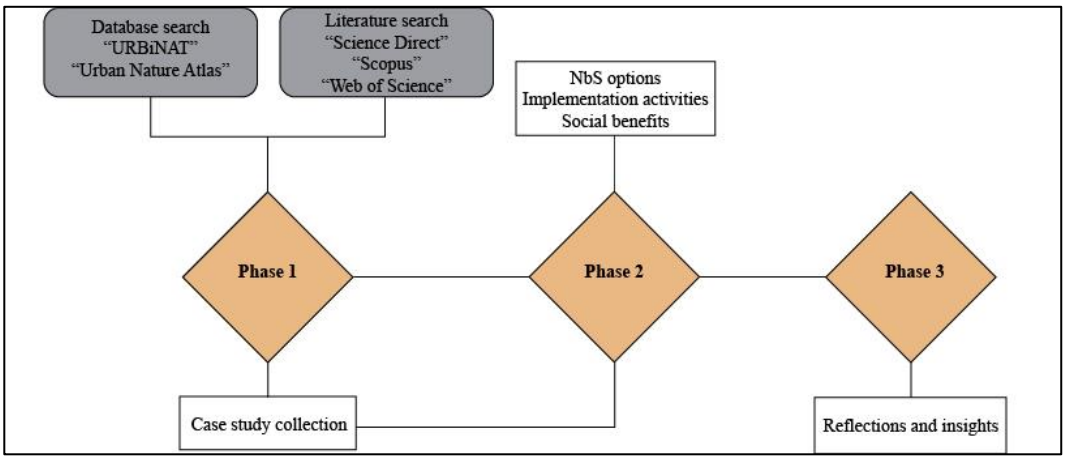

Fig. 1
The overall workflow of the study

3. Results and Discussions

This section explores the relationships between the intangible aspects of public space and social inclusivity through the analysis of several NbS projects. Tab. 1 provides an overview of the NbS identified through screening databases and research engines.

NbS options	Implementation activities	Social benefits	Case study
Community Garden	Implementation of the different garden elements is executed in communal work, supported by neighbors, youth, and volunteers.	① Increased visibility and opportunity for marginalized groups or indigenous people ② Improved mental and physical health ③ Increased sense of place identity, memory, and belonging	'Nature Island' Community Garden, Bonn, (DE), 2013 (*'Nature Island' Community Garden - Pennenfeld, Bonn* | *Urban Nature Atlas*, 2013)
	Local community launch and autonomous management by the gardeners.	① Improved health and well-being ② Increased sense of place identity and belonging ③ Increased opportunities for social interaction	Naomi Shimpo- Tokyo, (JP), 2024 (Shimpo, 2024)
Vegetable garden	Organize community horticulture workshops.	① Improved social cohesion ② Increased opportunities for social interaction	Asomadilla Park, Córdoba, (ES), 2004-2007 (*Asomadilla Park* | *Urban Nature Atlas*, 2004)

NbS options	Implementation activities	Social benefits	Case study
		③ Increased support for education and scientific research	
	Customized and assembled in several configurations according to user's preferences and space needs.	① Increased access to healthy/affordable food ② Increased opportunities for social interaction	Poble Nou district, Barcelona, (ES), 2015 (*Mobile Vegetable Garden*, 2015)
Rooftop garden	Workshops open to the public are held periodically to teach residents how to plant and maintain a small urban garden.	① Improved social cohesion ② Increased awareness of NbS and their benefits	Bilbao Roof Top Community Garden, Bilbao, (ES), 2011-2012 (*Bilbao Roof Top Community Garden* | *Urban Nature Atlas*, 2011)
	The decision to reshape the Hilldegarden bunker was made spontaneously by local residents and supported by architects.	① Increased involvement of locals in the management of green spaces ② Protection of historic and cultural landscape/infrastructure	Hilldegarden, Hamburg, (DE), 2019 (*Hilldegarden*, 2019)
Trees	Municipality organize workshops to help citizens assemble planters.	① Improved liveability ② Increased involvement of locals in the management of green spaces ③ Increased knowledge of locals about local nature	Operation Fil Vert to vegetate the streets, Rouen, (FR), 2014 (*Operation Fil Vert to vegetate the streets* | *Urban Nature Atlas*, 2014)
	-	① Improved health and well-being ② Increased social cohesion	Cruz-Sandoval et.al., Guadalajara, (MX), 2020 (Cruz-Sandoval et al., 2020)
Green corridor	Local government-led projects transforming	① Increased perception of safety	Green Corridor of the Guadalhorce Valley, Malaga, (ES), 2015

NbS options	Implementation activities	Social benefits	Case study
	abandoned areas into new green spaces.	② Improved access to urban green space ③ Protection of historic and cultural landscape/infrastructure	(*Green Corridor of the Guadalhorce Valley* | *Urban Nature Atlas*, 2015)

Tab.1 NbS projects derived from the search.

Community gardens are among the most commonly implemented NbS in neighborhood outdoor green spaces. Designed as meeting points for gardening activities, they strengthen connections between neighbors and foster social cohesion. Numerous studies confirm their positive impact on physical and mental health (De Bell et al., 2020). Unlike home gardens, where individuals often work independently, community gardens emphasize collaboration and encourage social interactions. The "Nature Island" Community Garden is a transformation project designed to enhance opportunities for elderly residents to engage with nature ('Nature Island' Community Garden - Pennenfeld, Bonn | Urban Nature Atlas, 2013). At the same time, it is a place of encounter that promotes social stability by encouraging all other residents to get engaged in the planning, implementation, and maintenance processes. This community garden effectively enhances the quality of life, increases local biodiversity, and also strengthens community building and mutual support in the neighborhood. Shimpo (Shimpo, 2024) investigated the role of community gardens in suburban Tokyo during the COVID-19 pandemic and demonstrated that they not only cultivate a sense of belonging but also promote active citizenship and enhance spiritual well-being, thus contributing to urban resilience.

Vegetable gardens, while focused on food production, are highly adaptable and can take various forms—such as in-ground plots, raised beds, and container systems—making them suitable for diverse urban spaces and resource constraints. A notable example is the Asomadilla Park project, which received a special Environmental Justice Award in 2010 from the Biodiversity Foundation (Asomadilla Park | Urban Nature Atlas, 2004). This recognition highlighted the project's contribution to environmental protection and social integration within the city. As part of the initiative, ecological vegetable gardens were established to host a variety of community activities. The city council also regularly organized horticultural workshops and environmental education seminars to enhance public awareness and understanding of NbS and their associated benefits. Another illustrative case is the implementation of mobile vegetable gardens in the Poble Nou district of Barcelona (Mobile Vegetable Garden, 2015). This initiative enables users to assemble and move modular containers within public spaces according to their preferences, creating opportunities for social interaction. Furthermore, it supports local food markets and increases the availability and accessibility of healthy, locally grown food.

The shortage of land in urban areas has inspired innovative approaches to fostering horticulture. With limited open spaces for traditional gardening, urban residents and designers are turning to creative solutions, such as transforming rooftops into green spaces. These rooftop gardens not only enhance urban liveability but also provide inclusive spaces for community engagement. The Bilbao Rooftop Community Garden exemplifies this trend by combining environmental education with inclusive urban practices (Bilbao Roof Top Community Garden | Urban Nature Atlas, 2011). The project educates local residents on sustainable food cultivation and healthy eating habits, while also offering free access to gardening plots and practice hours for individuals interested in managing their own space. Community-led workshops further promote collaborative learning and environmental stewardship, enhancing residents' capacity to engage in small-scale urban agriculture. A further notable example is Hilldegarden, a rooftop "reshape" project that places particular emphasis on ecological performance and social value (Hilldegarden, 2019). Situated on an 800 sqm rooftop, the garden incorporates sustainable technologies such as renewable energy systems and greywater harvesting for irrigation. It provides a shared space for residents to participate in food production, fostering intercultural dialogue and community cohesion. Beyond its environmental merits, the project generates significant socio-cultural benefits—contributing to the preservation of cultural heritage, while strengthening local identity, memory, and a sense of belonging.

Trees play a vital role in supporting both people and the urban environment. They provide multiple social benefits, including promoting physical and mental health for urban residents, strengthening community ties, and reducing crime rates. These contributions align with the United Nations Sustainable Development Goals (SDGs) 3 (Good Health and Well-being), 11 (Sustainable Cities and Communities), and 16 (Peace, Justice, and Strong Institutions) (THE 17 GOALS | Sustainable Development, 2015). "Operation FIL VERT" is an urban greening initiative aimed at creating a continuous green network across streets by systematically planting trees (Operation Fil Vert to vegetate the streets | Urban Nature Atlas, 2014). Through these greening efforts, the project fosters social connections among residents, strengthens community bonds, and enhances the overall quality and liveability of urban streetscapes. However, as Cruz-Sandoval et al. (Cruz-Sandoval et al., 2020) point out, the distribution of urban trees is often influenced by underlying social and economic inequalities, leading to uneven access to the benefits of urban greenery. This disparity underscores the urgent need for inclusive policies and equitable greening strategies that ensure all communities can benefit from the social and ecological advantages of urban greening.

Green corridors connect fragmented natural areas to form a cohesive green network, integrating elements of nature into urban environments and positively stimulating the senses through sound, color, motion, and smell (Aman et al., 2022). They promote biodiversity, improve air quality, and provide accessible recreational spaces, encouraging physical activity and social interaction. The Green Corridor of the Guadalhorce Valley in Málaga exemplifies such an approach (Green Corridor of the Guadalhorce Valley | Urban Nature Atlas, 2015). This transformation project repurposed a

previously neglected area into a multifunctional green space that is universally accessible, including dedicated pathways for people with reduced mobility. By ensuring equitable access to nature and public space, the intervention actively promotes social inclusion, cohesion, and environmental justice.

In general, these NbS contribute to healthier and more resilient urban environments. Reflecting on the examples discussed above, several key insights can be drawn to inform the design of inclusive urban spaces:

1. Community involvement and long-term management strategies: The creation of inclusive public spaces relies on active participatory approaches, such as co-selection, co-design, co-implementation, and co-monitoring.
2. Innovative solutions for urban constraints: Considering the limitation of urban land use, creative solutions like rooftop gardens and mobile installations show another possibility of making full use of space.
3. Maximizing synergies and ensuring inclusiveness: The selection of NbS should emphasize their capacity to generate environmental, social, and economic co-benefits, while also promoting equity and encouraging active public engagement across diverse social groups.
4. Equity in green space distribution: Addressing the unequal spatial distribution of green infrastructure is essential for ensuring that all urban residents, regardless of socioeconomic status or geographic location, have equitable access to the benefits of nature.

The successful implementation of NbS also depends on flexible participation formats that cater to diverse needs and facilitate the transfer of technical knowledge. By integrating the strategies mentioned above, cities can maximize the potential of NbS to create sustainable and inclusive environments.

4. Conclusion

NbS bring intangible social value through tangible interventions, transforming urban streets, squares, parks, and other public spaces into vibrant hubs of possibility. They foster connections among people, encourage interaction with natural elements, and create opportunities for social inclusion while cultivating a sense of belonging. NbS promote inclusivity by providing spaces where individuals from diverse backgrounds can equally participate and benefit. By integrating natural elements into daily life and adopting participatory approaches—such as co-selection, co-design, co-implementation, and co-monitoring—NbS empower communities to take an active role in their development. Through community workshops and shared knowledge transfer, these solutions not only enhance environmental benefits but also strengthen community engagement and resilience.

The findings emphasize that the success of NbS relies not only on their environmental outcomes but also on their ability to address the intangible aspects of urban spaces, such as inclusivity and community engagement. Incorporating co-design processes and participatory governance into NbS projects ensures their long-term sustainability and equitable impact. Ultimately, this work serves as

a foundation for urban planners, designers, and policymakers, offering actionable strategies to implement NbS that bridge environmental goals with the social and cultural needs of diverse urban populations, thereby promoting sustainable urban development.

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Conceptualizing a Data-Driven Platform for Public Space Revitalization: Integrating Tangible and Intangible Elements

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ABSTRACT

Revising public spaces in rapidly increasing cities is crucial for promoting social interaction, cultural expression, and communal well-being. Current urban planning methodologies frequently depend on disjointed data and predominantly emphasize concrete components, such as infrastructure and environmental conditions, while neglecting intangible aspects like cultural identity, social dynamics, and community needs. This paper presents Public Scape, a conceptual platform that amalgamates tangible and ethereal components into a cohesive whole. The platform facilitates urban planners, policymakers, and residents in formulating more inclusive, data-driven revitalization initiatives by integrating spatial analysis, environmental data, and community feedback. Public Scape utilizes collaborative participation and integrated analytical techniques to reconcile top-down planning with local viewpoints, guaranteeing that public spaces are both functional and socially, as well as culturally, pertinent.

PUBLIC SPACE REVITALIZATION | DATA INTEGRATION | TANGIBLE AND INTANGIBLE | URBAN PLANNING | COMMUNITY ENGAGEMENT

1. Introduction

Urban public spaces are critical to fostering social, cultural, and communal well-being within cities. However, rapid urbanization poses significant challenges, particularly in managing and renewing these spaces effectively. Existing planning approaches often rely on fragmented data, emphasizing tangible components such as infrastructure and environmental metrics, while underestimating the role of intangible dimensions like cultural identity, emotional attachment, and community participation (Gehl, 2011; Wang, Lu, & Fu, 2023; Hinrichs, 2009). Public Scape, a proposed conceptual platform, aims to address these challenges by seamlessly integrating diverse datasets to enhance urban planning strategies.

2. Contemporary Art ad a Catalyst for Public Space Revitalization

Contemporary art interventions can reframe the perception and function of public space, contributing to identity formation, memory preservation, and socio-political discourse (Lacy, 1995; Marchart, 2002; Hornig, 2009). Iconic projects like Wynwood Walls in Miami illustrate how art can revitalize underutilized industrial zones into thriving cultural hubs, attracting millions of visitors annually and driving local economic growth (Wynwood Arts District, 2021). Similarly, Superkilen Park in Copenhagen employs artistic interventions to celebrate the cultural diversity of its residents, promoting inclusivity and urban vibrancy (Superkilen Park Design Team, 2013). Public Scape acknowledges the potential of art-driven regeneration by incorporating mechanisms to evaluate artistic and cultural contributions, ensuring their integration into urban planning methodologies.

3. Evaluation Criteria for Case Studies

3.1. Framework

The evaluation of case studies in this research follows a comprehensive framework that considers both tangible and intangible criteria [Tab. 1]. This dual approach ensures a balanced assessment of public spaces, recognizing the importance of physical improvements alongside cultural and social factors. On the tangible side, the framework emphasizes enhancements to physical infrastructure, such as the addition of pathways, lighting, and planting. These elements are critical in transforming neglected spaces into accessible and visually appealing environments. For example, improved pathways not only enhance the functionality of a space but also encourage foot traffic and community interaction. Similarly, the strategic use of lighting improves safety and usability during evening hours, fostering a sense of security and inclusivity (UN-Habitat, 2013).

Environmental improvements are another key focus, with an emphasis on increasing biodiversity and improving air quality. Green spaces not only contribute to the ecological health of urban areas but also provide residents with a respite from the stresses of city life. Projects that incorporate sustainable landscaping techniques, such as the use of native plant species, create spaces that are both beautiful and environmentally beneficial (Parc de la Villette, 2020). For instance, these initiatives

often result in cooler microclimates, reduced noise pollution, and cleaner air, all of which enhance the quality of life for local communities.

TANGIBLE & INTANGIBLE CRITERIA									
Location	Description	Tangible - Before	Tangible - After	Intangible - Before	Intangible - After	Annual Visitors (Before)	Annual Visitors (After)	Economic Impact (Before)	Economic Impact (After)
High Line (New York)	An elevated rail line transformed into a public park with art, nature, and recreation.	Abandoned elevated railway line, inaccessible to the public.	An elevated park with pathways, seating areas, and over 500 plant species.	No cultural significance, largely ignored by the community.	A symbol of innovative urban development and a cultural hotspot.	None	8 million	Minimal economic activity in surrounding areas.	Surrounding property values increased significantly; major tourist spending.
Millennium Park (Chicago)	A central park featuring iconic art installations and hosting large public events.	Industrial wasteland, underutilized and poorly accessible.	A modern park equipped with iconic artworks and annual events.	Industrial area with no cultural or social value.	A cultural center featuring iconic artworks.	500,000	25 million	Limited economic activity, primarily industrial.	Boosted local economy with significant tourist revenue and events.
Federation Square (Melbourne)	A multifunctional square blending modern architecture and cultural activities.	Unattractive areas with minimal social use.	A multifunctional plaza with contemporary architecture and events.	Minimal identity or attraction.	A popular venue with strong identity and diverse uses.	200,000	10 million	Low-value commercial activity.	Dramatic increase in commercial activity and cultural tourism.
Superkilen Park (Copenhagen)	A park celebrating cultural diversity through artistic and urban design elements.	Unstructured urban space lacking identity.	A culturally diverse urban park with artistic elements.	No connection to cultural diversity.	Strengthened cultural diversity and community engagement.	100,000	2 million	Underdeveloped economic surroundings.	Enhanced local businesses due to increased foot traffic.
Parc de la Villette (Paris)	A cultural park combining green spaces with art and performance venues.	Former industrial site with no green spaces.	A cultural park with art installations and performance venues.	Lack of cultural integration.	Internationally known for its art and cultural events.	300,000	10 million	Neglected industrial zone with minimal economic output.	Revitalized area with increased property values and cultural tourism.
Olympic Sculpture Park (Seattle)	A waterfront park showcasing contemporary sculptures in an urban setting.	Industrial wasteland, no public use.	A public sculpture park integrated with nature.	Limited social or cultural relevance.	A hub for contemporary art and public interaction.	None	1 million	No significant economic presence.	Strengthened local economy with art-driven tourism.
Zaryadye Park (Moscow)	A modern park linking natural and urban elements in the heart of Moscow.	Vacant land, previously a hotel site.	An innovative park combining modern landscaping and historical elements.	No clear cultural or social identity.	Blends modern culture with historical relevance.	None	6 million	Vacant lot, no economic significance.	Boosted local economy with tourist and cultural engagement.
Gleisdreieck Park (Berlin)	A reclaimed railway area transformed into a green urban park with cultural venues.	Abandoned railway land with limited infrastructure.	A green urban park with sports and cultural activities.	Unattractive with no cultural integration.	A vibrant district with cultural and leisure offerings.	None	2 million	Neglected area with minimal economic use.	Property values increased; new cultural and commercial ventures.
Wynwood Walls (Miami)	An industrial district converted into an open-air gallery with large murals.	Old warehouse district with minimal artistic value.	An art district with large-scale murals attracting global attention.	Culturally insignificant and largely unknown.	An internationally recognized cultural destination.	50,000	3 million	Underdeveloped and largely ignored by investors.	Significant investment in art, tourism, and local businesses.
Plaza de las Tres Culturas (Mexico City)	A historic square revitalized with modern art and community spaces.	Historic site with a neglected environment.	A square featuring modern art and restored structures.	Little recognition as a culturally significant site.	A culturally enriched square with strong public perception.	10,000	500,000	Minimal local economic activity.	Revitalized local economy through cultural tourism and restoration projects.

Tab. 1 Tangible and Intangible Criteria. Source: Author's elaboration

Accessibility is also a fundamental criterion, addressing the need for inclusive public spaces that cater to diverse user groups. This includes the installation of ramps, clear signage, and transportation links that ensure people with disabilities, families with young children, and elderly individuals can fully utilize the space (Gehl, 2011). Accessibility improvements transform public areas into hubs of interaction, allowing more individuals to participate in community activities.

On the intangible side, the framework evaluates cultural significance by examining how spaces integrate local traditions, historical relevance, and symbolic value. Public spaces that honor a community's cultural heritage foster a sense of identity and pride among residents (Federation Square Management, 2019). For example, design elements that reflect local traditions or commemorate historical events help connect the community to the space in meaningful ways, strengthening the emotional ties between people and their environment.

Social engagement is another crucial intangible factor, focusing on the role of community involvement in the planning, design, and ongoing use of public spaces. Projects that encourage active participation, such as public workshops or collaborative design initiatives, ensure that the outcome aligns with the needs and desires of the community (Superkilen Park Design Team, 2013). This engagement not only increases the relevance of space but also promotes a sense of ownership and collective responsibility.

Finally, economic benefits serve as an essential indicator of the success of public space revitalization. Spaces that attract tourism, increase property values, or stimulate local businesses contributing to the overall economic vitality of the surrounding area. For instance, public spaces designed to host cultural events, markets, or exhibitions often generate revenue streams that benefit the entire community, creating a sustainable model for urban development (Chicago Planning Commission, 2018).

By applying these tangible and intangible criteria, the evaluation framework ensures a holistic understanding of the impact and potential of public spaces. This approach highlights the interconnectedness of physical, cultural, social, and economic factors, providing valuable insights for the development of Public Scape as a tool to guide future urban planning initiatives.

4. Public space: A Vision for Data-Driven and Inclusive Public Space Revitalization

Public Scape envisions a transformative platform that centralizes diverse datasets to enhance public space revitalization, balancing infrastructure with cultural and social needs [Fig. 1]. By integrating GIS layers, socio-economic metrics, and community feedback, it streamlines data collection, providing planners with intuitive tools for spatial analysis and informed decision-making. The platform features AI-driven feedback analysis to incorporate real-time community input, predictive modeling to simulate the impacts of interventions, and customizable design tools to address diverse user needs. GIS capabilities, including heatmaps and land suitability models, help optimize land use and assess environmental impacts, ensuring functionality and sustainability (GIS in Cultural Heritage, 2019).

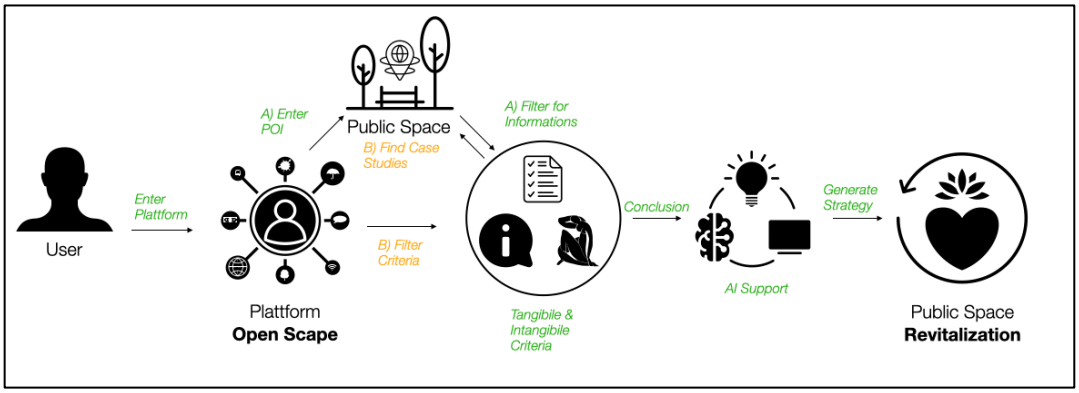

Fig. 1 Functional description Public Scape. Source: Author's elaboration

Public Scape also emphasizes post-revitalization monitoring via IoT sensors for real-time updates on visitor flow, environmental health, and maintenance needs. Visualization tools like augmented reality and interactive dashboards foster transparency and stakeholder engagement (ESRI, 2023).

By merging technology with participatory planning, Public Scape aspires to create inclusive, adaptive, and culturally resonant public spaces. Its innovative approach addresses urban planning challenges while prioritizing sustainability, equity, and local identity (GIS Cultural Resource Management, 2020).

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5. Case Study Insights

This research examines ten diverse case studies to explore innovative approaches to public space regeneration, providing valuable insights for the conceptualization of Public Scape. These examples were chosen for their ability to showcase adaptive reuse, geographic and cultural diversity, and measurable impacts on community engagement, cultural representation, and economic revitalization. Together, they form a comprehensive foundation for understanding how public spaces can be transformed into multifunctional and inclusive environments [Tab. 2].

Public Space Criteria Analysis

Criteria	High Line (New York)	Millennium Park (Chicago)	Federation Square (Melbourne)	Superkilen Park (Copenhagen)	Parc de la Villette (Paris)	Olympic Sculpture Park (Seattle)	Zaryadye Park (Moscow)	Gleisdreieck Park (Berlin)	Wynwood Walls (Miami)	Plaza de las Tres Culturas (Mexico City)
Multifunctionality	Strong - Combines art, nature, and recreation.	Strong - Art, events, and public spaces blend.	Strong - Combines architecture, events, and culture.	Strong - Celebrates diversity and urban design.	Strong - Combines green spaces and cultural venues.	Strong - Combines art and natural spaces.	Strong - Modern park blending history and urban design.	Strong - Combines sports, art, and leisure.	Strong - Focus on public art and community events.	Moderate - Focus on history and modern art.
Cultural Relevance	High - Became a cultural icon of NYC.	High - Iconic cultural landmark in Chicago.	Moderate - Significant but not globally iconic.	High - Represents cultural diversity in Copenhagen.	High - Known for its cultural contributions.	High - Promotes contemporary art in the city.	High - Represents Moscow's cultural transformation.	High - Symbol of urban renewal in Berlin.	High - Became a global cultural hotspot.	High - Celebrates Mexican cultural heritage.
Accessibility	Very High - Centrally located, easy to access.	Very High - Easily accessible, central location.	High - Central location supports foot traffic.	Moderate - Accessible but less centrally located.	Moderate - Reasonably accessible, outskirts of Paris.	High - Waterfront location enhances accessibility.	High - Centrally located, easy access.	High - Accessible via public transit.	High - Accessible, central location in Miami.	Moderate - Less central, but accessible.
Integration of Art	High - Art installations integrated into the landscape.	High - Iconic artworks like Cloud Gate.	Moderate - Less focus on art, more on design.	High - Artistic design reflects local cultures.	High - Contemporary art integrated into design.	High - Art and environment merge harmoniously.	High - Art and technology integrated.	Moderate - Less emphasis on contemporary art.	High - Street art integrated throughout the district.	High - Modern art integrated into historic context.
Community Engagement	High - Involves local artists and community.	High - Community and tourists heavily involved.	High - Engages diverse communities.	High - Strong community involvement.	Moderate - Limited community engagement.	High - Strong focus on public interaction.	Moderate - Community involvement limited.	High - Community engagement in design.	High - Strong local artist involvement.	Moderate - Limited public engagement.
Identity Building	Strong - Revitalized into a globally recognized space.	Strong - Became a symbol of cultural pride.	Moderate - Known locally but less internationally.	Moderate - Popular but less iconic globally.	Moderate - Recognized for its architecture.	Moderate - Local landmark but less global impact.	High - Symbol of modern Russian identity.	Moderate - Known locally, less internationally.	High - Recognized as a cultural destination.	Moderate - Known locally for cultural relevance.
Sustainability	Strong - Green spaces and eco-friendly designs.	Moderate - Focus on public use, less on eco-designs.	Moderate - Limited eco-design focus.	Moderate - Some eco-friendly features.	Moderate - Limited sustainability focus.	High - Focused on green spaces and nature.	High - Focus on eco-design and green spaces.	High - Emphasis on green spaces and ecology.	Moderate - Minimal focus on green spaces.	Moderate - Limited sustainability focus.
Aesthetic Enhancement	Very High - Significant improvement in aesthetics.	Very High - Dramatic aesthetic improvement.	High - Modern design enhances appeal.	High - Urban design significantly improved.	High - Improved aesthetics through design.	High - Improved urban aesthetic significantly.	High - Significant urban and cultural improvement.	High - Aesthetic appeal improved significantly.	High - Transformational aesthetic improvement.	High - Aesthetics improved through restoration.
Economic Impact	Very High - Property values and local spending increased.	Very High - Boosted local economy through tourism.	High - Cultural events boosted local spending.	High - Boosted foot traffic and local businesses.	High - Boosted tourism and cultural activity.	High - Strengthened local tourism economy.	High - Boosted tourism and cultural spending.	High - Increased local economic activity.	High - Boosted art tourism and local economy.	High - Boosted tourism and community pride.
Visitor Growth	Extreme - None to 8 million annually.	Extreme - From 500,000 to 25 million annually.	High - From 200,000 to 10 million annually.	High - From 100,000 to 2 million annually.	High - From 300,000 to 10 million annually.	Moderate - None to 1 million annually.	High - None to 6 million annually.	Moderate - None to 2 million annually.	High - From 50,000 to 3 million annually.	Moderate - From 10,000 to 500,000 annually.

Tab. 2 Public Space Criteria Analysis. Source: Author's elaboration

A recurring theme across the selected projects, such as the High Line in New York, Millennium Park in Chicago, and Superkilen Park in Copenhagen, is the principle of adaptive reuse. This approach involves repurposing underutilized or abandoned spaces into vibrant public areas, demonstrating the potential for such transformations to generate social, cultural, and economic benefits. For

instance, the High Line was reimagined from an elevated railway into a linear park featuring pathways, seating areas, and diverse greenery (New York City Department of Parks and Recreation, 2020). This project exemplifies the integration of nature, art, and urban innovation, attracting millions of visitors annually and redefining the space as a global landmark.

Similarly, Gleisdreieck Park in Berlin converted a disused railway yard into a dynamic community hub that combines green spaces with cultural and sporting facilities (Berlin Urban Development Agency, 2019). Millennium Park in Chicago turned an industrial wasteland into a cultural epicenter, featuring iconic art installations like “Cloud Gate” and the Jay Pritzker Pavilion (Chicago Planning Commission, 2018). These design elements not only enhanced the park’s aesthetic appeal but also created a venue for large-scale events and everyday community use, underscoring the social and economic benefits of thoughtful urban design.

Superkilen Park in Copenhagen represents a compelling example of how public art and cultural symbolism can foster identity and inclusion in multicultural neighborhoods (Superkilen Park Design Team, 2013; Marchart, 2002; Lacy, 1995). By incorporating artifacts and design elements from the international heritage of its local community, the park transformed a fragmented urban area into an inclusive space that celebrates cultural representation and social cohesion (Superkilen Park Design Team, 2013).

Additional projects highlight the integration of art and environmental sustainability. Parc de la Villette in Paris, for instance, converted an industrial site into a sprawling cultural park that blends green spaces with art installations and performance venues, showcasing the potential of large-scale adaptive reuse to foster cultural activity and environmental regeneration (Parc de la Villette, 2020).

Across all these projects, tangible improvements were central to their success. Enhancements to physical infrastructure, such as the addition of pathways, lighting, and green spaces, made these areas more functional and inviting (Gehl, 2011). Improved accessibility features ensured inclusivity for diverse user groups, such as families, elderly individuals, and people with disabilities. Environmental improvements contributed to biodiversity, urban cooling, and air quality, enhancing both the ecological and experiential value of these spaces (UN-Habitat, 2013).

Equally important were the intangible elements that enriched these projects. Community engagement played a pivotal role in ensuring that the designs reflected the needs and identities of residents (Superkilen Park Design Team, 2013). Economic benefits were another significant outcome, with projects like Wynwood Walls and Millennium Park generating increased property values, tourism revenue, and local business activity (Chicago Planning Commission, 2018; Wynwood Arts District, 2021). These case studies collectively demonstrate the transformative potential of adaptive reuse and emphasize the importance of balancing physical infrastructure with cultural and social dimensions.

5.1. Lessons for Public Scape

The findings from these case studies provide a robust foundation for the development of the Public Scape platform, highlighting critical insights that can guide its design and implementation. A key takeaway is the importance of contextual data integration. The diverse objectives and methodologies of the case studies underscore the necessity for a platform that accommodates a variety of datasets, including spatial, demographic, and cultural information (GIS in Cultural Heritage, 2019).

Another critical insight is the need to balance tangible and intangible elements in public space planning. Quantifiable criteria, such as visitor numbers and economic outcomes, must be considered alongside qualitative elements like the emotional connections communities have with their spaces. This dual focus ensures that public spaces are not only functional but also culturally and socially resonant (Federation Square Management, 2019).

Participation and inclusivity also emerged as pivotal factors in designing effective public spaces. Initiatives such as Superkilen Park exemplify the value of participatory planning, where community engagement informs the design process and ensures that the space reflects the needs and identities of its users (Superkilen Park Design Team, 2013). Public Scape can facilitate this approach by leveraging advanced tools like AI-driven sentiment analysis to gather and interpret community feedback, providing planners with actionable insights to create spaces that resonate with local populations (ESRI, 2023).

The role of contemporary art in public space regeneration is another important lesson. Projects like Wynwood Walls and Olympic Sculpture Park illustrate how art can transform public spaces into vibrant cultural hubs that attract diverse audiences (Wynwood Arts District, 2021). Public Scape must integrate evaluation metrics to assess the cultural and economic contributions of art-driven initiatives, ensuring that artistic elements are strategically incorporated into urban planning strategies (Olympic Sculpture Park Committee, 2021).

Finally, the case studies highlight the importance of employing economic and social metrics as success indicators. The measurable economic benefits of projects like Millennium Park and Wynwood Walls, including increased tourism revenue and property values, demonstrate the value of comprehensive analytical tools. By incorporating predictive modeling, Public Scape can estimate the potential outcomes of proposed interventions, enabling planners to make informed decisions and maximize the long-term benefits of revitalization efforts (Chicago Planning Commission, 2018).

5.2. Implications for Public Scape

The case studies highlight the complexity and diversity inherent in public space revitalization, emphasizing the need for a comprehensive, data-informed platform like Public Scape. By integrating the insights derived from these projects, Public Scape can address key challenges in urban planning while enhancing the efficiency, inclusivity, and impact of public space regeneration (GIS Cultural Resource Management, 2020).

A primary advantage of Public Scape is its potential to improve efficiency by centralizing and automating data aggregation. Currently, urban planners often face the labor-intensive task of gathering fragmented data from multiple sources. Public Scape streamlines this process, reducing the time and effort required to compile and analyze information. This allows planners to focus on designing and implementing effective revitalization strategies rather than being encumbered by administrative hurdles (ESRI, 2023).

Public Scape also has the potential to encourage innovation by leveraging advanced technologies like Geographic Information Systems (GIS), AI-driven feedback analysis, and predictive modeling. GIS integration enables spatial analysis to identify underutilized areas, while AI can process community feedback to reveal preferences and needs. Predictive modeling, in turn, allows planners to simulate the potential impacts of proposed interventions, providing valuable insights into economic, social, and environmental outcomes (GIS in Cultural Heritage, 2019). These capabilities empower planners to explore novel solutions tailored to the specific challenges of urban spaces.

6. AI and Public Space Revitalization

AI and GIS integration offer a transformative approach to public space revitalization, enabling efficient, inclusive, and functional urban planning. Public Scape leverages these technologies to centralize datasets and streamline urban analysis processes, aligning with current developments in GeoAI and digital twins as explored in recent research (Afroosheh & Askari, 2024; Fraunhofer IESE, 2023; Boutayeb, Lahsen-Cherif, & El Khadimi, 2024). AI-augmented GIS integrates environmental metrics, transportation data, and community inputs to automate processes like land use mapping. Predictive modeling simulates intervention impacts, aiding resource allocation for improvements such as green spaces, cultural installations, and accessibility upgrades. Successful examples like Wynwood Walls illustrate the potential of predictive tools to drive economic growth and community engagement (Wynwood Arts District, 2021).

Public Scape emphasizes participatory planning, analyzing real-time feedback with AI-driven natural language processing (NLP). By mapping community needs, the platform identifies intervention areas, as demonstrated by projects like Superkilen Park. Future innovations include digital twins and augmented reality (AR) for design visualization, fostering transparency and equity in urban development (Superkilen Park Design Team, 2013).

With its holistic and forward-thinking approach, Public Scape addresses modern urban challenges, balancing infrastructure improvements with community and cultural needs (GIS in Cultural Heritage, 2019).

7. Conclusion

Public Scape represents a visionary approach to public space revitalization, leveraging the integration of AI and GIS to address the complexities of urban development [Fig. 2].

By centralizing diverse datasets, employing predictive modeling, and incorporating community-driven insights, the platform balances tangible infrastructure improvements with intangible cultural and social needs. Its innovative tools, such as digital twins and augmented reality, empower planners to create inclusive, sustainable, and vibrant urban spaces. While still conceptual, Public Scape offers a forward-thinking framework that redefines how cities can foster equitable and meaningful public environments. As the discourse on AI-driven urbanism continues to evolve, it becomes increasingly clear that future-ready planning must not only be technologically advanced but also culturally responsive and socially inclusive (Boutayeb et al., 2024; Difu, 2025; Wang et al., 2023).

Fig. 2
Concept visualization of User Interface. Source: Author's elaboration

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Regeneration and Optimization of Public Open Spaces, strengthening Tangible and Intangible Connections through Dynamic Strategies

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ABSTRACT
This study proposes a comprehensive task list integrating spatial and temporal dimensions to guide urban planners and policymakers in optimizing public open spaces. This task list emphasizes optimizing spatial characteristics to create functional areas aligned with local cultural contexts while accounting for the dynamic nature of space usage. It highlights how usage patterns shift over time, from daily to seasonal cycles. By acknowledging these spatiotemporal changes, the study provides urban decision-makers with strategies that align long-term urban goals with actionable design interventions. The study offers practical optimization pathways focused on enhancing urban identity, fostering social interaction, and ensuring environmental sustainability. It underscores the need to consider social, economic, and cultural factors, such as users' lifestyles, economic activity distribution, and historical heritage preservation when designing public spaces. In doing so, the framework provides a roadmap for balancing the functional and symbolic roles of public open spaces, ensuring they serve both the immediate and long-term needs of POSs users.

PUBLIC OPEN SPACES | OPTIMIZATION STRATEGIES | SOCIAL INTERACTION | CULTURAL PRESERVATION

1. Introduction

Public open spaces (POSs), as a vital element of an urban's outdoor environment, encompass freely accessible parks, green areas, recreational facilities, sports venues, and leisure spaces (Koohsari et al., 2015). POSs have consistently played a key role in shaping urban and regional development, and these spaces enhance the built environment through their tangible physical attributes, such as architecture, infrastructure, and space design, while also contributing to the historical, cultural, and aesthetic identity of cities (Luo et al., 2024). It can be said that the significance of POSs goes beyond their material characteristics, also serve as social arenas that encapsulate residents' collective memories, social interactions, and cultural values (Luo et al., 2025). These spaces impact residents' well-being across multiple dimensions, including physical, emotional, economic, and psychological aspects. Consequently, POSs reflect diverse ways of living in and conceptualizing cities, embodying complex connections between tangible and intangible elements. In the context of rapid urban transformation, optimizing POSs to address evolving and diverse needs has emerged as a priority. Despite extensive research indicating that different types of POSs exhibit varying physical attributes (Han et al., 2022), and questionnaire surveys revealing distinct behavioral patterns and demands of users (Kiplagat et al., 2022), several challenges persist. Such issues hinder the ability of POSs to function as inclusive urban platforms.

To address these challenges, this study aims to develop an integrated framework that combines the static characteristics of physical environments with the dynamic changes in user needs through the construction of a task list. This approach seeks to help urban planners achieve a balance between functionality and cultural preservation.

2. Conceptual Framework

2.1 Setting goals

The optimization of POSs is guided by two main objectives: a top-down approach that focuses on the overall optimization of physical attributes, and a bottom-up approach that prioritizes user-centered development through the enhancement of social attributes (Theeba Paneerchelvam et al., 2020; Vahabi et al., 2023). Specifically, optimizing physical attributes emphasizes the creation of functional and environmentally friendly spaces. At the same time, optimizing social attributes focuses on improving user experience and interaction by increasing users' sense of participation and belonging, revitalizing spaces, and fostering social relationships and cultural preservation (Hegetschweiler et al., 2017) [Fig. 1].

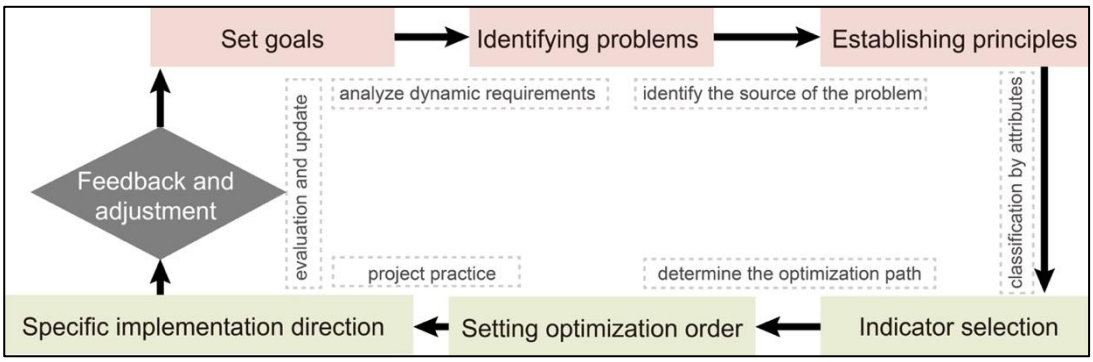

Fig. 1
The overall constructio n of the task list. Source: author's elaboration.

2.2 Identifying problems

The following will discuss the characteristics and problems of four types of POSs, including traditional historical spaces, open street spaces, courtyard spaces, and modern commercial spaces. The classification basis and existing practical problems are derived from the previous empirical research results of scholars in this field (Hunter et al., 2019; Luo et al., 2024; Shatu et al., 2019), addressing both physical and social dimensions [Fig. 2].

Fig. 2
Some of the problems identified in POSs. Source: author's photograph and elaboration.

Key features of traditional historical spaces include narrow, winding streets and alleys, along with pedestrian-oriented transport systems (Xu et al., 2022). Traffic and circulation, increasing population and vehicle numbers strain these spaces, leading to frequent traffic congestion and safety concerns, during peak activity or tourist periods, overcrowding disrupts traffic flow. Public facilities and insufficient cultural facilities fail to meet residents' social and recreational needs, and public functional facilities (like leisure seats, trash cans, etc.) are not fully configured and fail to effectively support diverse activities. In spatial order, street vendors, although contributing to local character, often occupy pedestrian spaces, causing clutter and disrupting the area's overall order.

Due to their lack of clear boundaries or constraints (Yoshihara et al., 2021), open street spaces face challenges in spatial functionality and order. Traffic and circulation, the absence of clear delineation or segregation between motorized, non-motorized, and pedestrian paths results in chaotic parking and obstructed pedestrian flows, impairing spatial order and walkability, and limited public transit coverage further restricts accessibility and utilization. Landscape and aesthetics, disorderly street landscapes, uncoordinated landscape elements, and outdated infrastructure create visual and functional disarray, deterring usage and diminishing appeal.

Courtyard spaces, typically enclosed or semi-enclosed, exhibit higher spatial order but still face challenges related to functionality and facilities. Traffic and circulation, insufficient or poorly managed parking spaces, and mixed vehicle-pedestrian flow create unsafe and inconvenient conditions. Public facilities, limited seating, and activity areas fail to meet users' needs, prompting informal use of spaces (e.g., sitting on flowerbeds or roadside steps). Landscape and aesthetics, overcrowded, haphazardly designed landscaping reduces visibility, comfort, and safety, while the sparse distribution of essential facilities inconveniences users (Chen et al., 2022).

As a concentrated area of commercial activities, the planning and management of modern commercial space needs to balance commercial and public needs, but the following problems still exist. Traffic and circulation, narrow roads, disorganized parking, and motorized vehicle encroachments impede pedestrian and vehicle flows, creating congestion in high-traffic areas. Public facilities, uneven distribution of seating, and activity facilities reduce user comfort. Landscape and aesthetics, encroachment of shopfronts on pedestrian spaces detracts from the street's aesthetics and walkability.

2.3 Establishing principles

From the identified problems, the optimization principles are mainly based on three aspects: traffic and circulation, public facilities, and landscape aesthetics [Fig. 3]. Consideration of natural environments, cultural contexts, and social structures is critical. Additionally, by integrating temporal dimensions, the adaptability and efficiency of space utilization can be significantly improved.

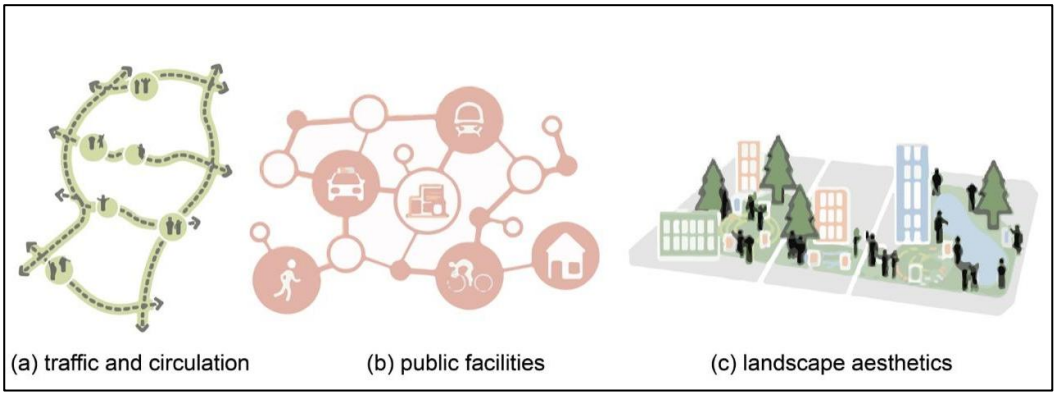

Fig. 3
Optimization principles considered from three aspects. Source: author's elaboration.

3. Development of the task list

3.1 Indicator selection

The task list integrates both spatial and temporal dimensions. Key indicators for the spatial dimension are derived from physical attributes, while those for the temporal dimension focus on user experiences and behavioural dynamics, ranging from the individual to the neighbourhood scale.

3.2. Task list development

The task list is built through the following steps:

- Identification: conduct on-site surveys to identify critical issues in poss.
- Dimension setting: classify observed challenges into tangible and intangible dimensions (physical and social attributes).
- Aims setting: establish overarching aims for each attribute, such as enhancing convenience, functionality, safety, comfort, intelligence, interactivity, culture, and aesthetics (Hunter et al., 2019).
- Aims refinement: decompose aims into measurable sub-aims.
- Optimization directions: align design interventions with refined aims.
- Task list structuring: develop a structured task list with quantifiable indicators, ensuring operational feasibility and temporal adaptability.

The task list is structured around eight key objectives, with specific indicators and explanations as shown in Fig. 4 and Fig. 5.

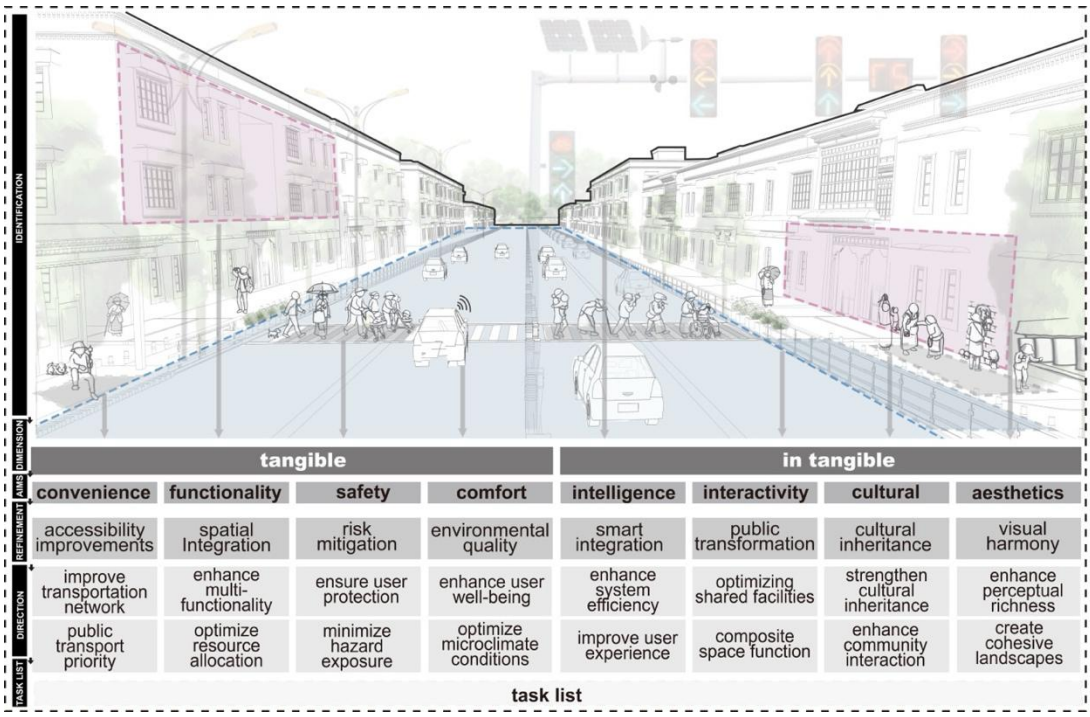

Fig. 4
Task list development process. Source: author's elaboration.

Task list			
	Indicator	Description	Standard for ref
Convenience			
☐	Public transportation	Service radius of bus stops or subway stations	≤300m coverage
☐	Walkability	Width and continuity of pedestrian paths	≥90% barrier-free
☐	Facility density	Number of public service facilities per km²	≥20 units/km²
☐	Parking space ratio	Match between motor/non-motor vehicle parking spaces and demand	≥1:1 ratio
Functionality			
☐	Functional mixture	Mixed ratio of residential, commercial, and office	Mixed-use index ≥0.7
☐	Facility diversity	Types and quantity of public activity facilities	≥5 types/km²
☐	Space utilization	Frequency of use per unit area (e.g., pedestrian	≥50 users/hour
Safety			
☐	Traffic separation rate	Degree of separation between pedestrian and vehicle lanes	≥85% separation
☐	Firefighting facility density	Number of fire hydrants or extinguishers per km²	≥10 units/km²
☐	Lighting coverage	Nighttime illumination coverage and brightness	≥90% coverage, ≥50 lux
☐	Accident rate	Number of traffic or security incidents per month	≤5 incidents/month
Comfort			
☐	Green coverage	Proportion of green area to total block area	≥30%
☐	Sunshade facility coverage	Coverage of shading facilities	Summer shading ≥80%
☐	Noise level	Average noise decibel value in the block	≤55 dB
☐	Air quality	Concentration of PM2.5/PM10 pollutants	PM2.5 ≤35 μg/m³, PM10 ≤50 μg/m³
☐	Seasonal protection design	Design of facilities for seasonal climate adaptation	Summer shading ≥80%, winter insulation ≥70%
Intelligence			
☐	Real-time monitoring	IoT sensor coverage for facility density and usage	≥90% coverage
☐	Barrier-free facilities coverage	Accessibility features (e.g., ramps, elevators)	≥95% coverage
☐	Emergency response time	Average response time for emergencies (e.g., fire, medical)	≤3 minutes
☐	Public Wi-Fi accessibility	Coverage and signal strength of free Wi-Fi	≥95% coverage, ≥-70 dBm
Interactivity			
☐	Public activity space ratio	Proportion of open spaces for social activities	≥15% of total area
☐	Seat density	Number of seats per 100m of pedestrian paths	≥10 seats/100m
☐	Community facility	Average time to reach community centers or parks	≤10 minutes
Culture			
☐	Historic building protection	Proportion of protected and restored historic	≥90% protected
☐	Cultural facility density	Number of cultural facilities per km²	≥3 units/km²
☐	Cultural symbol visibility	Density and distribution of cultural symbols (e.g., sculptures, murals)	≥5 symbols/km²
Aesthetics			
☐	Visual complexity	Diversity of building facades and landscape elements (colors, materials)	Visual richness score ≥ 4/5
☐	Sky visibility	Visible sky ratio in the field of view	≥0.6
☐	Landscape coordination	Harmonization of greening, paving, and architectural styles	Coordination score ≥4/5

Fig. 5
Task list with specific quantitative indicators and explanations. Source: author's elaboration.

It is worth reminding that not all indicators in the task list need to be implemented, and the implementation standards in the list are reference values. Instead, appropriate quantitative indicators should be selected according to the specific conditions of the POSs, and appropriate standard values should be determined.

1. Convenient: Improve spatial accessibility by optimizing the transportation network and prioritizing public transit. Increase road intersection density and network connectivity while

ensuring an efficient distribution of bus stops. Furthermore, aligns parking space allocation with the demand for motorized and non-motorized vehicles (Shatu et al., 2019).

2. Functionality: Promote multifunctional POSs by integrating residential, commercial, and office uses. Increase the diversity of public activity facilities and enhance space utilization efficiency to maintain an appropriate level of user engagement.
3. Safety: Improve spatial safety through traffic separation, fire safety measures, and adequate lighting. Ensure clear demarcation between pedestrian and vehicular zones, enhance the distribution of firefighting infrastructure, and maintain sufficient nighttime illumination to minimize security incidents (Han et al., 2022).
4. Comfort: Improve environmental quality by expanding green coverage and optimizing microclimate regulation. Increase the proportion of green coverage and green infrastructure to improve microclimate conditions while meeting aesthetic and ecological needs (Chen et al., 2022). Provide adequate shading facilities in summer and insulation measures in winter to enhance thermal comfort for users. Regulate noise levels and maintain air quality standards to foster a more comfortable public environment.
5. Intelligence: Integrate smart urban management systems to enhance spatial efficiency (Kiplagat et al., 2022). Deploy IoT sensors for real-time facility monitoring, ensure accessibility features are in place, and improve emergency response times. Employ time-based management strategies to effectively address peak-period traffic challenges to support intelligent urban infrastructure.
6. Interactivity: Optimize shared facilities and multifunctional spaces to foster public engagement. Maintain an appropriate proportion of open spaces for social interactions, ensuring adequate seating and accessible community facilities to enhance spatial usability and encourage social cohesion (Han et al., 2022).
7. Culture: Strengthen cultural heritage preservation and community identity. Monitor the status of historic buildings in real-time, safeguard historic buildings, and integrate cultural elements such as landmarks, sculptures, and murals to enrich urban spaces and reinforce cultural continuity (Hegetschweiler et al., 2017).
8. Aesthetics: Enhance spatial aesthetics through cohesive landscape design and architectural integration. Optimize sky view ratios, and harmonize greenery, paving, and built forms to create a visually engaging and well-balanced urban environment.

3.3. Task list application

The application of the task list is guided by space types, selecting specific indicators based on the characteristics and needs of different spaces. Four examples of spatial types are discussed below to illustrate concrete application pathways.

For traditional historical spaces, optimization should focus on preserving cultural heritage, managing peak crowd density, and enhancing functional diversity (Luo et al., 2024),. Key strategies include

increasing green coverage and leisure spaces to improve environmental quality. To regulate visitor flow, intelligent monitoring systems can be implemented, along with entry limits during peak periods. Pedestrian pathways should ensure accessibility, and traffic separation measures can help improve safety. As a reference, maintaining a clear separation between pedestrian and vehicle zones (e.g., at least 85%) is often recommended (Hegetschweiler et al., 2017).

For open street spaces, the primary goals are enhancing transport efficiency, ensuring sufficient walking space, and integrating greenery and public amenities. Streetscape design should align with the surrounding environment, incorporating public seating areas and active street interfaces such as shaded spaces or transparent facades to improve connectivity and visibility. To enhance walkability, pedestrian crossings should be placed at appropriate intervals, and paving materials should balance permeability and durability to facilitate drainage. For reference, public seating is often recommended at an interval of approximately 10 seats per 100m of pedestrian space.

Courtyard spaces should focus on ecological maintenance and user comfort by integrating vegetation and optimizing spatial functionality. Seasonal adaptability can be improved by selecting deciduous trees with dense canopies to provide shading in summer while allowing sunlight in winter. The use of permeable materials for pathways can help reduce heat accumulation and improve drainage. Additionally, rest areas should be well-equipped with seating and sanitation facilities to enhance usability. A common recommendation is to maintain a significant proportion of green space to ensure adequate shading and climate regulation.

For modern commercial spaces, optimization should emphasize improving accessibility, functional diversity, and service infrastructure (Vahabi et al., 2023). Expanding pedestrian pathways, increasing public transport connectivity, and enhancing green spaces can contribute to a more efficient and user-friendly environment. During low-utilization times, repurpose semi-open spaces for public activities. Hard parking and temporary traffic restrictions can ease congestion and improve flow, creating a more vibrant and efficient commercial space.

4. Discussion and conclusion

This study develops a task checklist framework for optimizing POSs from spatial and temporal dimensions, aiming to assist urban planners and policymakers in designing spaces that are inclusive, functionally diverse, and culturally resonant. The proposed task list centers on multidimensional indicators and emphasizes a systematic approach from macro-level planning to micro-level design, it provides clear and actionable pathways for optimizing public spaces, making it a valuable tool for practitioners.

In summary, the task list proposed in this study offers a perspective on POSs design and management. By integrating tangible and in-tangible dimensions, this approach addresses the challenges posed by the diversified demands of POSs in the context of rapid urbanization. Future research could focus on the deeper integration of smart technologies and the development of

localized optimization strategies (Luo et al., 2024), further advancing POSs toward greater inclusivity, cultural continuity, and environmental sustainability.

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Promoting local ecologies. Collective practices of symbiotic design

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ABSTRACT

This paper explores the relevance of community-based design practices in responding to current global uncertainties, pollution, climate change, and biodiversity loss. It highlights how collaborative and 'symbiotic' design approaches can promote and encourage the diffusion of a tangible and intangible sense of 'collective ecological consciousness'. The aim is to investigate the potential of design in creating collective knowledge networks through 'rhizomatic' processes, community approaches and local ecological practices. The research emphasises the importance of new forms of civic action in fostering a sense of ecological citizenship and community, addressing socio-environmental issues. The case studies presented illustrate the activities of realities that, through collective awareness actions, develop local ecologically appropriate design practices. The adoption of the Circular Value Framework allows the social values generated to be analysed and highlighted. Design is thus configured as an activist force capable of triggering positive changes, transforming individual and collective behaviour into concrete actions for 'co-futuring'.

COMMUNITY-CENTRED DESIGN | ECOLOGICAL CITIZEN VALUE | BIOINTEGRATION | LOCAL COMMUNITIES ACTIVISM

1. Design and civic action

In order to address the complexity of global challenges, pollution, climate change, and biodiversity loss (Elhacham, Ben-Uri, Grozovski, Bar-On, & Milo 2020), unconventional community-based design strategies are being developed in recent years (Villari 2021).

The design process becomes 'rhizomatic' (Lotti, Vacca, Tanzini, & Ballerini 2022), creating a network of collective knowledge that arises from the connection of different knowledge.

The study highlights the importance of adopting community-centred approaches (Meroni 2007; Priola & Manfroni 2024) that, through a continuous interaction with design, support and guide the necessary social and cultural transformation.

This research aims to reflect on how community-centred design processes, practices and values are changing in response to global uncertainties.

In particular, it aims to identify realities capable of promoting positive behaviour and ecologically appropriate local design practices through collective awareness actions. These include design approaches that aim to stimulate the 'citizen relationship' with the natural world (Phillips Alexander, Baurley, Boxall, Gooding, Knox & West 2024), 'endogenous' practices (Cardini 2022), and design expressions that emerge within a specific community or context.

Therefore, the research focuses on the interconnection between the tangible and intangible dimensions of design, the engagement of local communities, and its capacity to foster reparative practices through which citizens actively contribute to reconnecting with their environment.

2. Eco-social relational practices (background/literature review)

Facing contemporary issues, emerges the need for a radical change and a new sensibility that promotes 'symbiotic relationships' (Albrecht & Van Horn 2016) between humans and the natural environment. This term refers to mutually beneficial interactions between humans and the environment, promoting co-evolution and balance. This concept challenges anthropocentric paradigms, encouraging regenerative and reciprocal connections that support both ecological and social systems.

In this perspective, the tendency is to operate through an holistic approach with local communities, for territories and contexts where designers 'create the conditions' to enact change (Manzini 2019).

In the field of design, expert designers' attention is increasingly focused on local issues (Fagnoni, Manfroni & Priola 2024). There is a radical shift in collective vision and design practices, encouraging the adoption of biocentric strategies concerned with ecosystem dynamics: strategies promoting a deeper understanding of ecological processes, emphasizing the need to align design interventions with the rhythms, needs, and regenerative capacities of ecosystems.

At the same time, we are witnessing the proliferation of a variety of initiatives that contribute to the emergence of different energies and capacities in society, which, when they find a favourable context, could become powerful resources for the diffusion of 'social innovation' initiatives (Murray, Caulier-Grice & Mulgan 2010).

These are the 'Changing Communities' (Gonzaga, Nam, Rebaglio & Selloni 2023), groups of people, associations, social enterprises capable of addressing complex problems and at the same time regenerating the society and territory in which they operate.

Through collaborative practices they also contribute to regenerating the local social fabric, producing alternative visions.

In this sense, designers are increasingly concerned with intangible aspects associated with design, such as the construction of a 'sense of community' (Yuan 2024), useful to reflect and respond to current social and environmental changes.

Design today has to deal with complex daily aspects and issues, and shifts the focus of its actions from taking care of the tangible and formal aspects (Fagnoni 2022) to enhancing the intangible and

relational aspects of the project, creating opportunities for contact and discussion for the development of the territory.

Recurrent is the idea of a design that comes out of laboratories and studios (Campagnaro 2023), which dialogues with and actively involves interested individuals, giving them a role in the decision-making process.

There are emerging approaches aimed at promoting 'ecological citizenship' (Phillips et al. 2024). Platforms that act as catalysts for active citizen participation and for the promotion of positive ecological behaviour, involving and empowering communities through individual and collective actions (Phillips, West, Shepley, Baurley, Simmons, Pickles & Knox 2023).

3. Methodology: Circular Value Framework

Referring to theoretical insights, good examples and practice-based actions, the research examines how designers promote 'community-centred' approaches (Villari 2021), including citizen science, activism and collective learning.

The aim is to map local realities from different international contexts, explore opportunities, communities and movements based on civic engagement that can offer opportunities to re-imagine a collective ecology from different cultures and approaches.

The criteria adopted for the selection of the case studies are: 1) semantic adherence, designer-led realities that carry out activities to develop collective knowledge networks, and foster the dissemination of local community involvement practices; 2) time frame, realities operating between 2015 and 2025; 3) design approach, realities that adopt community approaches by involving citizens and promoting local ecological practices; 4) application field, cases that promote the integration of design and forms of civic action in fostering a sense of ecological citizenship and community, and address socio-environmental issues.

The paper presents a comparative analysis of the mapped cases, with the aim of highlighting their value in addressing complex socio-environmental challenges and disseminating ecological practices.

This qualitative approach explores specific parameters and is mainly based on the use of the Circular Value Framework [Fig. 1], revised and based on the existing five-layer model (Leclercq & Smit 2023).

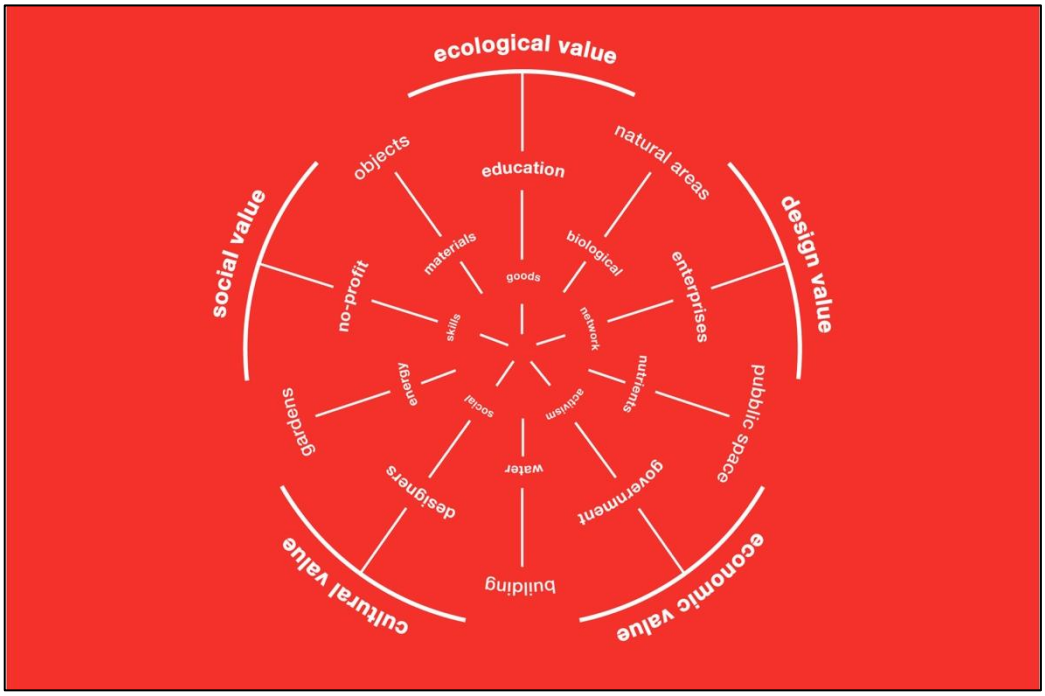

Fig. 1
Circular Value Framework revised and based on the model of Leclercq & Smith 2023. The diagram maps five layers of community-based initiatives: ambitions and activation potential; resource cycles; involved actors; spatial interventions; and generated values.

The first layer of the chart highlights the ambitions of the realities and the activation potential present or needed within the community. The second layer shows the different resource cycles on which the initiatives focus (water, energy, nutrients, materials, biological and plant resources). The third layer presents the possible actors the realities can relate to in order to achieve their ambitions (designers, public entities, private companies, non-profit organisations and institutes). The fourth layer shows the potential spatial interventions (natural areas, public spaces, gardens, buildings and urban objects). The outer layer is formed by the values generated by the realities (social, economic, ecological, design and cultural).

Subsequently, individual case studies are examined using value charts, with the aim of providing evidence on the impact created and identifying the values that the initiatives generate.

These initiatives should not be interpreted exclusively as responses to local problems, but as true experimental cultural laboratories capable of offering new perspectives. To fully assess their value and impact, it is necessary to consider both dimensions, not only the practical and tangible/explicit results, but also the tacit and cultural potential they can bring on a broader scale and in the long term.

4. Different forms of citizen activism

Atelier LUMA[1] is a research laboratory located in the Camargue wetlands region. It experiments with alternative practices of bioregional design (Magnaghi 2020) and establishes new connections with the territory.

The design activities are based on a multifaceted approach aimed at connecting and engaging the Mediterranean community of Arles and various local stakeholders, including artisans, experts, investigating the use of local materials such as agricultural waste, invasive plants or seaweed, activating traditional knowledge and disseminating the results through open source resources, workshops and other replicable eco-social educational activities (Boelen, Sachetti, Travnik, Hofmann, Bouhayati, Finders, & Picon 2019).

Field Meridians Nature School[2] is an educational programme based on urban ecology, developed to generate resilience tools. Their practices include activities to investigate and explore urban micro-ecologies [Fig. 2]. Through workshops and educational programmes, it aims to raise awareness in the local community about the importance of ecology in public spaces such as parks and community gardens. The school collaborates with local organisations to promote waste reduction, land care and resource redistribution. In addition to sharing skills, knowledge and collective values, it promotes the re-connection between people and places.

Ecological Citizen(s) Network+[3] *at the Royal College of Ar*t is a global network of individuals and organisations promoting a form of ecological citizenship.

The network consists of a transdisciplinary team, including design, art practice, citizen science, environmental science, engineering, technology, education, and through awareness and collective action promotes ecological projects, behaviours and values that connect the individual, society and ecosystem.

La Foresta[4] is a community academy located in the Rovereto railway station. This collectively regenerated space is dedicated to eco-social transformation, hosting an open network of people and a variety of participatory, cultural, design and educational activities.

Through co-design paths, the community actively participates in the definition of workshop activities in which self-production techniques are shared and solutions to optimise natural resources are explored.

[1] Atelier LUMA website: https://www.luma.org/en/arles/atelierluma.html
[2] Field Meridians' Nature School website: https://natureschool.fieldmeridians.org/
[3] Ecological Citizen(s) Network+ website: https://ecologicalcitizens.co.uk/
[4] La Foresta website: https://laforesta.net/

Fig. 2
Field Meridians' Nature School, New York. Source: https://www.instagram.com/fieldmeridians/

Terzo Paesaggio[5] promotes cultural practices with a focus on marginal places. It realises interventions of regeneration and temporary reuse of disused public heritage and soils. It promotes co-creation practices among plural communities by involving resident designers, practitioners, researchers and policy makers. It also experiments with learning and training approaches open to cultural crossover and self-learning.

Barena Bianca[6] is a collective dedicated to raising public awareness of ecological and social issues in the Venetian lagoon [Fig. 3].

The group organises ecological walks in the sandbanks of the Venice lagoon and collaborates with designers to develop installations to educate participants on the ecological importance of these areas and the threats they face. They offer environmental education workshops for schools and local communities focused on the lagoon's biodiversity and environmentally friendly practices.

5. Value of communities relations

The results of the analysis are shown in several value charts [Fig. 4] indicating the extent of value generated by each specific reality. This 'entity of value' refers to a qualitative and comparative assessment of the value produced by each identified case study, considering a number of factors such as ecological, design, economic, cultural and social contributions.

[5] Terzo Paesaggio website: https://terzopaesaggio.org/
[6] Barenabianca website: https://www.barenabianca.earth/

Fig. 3
Barena Bianca, Venezia. Source: https://www.barenabianca.earth/category/education/

By systematically assessing these aspects among the selected cases, the graphs provide a representation of the different degrees of value generated by each initiative, offering insights into the effectiveness and overall contribution of community-centred design in the local context.
The value is verified with a qualitative indication, visually represented by the three levels, where the minimum level corresponds to 'to a minimum extent', the intermediate level represents 'to a limited extent' and the outer level means 'to a large extent'.
The analysis of these relationship-based practices could offer alternative perspectives in the sharing of knowledge and values, to collectively re-imagine how to cope with the socio-ecological adversities that characterise the present moment and the near future (Schneider-Mayerson & Bellamy 2019).
These are activities, initiatives and practices in which the design's capacity and ability to enhance the community, the commons, and the cultural and natural resources of specific territories emerge. These realities and communities are connected to the places in which they operate (Manzini & Thorpe 2018) and contribute to the diffusion of forms of active citizenship that focus on specific ambitions for each project and context.
In this sense, community-centred actions and relationships emerge, promoting design strategies and practices, aimed at orienting the capacity of design towards ways of acting in tune with social and ecological contexts (Fagnoni, Manfroni & Priola 2024).
In this scenario, community members do not limit themselves to developing solutions to address their own needs, but proactively participate in a broader collective design process that brings together designers and local stakeholders. These communities evolve through an ongoing

interaction with design, which not only supports but also drives social and cultural transformation (Gonzaga et al. 2023) in response to the main social and environmental challenges.

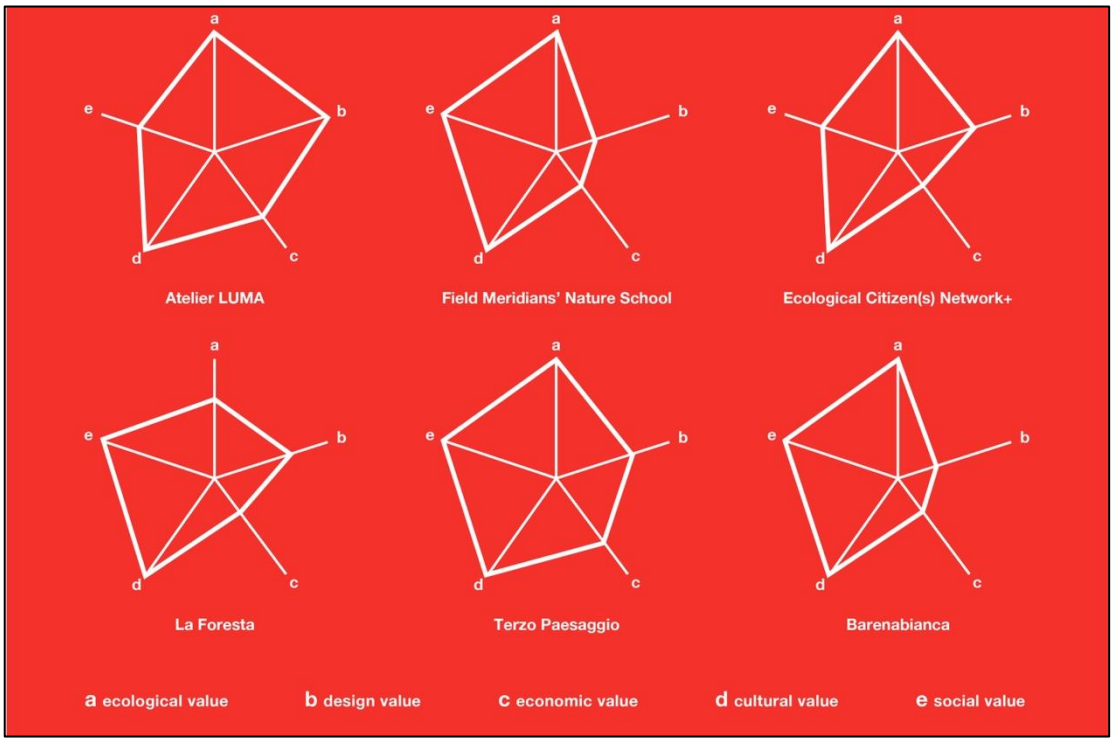

Fig. 4 Community Values Chart represent the ecological, design, economic, cultural and social value generated by each specific mapped reality

6. Co-futuring: a sense of collective ecological consciousness

This paper highlights how the adoption of different collaborative approaches can contribute to addressing environmental challenges and reciprocally benefit communities of citizens, ecological environments and society in general.

The results of these practices include relational approaches that generate scalable and transferable 'social-environmental values' for broader applications in addressing critical ecological issues.

As many of these initiatives are not well established to date, it is complex to bring out and analyse the explicit contribution of design. However, within formally structured communities, such as those presented here, it is possible to identify the potential generated by designers who, together with citizens, address a multiplicity of challenges in dynamic and cooperative ways. One problem that emerged during the collection of the case studies was the lack of information, which limited the comprehensiveness of the analysis. To address this challenge, it will be necessary to explore additional data sources and adopt more effective collection strategies.

The difficulty in measuring the designer's tangible contribution stems from the fact that many initiatives focus on educational and awareness-raising actions aimed at citizens.

This difficulty should not be seen as a weakness in the traditional design paradigm, but as a reflection of the evolution of design towards an expanded approach that goes beyond the production of objects and includes relational, interactive and collective processes. In this context, design is no longer

measured only through tangible results, but also in terms of social impact, awareness and cultural transformation.

In this kind of activity, design triggers ‘interactions’ that can transform behaviour into positive impacts on the natural world (Phillips et al. 2023). Design becomes a medium for fostering a tangible and intangible sense of ‘collective ecological consciousness’ [Fig. 5].

The potential of design as an ‘activist’ force thus emerges, fundamental in addressing the collective challenge of promoting democratic practices and values, actively contributing to the shared construction of ‘co-futuring’ (Fuad-Luke 2009).

These visions offer critical perspectives on a fragmented present (Morton 2016) and outline pathways and strategies for the co-construction of desirable futures (Escobar, 2018) and positive change.

Fig.5
Relevant aspects for developing a sense of collective ecological consciousness in community-centred design practices

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The contribution is the result of a common reflection of the Authors, who defined the main concept for the research activity about the identification and analysis of different realities that promote a common civic and ecological sense through city relations.
Moreover, the paragraphs 'Design and civic action' and 'Eco-social relational practices' are to be attributed to Manfroni M., 'Methodology: Circular Value Framework' and 'Different forms of citizen activism' to Priola C. M.. The paragraphs 'Value of community relations' and 'Co-futuring: a sense of collective ecological consciousness' are to be attributed to both authors.

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The Intangible Architectural Design Agency: Navigating the Tangible Construction Process of

Public Space in Rural China. The Case Study of Zhaoshan Village

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ABSTRACT
This article examines the construction process of the Zhaoshan Village Community Center in Hubei Province, China, as a case study of the national strategy for rural revitalization. Grounded in ethnographic research, it challenges top-down narratives in public space transformation by exploring the interplay of material and design choices, stakeholder relationships, and socio-economic consequences during construction. By examining the entanglement of different construction systems, it shows how these technologies influence economies, stakeholder relations, and benefits. Using WeChat-mediated interactions between architects, contractors, and workers as a lens, it unveils the underlying hierarchies and negotiations that define construction practices. It reveals the constraints imposed by bureaucratic frameworks and procurement standards, which often prioritize replicability and environmental indicators over local needs. This analysis advocates for an expanded role for architects as mediators, bridging policy mandates with community goals to ensure projects achieve their transformative potential. The findings highlight overlooked intangible socio-economic dynamics in rural regeneration practices.

ETHNOGRAPHIC APPROACH | CONSTRUCTION TECHNOLOGIES | SOCIO-ECONOMIC IMPACTS | ARCHITECTURAL PRACTICE

1. Introduction: Ethnographic Insights into Transformative Rural Revitalization Processes

In November 2023, construction commenced on the extensive renovation of an old factory in Zhaoshan Village (沼山村- Zhaoshancun), in Baohan County (保安镇- Bao'anzhen). It is a central aspect of the rural revitalisation process, which aims to establish the first rural scenic area in Hubei Province, designed by SUP Atelier by THAD design institute. In recent years, China has established a comprehensive framework of policies and investments targeting rural areas, recognizing them as a fundamental component of the nation's overall development strategy. Policies

such as the Rural Revitalization Strategy introduced during the 19th Party Congress in 2017, the National Strategy of Rural Revitalization issued the same year, and the Rural Revitalization Promotion Law enacted in 2021 are among the key initiatives that have redirected national attention toward the countryside. Central to this strategy are public infrastructures that serve as nodes of social interaction, fostering identity formation and mediating inequalities and conflicts within rural-urban dynamics. The construction of such infrastructures becomes a space where the negotiation between tangible and intangible realities unfold, redefining both the spatial configurations and the meaning of publicness in contexts shaped by China's socio-political conditions (Smith 2021; Trémon 2023). The term ‘publicness’

is adopted here for its versatility across multiple dimensions of the public realm. Rather, it refers to the condition of “being public”, encompassing a heterogeneous set of factors – goods, actions, and decisions– that collectively generate public meaning and value.

This discussion is grounded in ethnographic fieldwork conducted as part of my doctoral research, which examines rural revitalization "from the ground up" and challenges conventional top-down narratives.

This bottom-up view is grounded in theoretical frameworks such as Actor-Network Theory (Latour, 2005), a theoretical framework that reconceptualizes society as an assemblage of heterogeneous human and non-human actants, each contributing agency to socio-technical processes whose relationships shape outcomes. This approach allows us to explore how architectural technologies and construction choices influence stakeholder interactions, revealing the micropolitics of rural transformations. The article specifically focuses on the interplay between architectural design choices, construction technologies, and the actors involved in the building process, offering insights into the elusive intangible dynamics embedded in the materialization of national policy agendas.

2. Construction Industry Challenges and Controversies for Architecture practices in Rural Context

Architectural practice, and the construction industry as a whole in which it operates, is inextricably linked to 'socio-economic conditions, as well as governmental policies, that profoundly influence design and construction decision-making.

Given the complexity of rural regeneration processes and their multi-layered interactions between policy, market and local communities, it is essential to critically examine the role and positionality of architectural design and the architect within and in relation to the construction market.

Shifts in the socio-political system and market acceptance have significantly influenced Chinese architecture, reshaping both the profession and the construction industry (Han, 2018). Recognized as a distinct sector only since 1983, the construction industry was unified by a law effective March 1, 1989, addressing qualifications, procurement, supervision, safety, quality, legal accountability, market regulations, and project procedures.

On the material side, these regulations emphasize technologies like reinforced concrete, often prefabricated, which align with the demands for rapid urban development with highly industrialized approach to construction, prioritizing speed, cost-efficiency, and prefabrication (Smil 2013). This paradigm has sidelined traditional materials like clay bricks and wood, further restricted by environmental regulations aiming to curb deforestation or phased out due to resource preservation of raw material (China's reliance on concrete). [1]

Labour from rural areas has played a key role in this growth,[2] with many rural workers acquiring skills in concrete construction through their involvement in large-scale projects, also occurs the knowledge and transmission and the diffusion for its replicability. Consequently, today much of the workforce is specialized, or has the ability, to easily manage reinforced concrete constructions. These shifts have transformed not only the materials of construction but also the social and economic frameworks underpinning the industry, which is now highly controversial in rural areas undergoing regeneration.

Rural revitalization projects face distinct challenges, particularly in how the choice of technologies and materials shapes who participates in construction and who benefits economically. Publicly funded initiatives, designed to improve community well-being, often neglect the social and economic opportunities embedded in the construction process itself. This raises a key question: who truly benefits from these efforts?

However, publicly funded projects are constrained by formal procedures and regulations, including new sustainability metrics like carbon footprints and energy efficiency, adding complexity to architectural choices. These decisions influence not just environmental outcomes but also economic equity, yet they are rarely considered in procurement processes or tracked through indicators, as they usually rely on intangible and and ungraspable dynamics.

3. Unfolding thought ethnography: a methodological challenge

Without claiming to provide a methodology for measuring the intangible and ungraspable dynamics mentioned above -assuming that's not the desired goal- the research proposes an ethnographic approach to start to identify and track informalities and presences on the construction site in relation to design choices.

Ethnography offers a unique lens for understanding the construction process as a site of negotiation, revealing the interplay between envolved actors and material assemblage. By observing and documenting informal and formal interactions, this methodology unpacks the intangible connections shaping rural revitalization.

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[1] Avant-garde architects have paradoxically embraced concrete, a material linked to mass production, for its expressive potential. See: Bologna, A. (2019). Chinese Brutalism today: Concrete and avant-garde architecture. ORO.

[2] For more: Swider, S. (2015). *Building China: Informal Work and the New Precariat* (1st ed.). Cornell University Press.

WeChat, a widely used communication platform, played a central role in the Zhaoshan project. The interactions among architects, contractors, and specialized teams were often mediated through group chats, categorized by task and stakeholder group. Moreover they became tangible since they became a traces.[3] As Albena Yaneva (2023) has documented, the ways of interacting and the tools used in the practices change according to contextual needs, but they can also change the way we look at the process. As observer researcher I was in the following WeChat groups: Architectural Team (AT), AT+Engineering Team (ET), AT+ET+Contractor (C); AT +ET+C+Timber Manifactury (TM).

As can already be understood from the list of groups, the timber manufacturing team started direct dialogues with the design team, unlike the other craftsmen who were instead managed through the on-site contractor. This required more consultation time from the design team and a greater level of coordination. As a result, the intensity and structure of communication varied across phases.

For instance, during the construction of the reinforced concrete and steel structures, the frequency of communication between AT and C was significantly reduced, unlike during the construction of the vertical brick closures, which required more continuous exchanges.

These digital interactions provided unique insights into the hierarchy of communication, decision-making processes, and the adaptability of construction practices in response to unforeseen challenges.

4. The Zhaoshan Case Study: Interweaving Technologies and Local Economies

The Zhaoshan project exemplifies the entanglement of technological choices and actor relationships in rural construction. The construction process for the Zhaoshan Community Center lasted approximately eight months and involved a diverse workforce, including specialized teams skilled in various construction techniques. These teams worked with a range of materials such as timber, reinforced concrete, steel, bricks, and stone.

The Taoli-Numayama Village Villager Center, as the project is officially named, transforming the abandoned site into a public space for both the local and tourist communities. Its goal is to serve as a hub connecting inhabitants of the village, the inhabitants of the town (4km), encouraging a flow of people from nearby cities (105-408km) but also at a national level thanks to the classification as a Level 4A Scenic Area.

Originally built around 2000, the factory processed natural soil into kaolin industrial materials, utilizing the site's topography and cost-efficient construction methods like brick columns and wooden trusses [Fig. 1].

[3] See concept of "documentality" described by Maurizio Ferraris (2009), *Documentalità. Perché è necessario lasciar tracce.* Laterza.

Fig. 1
Interior of the original factory built around 2000, featuring bricks, concrete and wooden trusses. Photo by Sun Jingfen, courtesy SUP Atelier

The design team aimed to transform in new 2,993-square-meter site within a constrained budget. The decline in industrial activity led to the abandonment of the factory and its deteriorating structure, which was later deemed unsafe and had to be demolished. The new centre needs to accommodate a variety of activities that require different spaces of varying dimensions, but which echo the original structure of the factory. To achieve this, the design has provided all of these under a single expansive wooden roof with a span of 12+8 meters. The project required advanced construction technologies and a highly specialized team, expertise unavailable locally and sourced from Wuhan city武汉市 (distance:105 km).

The timber components were designed and prefabricated off-site, enabling quick on-site assembly by a team of 6-7 specialists from the manufacturing company [Fig. 2]. To minimize lodging and meal costs, the team tracked their time and days on-site closely, as their fee, like the project budget, was at the limit of the service provided. As the most technically complex element, the roof significantly shifted the project's economic geography. Even if it was a deliberate choice by the design team, it reflects a broader strategy to emphasize an innovative feature, enhancing the project's alignment with the government's 'Rural Green Sustainable Development'[4] plan.

[4] The development of rural industries and changes in farmers' lifestyles will increase carbon emissions. See Xu T. et al. (2024). Balancing the development and carbon emissions in rural areas of China. *Journal of Cleaner Production*, n° 454.

Fig. 2
Specialists from the manufacturing company quickly assembling the prefabricated timber structure on-site. Photo by the author

Pragmatically, it also defined the portion of the budget allocated outside the local economy. Paradoxically, this part of the structure was the element that brought satisfaction and merit to the builder and pride to the community as an innovative and exceptional mark. This is something that, as the designers who work in the countryside can attest, does not happen with traditional technologies.[5]

By contrast, other components utilized local labor and materials from the nearest town. Before design began, architects made weekly visits to villages and towns, studying local craftsmanship, including masonry and brickwork. Reinforced concrete was used for the foundations and the first-level frame, a standard and reliable choice to meet safety regulations within the lower budget.[6]

Steel structures, utilizing on-site welded joints, allowed for flexibility in addressing imperfections and design adjustments during construction, unlike the timber structure with nail joints, which is difficult to manage given the low error tolerance [Fig. 3]. As mentioned above, communication with the timber manufactory and design team was direct and frequent during construction. Also, collaboration with other local tradesmen working with the steel structure where the timber frames were placed was complex to manage.

[5] This statement is supported by interviews and fieldwork done in different villages by the author.
[6] The need for static safety certifications makes standardized systems more economically accessible.

Fig. 3
Image shared on WeChat by the design team to the timber manufacturer, showing timber structures with nail joints and digital interaction with design team. Photo by WeChat instant messaging group, courtesy SUP

Bricks were used for the elevations, always following the echoes of the original structure. The original factory buildings, constructed around 2000, were made of high-quality bricks more than modern ones, as restrictions in recent history on using clay from farmland have altered material production.[7] Even residents frequently visited the site to collect salvaged bricks. So the architects team suggested to recycle these old bricks, selecting only intact ones for reuse. New bricks were reserved for less visible areas, such as interior partitions and inconspicuous exterior walls. The new bricks sourced from Yichang city宜昌市 (408km) differ in size from the reused ones, as they are designed to meet national standards. However, upon arrival, they were found to be slightly smaller than expected. Since these bricks are sold by unit rather than weight, cost-saving measures in production often lead to such inconsistencies, undermining standardization. Many new bricks also had black stains from the drying process.

[7] See: http://en.people.cn/200403/17/eng20040317_137777.shtml (last accessed 27/11/2024)

After testing various masonry arrangements with artisans and message with the architect team, a composite wall method was finalized [Fig. 4]. Finding skilled workers capable of meeting the architects' expectations while managing these challenges within a tight budget and before the National Chinese Spring Festival Holidays proved difficult.

Fig. 4
Image shared on WeChat by the design team to the contractor on-site to coordinate brick assembly. Photo by WeChat instant messaging group, courtesy SUP Atelier

This reflects the historical evolution of China's construction industry, which long ago phased out solid clay bricks. These bricks were central to socialist era building practices, symbolizing a local, manual approach aligned with the ideals of the Cultural Revolution. The shift to hollow blocks and modern walls also had symbolic weight, marking a step toward economic liberalization and moving away from ideologically driven construction practices (Roskam 2020).

Contracted teams from a nearby Bao'an Town 保安镇 (4km) created mock-ups to assess the outcome on a smaller scale. After rejecting the first team, a second team successfully completed the work. The search for labor, led by the local contractor, working closely with the architects, achieved a balance between aesthetic goals, sustainability national compliance, and supporting the local economy. Even unskilled villagers contributed to minor tasks on-site, providing them with an additional source of income [Fig. 5].

This process required extra consultation time from the design team. Communication between the technical advisors and contractors was less frequent during the construction of reinforced concrete and steel structures than during the brickwork for vertical enclosures and timber structure. Contrasting what law and contract ask: architects cannot interfere with the builder (See: Paragraph 2).

Fig. 5
Unskilled villagers contributing to minor on-site tasks. Photo by the author

The findings of this study emphasize the importance of analyzing the intangible socio-economic dynamics of design and construction in rural revitalization, particularly in the creation of public and collective spaces. The process of architectural realization unfolds as a 'cosmogram' (Tresch 2007). —between materials, labor, and public space projects—that require deliberate consideration and study to ensure meaningful outcomes.

Yet these socio-economic dynamics are often overlooked in formal project construction process, which tend to emphasize metrics such as cost efficiency and environmental factors (e.g. carbon footprint), while disregarding the situated complexities and socio-economic implications of material and technological choices. However, rural revitalization offers architects an opportunity—and a responsibility—to challenge these procedures. How can the gap between the construction market and the public interest be addressed when investing in public spaces?

The choice of construction technologies is especially critical in contexts where oversight is limited, as high-tolerance systems susceptible to errors can lead to technical failures, economic losses, and diminished project impact. Conversely, adaptable, locally accessible methods can mitigate these risks, involve local labour, but are unattractive to visitors and not a source of pride for locals [Fig. 6]. However, architects often face significant constraints due to bureaucratic procedures and public procurement rules, which limit innovation and community-oriented approaches. As government-

funded projects place growing emphasis on sustainability metrics like carbon emissions and energy efficiency, architects face the challenge of aligning these technical requirements with broader socio-economic goals. Achieving this balance increasingly depends on the strategies and tools individual architects or firms employ in their design processes —such as through tools like WeChat for monitoring and managing construction processes— highlighting the need to examine how these objectives are being addressed in practice today.

Fig. 5
Local women dancing and enjoying the public space under the wooden structure, proudly filming for their Tiktok account. Photo by the author

In essence, the technologies and processes employed in rural revitalization projects shape not only the built environment but also the economic and social frameworks of the communities involved. For architectural design to fulfill its potential as a tool for empowerment, architects must bridge the gap between top-down directives and local realities. By critically examining these intersections, the profession can redefine its role in rural development.

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Cooperatives and community maps: local development strategies

for territorial enhancement

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ABSTRACT
This article explores the role of place-based tools in valorizing local resources and to new networks of territorial relations by analysing two case studies: the 'Terra delle Balestrate'Community Cooperative and the Atlas Stories and Places. It is positioned at the intersection of the scientific debates on the territorialism approach by matching theoretical perspectives on local identity, social cohesion and the narration of places. The methodology adopted qualitative-quantitative methods. The results highlight how the community, understood as intangible infrastructure, actively acts in the narration and valorisation of the social, cultural and environmental stratifications that define the local space. These practices reinterpret territorial values and identities, strengthening the sense of belonging and socio-economic networks. However, limitations emerge linked to the absence of integrated territorial policies that can amplify the impact of these initiatives on a broader scale. The article concludes with a critical reflection on future developments, highlighting the need to integrate local planning and territorial policies to foster generative and durable local development.

COMMUNITY COOPERATIVE | COMMUNITY MAP | BOTTOM-UP | MARGINALITY

1. Introduction

Within the now decade-long debate on the development of territories, the contribution lays the groundwork for initial reflections on the impact and role of community-based approaches and with the community. In territories characterized by multi-fragility there are marked forms of community associationism in which territorial rootedness acts as glue for spatial enhancement activities. Specifically, here we investigate Community Map (CM) and Community Cooperatives (CC) as tools but also actors capable of strengthening social ties and spatial identities.

CCs are defined as support tools for the valorization of the local cultural heritage that, by responding to the needs of the population and improving the quality of life, can act in dimensions of sustainability

and foster citizens' participation in the management and provision of collective goods and services (Apulia Region 2014), while the CM can also be defined as an identity map of a territory through which the community, through perception, depicts the material and immaterial components that define collective identities (Magnaghi 2010).

It is in this perspective that we question the proactive role that these elements play in the reconfiguration of social dynamics as well as the necessary preconditions for them to be able to activate material and immaterial valorization synergies of local identities. On the one hand, these Maps, the outcome of both tangible projects, can be assimilated into forms of identity narration; and intangible processes of self-recognition and exploration of identity stories that have coined the territory. On the other hand, these Cooperatives that embody the tangible and intangible dimensionality of connections, projects, and interactions present themselves as tools/actors capable of generating new socio-spatial relations as well as asset enhancement and community management. Community co-operatives are the focus of ongoing doctoral research, in which the Community Map discussed in this paper was developed as part of an experiment conducted by the research team.

The structure of the study is divided into five parts: the first outlines an initial framing of the topic and the research question guiding the entire reflection; the second, outlines the theoretical frame of reference; the third defines the methods used, the application and discussion of which are reported in the fourth part. The last section offers initial reflections on the limitations of the study conducted and the future development of these tools.

2. Local Development: Community Cooperatives and Community Maps

The territory considered as a network of historical, social and environmental stratifications is an active witness to local identity (Magnaghi 2010; Magnaghi 2012; Magnaghi 2020). Mutable over time and endowed with dynamism, it, in its meaning as a rur-urban organism, does not follow an immodifiable biological path but has the capacity to regenerate/re-cycle within itself (Carta *et al.* 2017).

As an active subject, together with the community living there, it plays a relevant role in the definition of local development strategies, where local development means a multidimensional process (Pasqui 2005; Lucatelli 2020) with variable characteristics that can be modeled in relation to local contexts (Vinci 2020) and where the relational dimension holds, with equal dignity, the same relevance as that of governance (Angelini & Bruno 2016).

Considering cities as a mixed and complex living organism made up of material and immaterial infrastructures (Dyer, Dyer, Weng *et al*. 2019), communities are to be understood as active actors of the territory who, acting in the perspective of community making, generate new identities, relationships, connections as well as material and immaterial projects that transform territorial marginality into opportunities for enhancement. Two bottom-up tools of local development fit into this case of proactive and generative activism: Community Cooperatives and Community Maps.

Community Cooperatives, based on participatory and self-organizing models, offer the inhabitants of territories the opportunity to be active players in the management and valorization of local resources starting from existing needs for a higher quality of life (Moulaert *et al.* 2013; Alfonsi 2020; Bianchi 2021). Through democratic processes of local governance, they foster the creation of new economic and social relations, promoting cohesion and inclusion (LegaCoop 2011; EURICSE 2024; LegaCoop 2024). At the same time, these bodies represent a concrete example of how public space and local heritage can be transformed into vectors of sustainable development, generating a positive impact both in tangible (new infrastructures and services) and intangible (strengthening of collective identities) terms (Pezzi & Urso, 2018).

Community Maps, on the other hand, constitute a tool for the exploration and narration of the territory, in which local communities are involved in the representation of the tangible and intangible resources of their living space (Clifford *et al.* 2006; Madau 2015; Summa 2009). Through participatory mapping, collective memories, socio-spatial relations and networks of cultural and economic exchange are highlighted, making visible those intangible aspects that usually do not emerge in formal representations of the territory (Magnaghi 2010). These maps not only offer a dynamic and inclusive snapshot of territories, but also become an empowerment tool for local communities (Saija & Pappalardo 2018), capable of strengthening their awareness and ability to influence decision-making processes.

3. Methodology

The article explores two different experiments to highlight their capacity to contribute, both on a material (cooperatives) and immaterial (maps) level, to the strengthening of local identities and territorial regeneration. The methodology adopted in this study follows a qualitative-quantitative approaches, aimed at exploring the different role of the two projects in territorial narrative processes. The selection of the case studies was guided by specific criteria:

- Territorial relevance: two emblematic contexts of territories characterised by marginality, but also by a strong identity link with the territory where a tool (Local Action Group) or a policy (National Strategy Inner Areas) of local development was already in place.
- Complementarity: one case represents the material dimension of regeneration practices (Community Cooperative), the other the immaterial one (Community Map).
- Data accessibility.

A qualitative-quantitative methodology was used for the analysis of the case studies, combining content analysis of official websites with qualitative interviews with the protagonists.

4. Atlas Stories and Places of Santo Stefano Quisquina and 'Terra delle Balestrate' Community Cooperative

To explore the role of CC and CM in local processes, two emblematic case studies were selected:

- ‘Terra delle Balestrate’ Community Cooperative (Sicily); [1]
- Atlas Stories and Places of Santo Stefano Quisquina (Sicily). [2]

The ‘Terre delle Balestrate’ CC, founded in 2020, has 22 members, including citizens, professionals, etc. It stems from the promoter group's previous experience in associative initiatives and aims to enhance the local cultural identity. The cooperative's activities include organizing experiential tours, events to promote traditions and typical products, educational projects with schools and participation in territorial initiatives. A central objective is the deseasonalisation of tourism, fostering sustainable and lasting development of the local socio-economic fabric.

This CC represents an example of local self-organization aimed at the valorisation of the cultural heritage and territorial resources, as an active response ‘from below’ able to compensate for local systemic abandonment (Saladino, 2024). Situated in a context characterized by problems of depopulation and socio-economic marginality, the cooperative has distinguished itself for initiatives aimed at recovering ancient local traditions and craftsmanship, introducing new crops, and defining experiential routes for both tourists and school children. Thanks to a participatory governance model, the cooperative has promoted social inclusion projects, training for young people and sustainable tourism development. The case analysis focuses on how the cooperative has strengthened the sense of belonging and local identity, creating new economic and social opportunities.

The Atlas Stories and Places is a participatory mapping project created to enhance the intangible cultural heritage and collective memory of territories and communities. Through the direct involvement of inhabitants, the Atlas collects and narrates stories, traditions, significant places and identifying symbols, creating a shared platform of knowledge accessible to all. The project aims to strengthen the sense of belonging and social cohesion, offering an innovative model for the protection and promotion of local peculiarities in a perspective of sustainable development and cultural tourism. It is part of a project aimed at mapping the tangible and intangible resources of a Sicilian Mountain territory, known for its rich historical and natural heritage. The Atlas is implemented as part of the project ‘Land of Skies, Water and Stones’ funded by the PNRR, Mission 1 - Digitalisation, Innovation, Competitiveness and Culture, Component 3 - Culture 4.0 (M1C3). Measure 2 ‘Regeneration of small cultural sites, cultural, religious and rural heritage’, Investment 2.1: ‘Attractiveness of historic villages’, funded by the European Union - NextGenerationEU.

Realized through a participatory process that actively involved the University of Palermo,[3] a team of experts and the local population, the map contributed to the emergence of collective narratives

[1] Web Site: https://www.terredellebalestrate.it/
[2] Web Site: https://www.atlantestorieluoghi.it/
[3] The Atlas Stories and Places of Santo Stefano Quisquina is the result of a research-action process on the territory conducted by the Augmented City Lab of the Department of Architecture of the University of Palermo. The working group is structured as follows: Prof. Maurizio Carta (Scientific Coordinator); Prof. Barbara Lino (Scientific Coordination and Co-Director of the research group); Researcher Annalisa Contato (Project Activity Manager); Prof. Daniele Ronsivalle (Member of the research group); PhD Student (Member of the research group, scholarship holder); Prof. Sandro Scalia (Photo and Video Expert); Dott. Valerio Rabante (Publication graphics expert); Arch. Marco Ingrassia (Participatory processes, graphics and web expert).

and shared memories, becoming a fundamental tool for cultural promotion not only for tourists but also for the local population. This case examines the impact of the map in building socio-spatial networks and strengthening connections between residents and their territory.

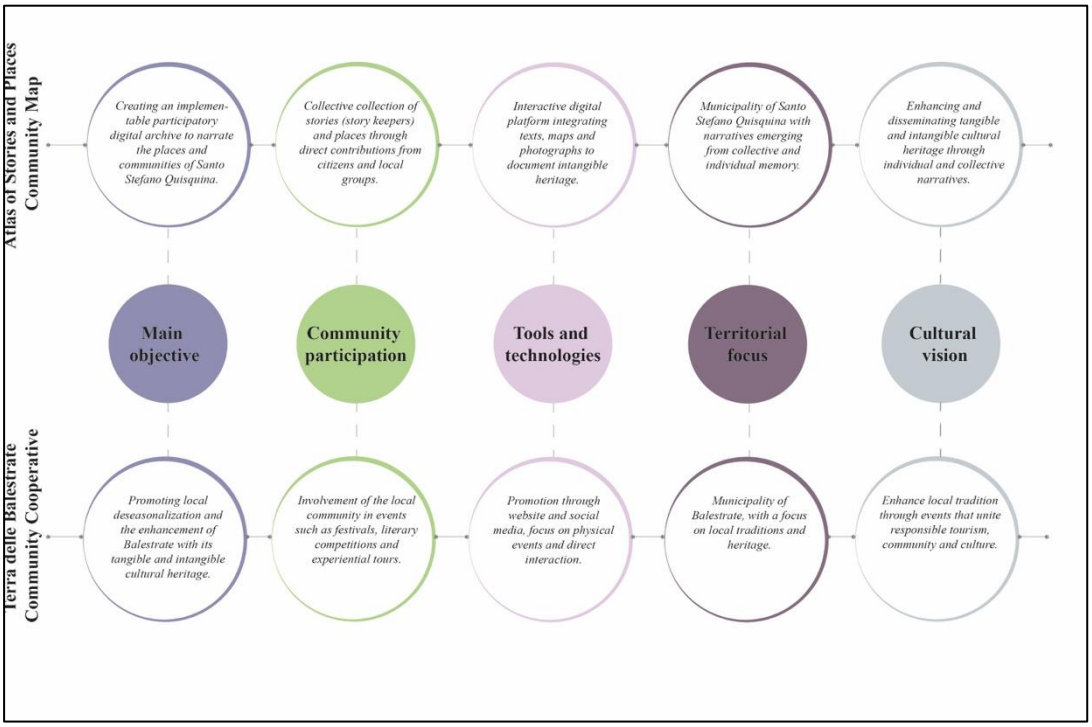

Fig. 1
Case studies compared

The two cases were chosen for their complementarity: on the one hand, the cooperative represents an active player in territorial regeneration through economic and social projects; on the other, the Atlas is a narrative and strategic tool that integrates local knowledge into territorial development processes. Their comparative analysis highlights how community-based approaches can act synergistically to strengthen social ties, local identity of marginal territories. Both the 'Terra delle Balestrate' CC and the CM project 'Atlas Stories and Places' show affinities with the dimension of the intangible understood as both interactive, project-based and connective with urban dynamics [Fig. 1].

In the context of the relationship between tangible and intangible, the 'Terra delle Balestrate' Community Cooperative and the 'Atlas of Stories and Places' represent two complementary approaches that exemplify innovative and inclusive dynamics. Through concrete territorial enhancement initiatives, the cooperative creates a bridge between the material dimension (physical projects, such as regenerated spaces) and the intangible dimension (the collective identity and sense of belonging of the local community). At the same time, the Atlas, with its narrative mapping, explores and amplifies the intangible interactions between collective memory and the territory, emphasizing the transmission of local stories as tools to strengthen social cohesion.

Both initiatives are located in a 'grey zone' between the real and the symbolic, contributing to the construction of inclusive and sustainable urban imaginaries. While the 'Terra delle Balestrate'

cooperative operates mainly at the socio-economic level, supporting new forms of participation and local development models, the Atlas acts at the cultural level, strengthening identity perception and the quality of social relations. Together, they demonstrate the transformative potential of synergies between the tangible and intangible in reshaping contemporary urban and rural space.

Both case studies explore territorial and social marginality through innovative and participatory approaches. The 'Terra delle Balestrate' Community Cooperative tackles marginality through the valorization of local tangible and intangible resources, such as regenerated spaces and cultural traditions, promoting a vision of sustainable development based on collective participation. The 'Atlas of stories and places', on the other hand, interprets marginality in terms of cultural invisibility, bringing often neglected places and communities back to the centre of the narrative through the collection and enhancement of local memories.

These tools not only manage and enhance local resources, but also profoundly influence social and spatial dynamics, strengthening collective identities and socioeconomic networks. The cooperative generates a tangible impact through the direct involvement of citizens in the management of common goods, while the Atlas fosters an intangible aggregation, building bridges between past and present to promote cultural cohesion.

In terms of sociality, both cases demonstrate an inclusive approach: the cooperative creates opportunities for aggregation through shared activities and community services, while the Atlas transforms intangible heritage into a catalyst for dialogue and the rediscovery of a sense of belonging. These integrated processes make it possible to decline the concept of marginality as an opportunity for redemption, consolidating social networks and local resources [Fig. 2].

5. Conclusions

The two experiments presented show how community and territory are interconnected in a dynamic relationship. The community, considered as an intangible infrastructure, plays a central role in the narration and enhancement of the cultural, social and environmental stratifications that define the territory. These practices reinterpret local values and identities, responding to the growing social need for an inseparable link with places and their meanings.

Although with different approaches and results, both case studies converge in promoting new relational networks rooted in social and territorial ties. On the one hand, the Atlas operates in a narrative and conservative perspective of memories and tangible and intangible cultural heritages; on the other, the Cooperative acts in the active valorisation of local resources, nurturing a shared sense of belonging and identity. However, both instruments face limitations linked to the lack of integrated territorial policies that can amplify their impact on a larger scale. The analysis of the case studies highlights that the activation of spatial regeneration and enhancement processes through such "tools" requires the presence of certain preconditions. Among these, key factors include: active community involvement, a strong sense of place identity and awareness of heritage value, as well as integration within broader territorial dynamics and strategic frameworks.

Future developments call for strengthening synergies between local initiatives and more inclusive policy agendas that can support these instruments as drivers of generative and durable local development. In particular, it is necessary to explore how such practices can be formally integrated into spatial planning processes, promoting a cohesive vision that enhances both the tangible and intangible dimensions of community heritage.

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[In]tangible interactions

[In]tangible interactions

In a historical context characterized by profound technological, social, and environmental transformations, the relationship between the tangible and intangible dimensions is gaining significance taking on an increasingly central role in design processes. Systems, services, and artifacts can no longer be interpreted exclusively as material or functional entities, but rather as components of hybrid ecosystems in which human, artificial, and environmental factors interact. In this scenario, design cultures are called upon to assume a critical mediating role, capable of making complex interactions legible, accessible, and negotiable. The [In]tangible Interaction track fits within this interpretative framework, offering itself as a space for interdisciplinary discussion on the changes taking place in the relationship between design and technology. In particular, the goal is investigating how contemporary design practices are increasingly oriented towards working with intangible elements, data, relationships, memories, behaviors, and experiences, without losing the connection with material, corporeal, and situated dimension of interaction. Exploring how design can contribute to the construction of more inclusive, accessible, and sustainable experiences, overcoming physical, cognitive, and cultural barriers, became one of the targets of this collection. The main objective is to investigate the role of design in the representation, and activation through enhancing the relationships between tangible and intangible, with particular attention to the impacts. Especially, this cluster investigates how contemporary design practices are increasingly oriented towards working with intangible elements, data, relationships, memories, behaviours, and experiences, without losing gaze of the material, physical, and situational dimensions of interaction. A second goal is represented by the delving on how design can contribute to the creation of more inclusive, accessible, and sustainable experiences, overcoming physical, cognitive, and cultural barriers.

The contributions collected address the topic from different but converging perspectives, highlighting design as a cultural and operational infrastructure capable of translating complexity into understandable and participatory interaction systems. Researchers, designers, and technologists responded to the call for action by presenting theoretical studies, applied experiments, and critical reflections that interpret design as a device for mediation between people, data, and systems. In this sense, the discipline of design is understood not only as a practice of formalization, but as a process capable of orchestrating interactions between heterogeneous actors, human and non-human, and generating new forms of shared knowledge. This approach is particularly relevant in application areas such as cultural heritage, public services, inclusive mobility, data visualization, and the relationship between society and artificial intelligence.

The contributions selected and presented in this section outline a complex panorama of research which, although operating on different scales and in different contexts, share a design-driven vision focused on the centrality of experience, social responsibility, and the construction of collective value. A first set of works addresses the theme of cultural heritage, both tangible and intangible, as a dynamic ecosystem of relationships. The original contributions dedicated to landscape, collective memory, and industrial know-how underline how design can operate as a tool for mapping,

narrating, and activating distributed knowledge. In these studies, heritage is not understood as a static entity to be preserved, but as a living process, renewed through participatory practices and design devices capable of making often invisible values like knowledge and identities, visible. In this case, the focus on the intangible dimension translates into methodological approaches that integrate field research, co-design, and digital tools, providing a systemic and situated knowledge overview.

A second thematic axis concerns the role of design in public services and systems, with particular reference to accessibility and inclusion. Contributions dedicated to Digital Twins, public services, and mobility for elderly or fragile populations show how technologies can become enablers of social innovation only if integrated within human-centered design frameworks. In these cases, design acts as a mediator between complex infrastructures, data, and citizens' needs, helping to translate abstract information into understandable interactions and to design experiences capable of reducing inequalities and barriers to access. considering that, focusing on tangible and intangible interactions allows the development of multi-level solutions, ranging from systems to services to products, while maintaining a design consistency oriented towards equity and sustainability.

Another conceptual core explores the relationship between data, their visualization, and derived behavioral change. Research on the representation highlight how the design of visual feedback can affect individual and collective attitudes, promoting more conscious and sustainable practices. In this sense, the intangible dimension of data is made perceptible through interfaces, dashboards, and that translate complex information into meaningful signals. Design emerges as a discipline capable of orchestrating such translations, taking into account cognitive, and social factors, demonstrating how interactions can become a lever for learning and transformation.

Beyond the specific themes, the contributions to the track share some key elements that outline virtuous design approaches. First of all, there is a strong focus on the participatory dimension of the project: users, communities, and stakeholders are not considered mere recipients of solutions, but active players in the processes of co-creation and evaluation. This orientation reinforces the role of design cultures as a relational practice, capable of building spaces for dialogue and negotiation. On the other hand, many contributions adopt a systemic perspective, recognizing the need to address complexity through multilevel and interdisciplinary models. Disciplinary mediation thus acts as a bridge between technical and social knowledge, capable of integrating advanced technologies, such as artificial intelligence, immersive systems, and digital platforms, within visions oriented towards the common good.

Finally, the sharpest outcome of this section highlights the potential of design to make the intangible aspects of experience visible and operational. Whether it is memory, data, behaviour, or relationships, the project action becomes a tool for translation and materialization, capable of transforming abstract elements into meaningful experiences. In this perspective, [In]tangible Interaction has established itself as a space for advanced reflection on the role of design in the future of interactions, helping to outline scenarios for a more inclusive, and sustainable society. At the same time, the variety and effort recordable in the collected contributions, confirm the need for more places where theoretical research and design experimentation can converge. Through design-driven approaches, the works presented show how design can operate effectively in the borderlands between tangible and intangible, offering critical and operational tools for addressing

contemporary challenges. This cluster is not only a space for presenting research, but also a cultural platform for imagining and designing new forms of interaction between people, technologies, and environments.

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Artificial Intelligence, Design Cultures, and the Future of Digital Practice

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ABSTRACT
This paper examines the relationship between generative artificial intelligence and design practice, addressing three interlocking dimensions: the technical genealogy of machine learning and predictive models; the environmental and economic costs of large-scale AI deployment; and the emergent implications for design work, education, and professional identity. Drawing on two decades of research into technology production, power, and diversity, we argue that AI is not a magical or autonomous force but a deeply human enterprise shaped by the values, cultures, and biases of those who build it. The paper concludes with practical recommendations for designers seeking to engage critically and constructively with these technologies.

GENERATIVE ARTIFICIAL INTELLIGENCE | ETHICAL DESIGN PRACTICE | RESPONSIBLE AI | AUTOMATION | AI ETHICS

1. Introduction

The emergence of generative artificial intelligence as a mainstream cultural phenomenon has provoked widespread anxiety and enthusiasm in equal measure. Within design communities, disciplines long accustomed to successive waves of digital transformation, the arrival of tools such as Midjourney, DALL·E, and ChatGPT has catalysed urgent questions about professional relevance, creative authorship, and the future of skilled practice. These reactions, while understandable, risk obscuring a more nuanced and historically grounded understanding of what AI actually is, how it works, and what its adoption implies for society at large.

This paper presents the position and research we at the Digital Design Lab have developed through fifteen years of inquiry into technology production, diversity, and design methodology, which provide a critical framework for evaluating generative AI's promises and risks. My central argument is straightforward: AI is *human* work. Its outputs, its blind spots, and its power relations are all products of human decisions about what data to gather, whose labour to commission, which problems to solve, and for whom. Understanding this is not merely an academic exercise; it is a prerequisite for designers who wish to shape, rather than be shaped by, the tools of the coming decade.

2. Demystifying Artificial Intelligence: From Cognitive Automation to Predictive Models

2.1 A Terminological Clarification

Popular discourse has collapsed a rich taxonomy of techniques into a single, often mystified term: "AI." In everyday usage, artificial intelligence has become almost synonymous with large language models such as ChatGPT. This conflation obscures the historical depth and technical diversity of the field. Artificial intelligence is in fact an old discipline, concerned broadly with conitive automation, that predates the machine learning paradigm by several decades.

Machine learning represents one particularly powerful family of approaches within AI, distinguished by its capacity to extract patterns from data rather than following explicitly programmed rules. It is itself subdivided into three principal learning paradigms:

- Supervised learning, which operates on labelled datasets and is particularly suited to classification and price-prediction tasks, a labour-intensive process that demands extensive human annotation.
- Unsupervised learning, which discovers latent structures in unlabelled data, enabling applications in clustering, anomaly detection, and exploratory analysis.
- Reinforcement learning, in which agents learn optimal behaviour through iterative interaction with an environment, most visibly in robotics and game-playing systems.

These categories are not mutually exclusive: reinforcement learning is frequently used to refine classifiers initially trained with supervised methods, for example. Crucially, we observe a recurring

cultural phenomenon: as soon as a machine learning application becomes reliably useful, it tends to be reclassified in the public imagination as something other than AI. This perpetual horizon effect serves to maintain an aura of novelty around whatever remains experimental.

2.2 The Production Pipeline: AI as Human Labour

A common misconception frames AI as a technology that generates outputs ex nihilo. In reality, every machine learning system is the product of an extended human production pipeline. This pipeline typically involves the following stages:

- Raw data acquisition, which raises immediate questions about whose experiences, images, and language are represented.
- Data cleaning and preparation, which together account for approximately eighty percent of the time invested in building a model, a figure that underscores the profoundly manual nature of the enterprise.
- Training, in which an algorithm iterates over the prepared data to construct a predictive model.
- Validation and testing, performed on a held-out subset to assess performance.
- Deployment and iterative refinement, which introduce further human judgements about thresholds, corrections, and acceptable failure modes.

The implication is significant: what is presented as machine output is, at every stage, the sediment of human choices. This is not merely a technical observation; it is a political one. As our doctoral research demonstrated, the communities producing AI, defined by nationality, gender, and institutional affiliation, disproportionately determine the values, aesthetics, and blind spots encoded in the resulting systems.

3. A Genealogy of Generative AI and Its Impact on Design

3.1 Neural Networks and the Long Prehistory of Generative Models

Neural networks, the algorithmic architectures underlying the most capable contemporary AI systems, were first theorised in the 1950s, long before the computational infrastructure required to realise them existed. Their development proceeded incrementally through successive generations of engineering contributions, producing a culture oriented toward incremental problem-solving and intra-community peer recognition rather than toward anticipating societal impact.

For design practice, this technical culture had a crucial consequence: until the emergence of publicly accessible generative tools, AI development was largely invisible to practitioners. The field advanced in specialist laboratories, its outputs circulating within technical communities rather than entering the broader design ecosystem.

3.2 Generative Adversarial Networks and the Arrival of Synthetic Images

The landmark development that began to change this dynamic was the Generative Adversarial Network (GAN), first proposed in 2014. GANs were originally conceived as a solution to the problem of training data scarcity: by generating synthetic labelled images, they would in theory augment the data available for supervised learning. The architecture pairs a generator, which produces candidate images, with a discriminator, which evaluates their plausibility, in an adversarial training regime.

The trajectory from the 2014 proof-of-concept to NVIDIA's StyleGAN (2019) and the subsequent public release of Midjourney and DALL·E (2022) illustrates a characteristic pattern: techniques developed to solve narrow engineering problems within the machine learning pipeline are refined to such a degree that they ultimately transform entire creative industries. What began as an attempt to produce convincing training data became, within eight years, consumer software capable of generating photorealistic images indistinguishable from photographs of real people.

3.3 The Transformer and the Rise of Generative Text

The second pivotal architectural innovation was the Transformer, which addressed a fundamental limitation of earlier recurrent models: their inability to maintain coherent representations over extended sequences. This limitation had previously constrained the quality of machine-generated text, producing outputs that degraded rapidly in coherence. The Transformer's attention mechanisms resolved this, enabling the training of models capable of generating extended, plausible prose.

The GPT family of models instantiates this architectural advance at scale. The acronym GPT, for Generative Pre-trained Transformer, encapsulates the key elements: generative (producing new text), pre-trained (on vast corpora before task-specific fine-tuning), and Transformer (deploying attention-based sequence modelling). It is worth noting a chronological irony: the field achieved highly convincing synthetic image generation with diffusion models before it achieved comparably convincing synthetic text generation, inverting the intuitive expectation that visual creativity would prove more difficult to automate than linguistic composition.

4. Design Practice and the History of Automation

The panic that has greeted generative AI in design communities is understandable but, we argue, historically myopic. Every major design discipline has undergone successive phases of digitisation and automation over the past thirty to forty years: graphic design, photography, product design, animation, and architecture have all seen their tools evolve from manual craft to digital representation to increasingly automated production.

This dematerialisation has consistently facilitated transmission, accelerated iteration, and expanded the scope of what individual practitioners can produce. Generative AI can be

understood as a further step along this trajectory, one that automates not merely the execution of a design decision but increasingly the generation of design options themselves. The relevant historical precedent is the Industrial Revolution, or more precisely, the Fourth Industrial Revolution (Industry 4.0), which represents the fourth major wave of technological transformation of labour. Historical analysis of previous industrial transitions offers two recurring lessons of particular relevance to the present moment:

- Immediate impacts are systematically overestimated. Technological adoption is slower, more uneven, and more dependent on institutional and cultural factors than utopian or dystopian projections suggest.
- Long-term structural impacts are systematically underestimated. The cumulative displacement of skills, the emergence of new occupational categories, and the redistribution of economic value typically exceed initial forecasts by a considerable margin.

5. The Hidden Costs of Generative AI

5.1 Energy Consumption and Environmental Implications

The environmental cost of large language models and other foundation models is one of the most poorly understood dimensions of the generative AI phenomenon. Corporations have strong incentives to withhold or obscure energy consumption data, making precise accounting difficult. However, back-calculation from available information yields striking figures.

A single training run of GPT-3, a model that is small by contemporary standards, with 175 billion parameters trained on 45 terabytes of text, cost an estimated twelve million US dollars and consumed approximately 936 megawatt-hours of electricity across thirteen days of computation on approximately ten thousand GPUs. To contextualise this figure: 936 MWh corresponds to the annual electricity consumption of approximately two hundred French households, under conservative assumptions. These estimates cover only the training phase; they exclude data acquisition, storage, cleaning, and the ongoing costs of inference, that is, the energy consumed each time a user submits a query.

The current generation of high-performance GPUs (NVIDIA's latest flagship chips) consumes approximately 700 watts each. NVIDIA sold chips in 2024 at volumes that, in aggregate, exceeded the total electricity available globally to power them simultaneously, suggesting that organisations are accumulating computational capacity they cannot yet utilise, a pattern consistent with speculative investment dynamics. Beyond electricity, large data centres require substantial quantities of freshwater for cooling, placing additional pressure on local water supplies and competing with agricultural and domestic use.

These environmental pressures are not isolated to AI: data centre demand encompasses cloud computing, streaming media, and cryptocurrency. Nevertheless, the rapid growth of AI workloads represents a structurally significant and accelerating component of this demand. Several US states have already imposed restrictions on new data centre connections to their power grids due to infrastructural constraints. The question of whether this trajectory is ecologically sustainable, and who will bear the costs when it is not, is one that design communities, as major consumers and producers of digital content, have a responsibility to engage.

5.2 Intellectual Property, Copyright, and the Politics of Training Data

A second category of systemic costs concerns the provenance and ownership of the data used to train generative models. The legal and ethical landscape is contested and rapidly evolving.

In the United States, fair-use doctrine has historically been interpreted permissively, with considerable latitude extended to transformative uses of copyrighted material. Many AI companies have relied on this interpretation to justify training on publicly accessible web content, including the work of artists, photographers, and writers who did not consent to such use. This has produced a wave of litigation: Stability AI, developer of the open-source image generation model Stable Diffusion, faces copyright claims from Getty Images, among others, precisely because its open-source architecture makes the training data auditable.

A particularly instructive case is that of Zarya of the Dawn, a graphic novel whose copyright was initially granted and subsequently partially revoked by the US Copyright Office: protection was maintained for the text but withdrawn from the images, which had been generated using Midjourney, on the grounds that AI-generated outputs do not constitute authorial work in the relevant legal sense.

An unexpected dynamic has emerged from this litigation: AI developers depend on high-quality human-generated data not merely for ethical reasons but for technical ones. Models trained predominantly on AI-generated outputs undergo a degradation process, sometimes termed "model collapse", in which iterative self-referential training amplifies biases and reduces output quality. The organic variability and contextual richness of human-produced data are, it transpires, necessary for maintaining model performance. This technical dependency has provided leverage to media organisations and artists in negotiations with AI companies, shifting the landscape from pure litigation toward licensing arrangements.

A further dimension of the intellectual property question concerns the emergent demand for human labour in tasks created by AI deployment: content moderation, data labelling, output evaluation, and the production of training corpora. These roles, often low-paid and psychologically demanding, represent a new form of piecework that merits sustained critical attention.

5.3 Economic Models, Access, and Labour

The current accessibility of most frontier AI tools is sustained by venture capital and advertising revenue, not by the economic value they generate for users. This model has created an expectation of free or low-cost access that is unlikely to persist as development costs remain high and competitive dynamics intensify. The probability of significant price increases, potentially pricing out smaller studios, individual practitioners, and institutions in lower-income contexts, is real and underappreciated.

The labour market implications are complex. We resist simple narratives of wholesale job destruction, but observe a more insidious process of positional reduction: a design consultancy that previously employed ten designers may, with AI-assisted productivity, find that it requires five. The aggregate effect across many such organisations constitutes a structural contraction of employment in certain categories of design work, potentially mimicking the trajectory of the music industry, in which the professional middle-market was substantially eliminated while a small number of highly prominent practitioners and a large number of self-funding amateurs remained.

6. Opportunities and Recommendations

6.1 Appropriate-Scale and Privacy-Preserving AI

Not all AI applications operate at the scale, and therefore the environmental and economic cost, of frontier foundation models. Retrieval-Augmented Generation (RAG) architectures enable open-source and small language models to run on local hardware, processing proprietary documents without transmitting data to external servers. This approach offers significant advantages for practitioners concerned with intellectual property, data sovereignty, and ecological impact. Tools such as NotebookLM offer user-friendly entry points to this paradigm, though they are not technically small language model deployments in the full sense.

6.2 AI for Social Good: The Case of Benin

We present an ongoing project as an example of AI deployment calibrated to genuine human need rather than market optimisation. In Benin, where a 56% illiteracy rate coexists with a linguistic landscape comprising approximately seventy languages, a government initiative is underway to collect speech samples across this linguistic diversity and develop text-to-voice systems. This text to speech (TTS) model may be capable of disseminating weather information, particularly storm warnings, via voice messages deliverable on basic mobile handsets to the farmers that make up 70% of Benin’s economy. The project addresses a concrete development challenge: helping smallholder farmers prepare for extreme weather events in a context where written communication is not universally accessible.

This example illustrates that AI's value is not intrinsic but relational: it depends on whether the technology is matched to the context, constraints, and genuine needs of the people it is intended to serve.

6.3 Implications for Design Education and Practice

Several trajectories for design practice and education merit consideration in light of the developments outlined above.

First, there is a growing need for designers with the capacity to participate in the development of predictive models themselves. Currently, the teams that build AI systems rarely include design practitioners, and the resulting products frequently exhibit failures of usability, accessibility, and cultural sensitivity that would be mitigated by earlier design involvement. Developing the technical literacy to operate at this interface, including understanding data pipelines, model architectures, and evaluation methodologies, represents a significant opportunity for the discipline.

Second, we anticipate a renewed valorisation of skills that resist automation: systemic thinking, strategic decision-making, craft, materiality, and oral performance. As AI-generated text floods academic and professional channels, the capacity to perform knowledge credibly in real time, namely to present, discuss, and defend ideas in embodied social contexts, may recover value it had partially ceded to written documentation.

Third, there are grounds to expect aesthetic fatigue with the characteristic outputs of current generative models, which some practitioners have begun to call "AI slop": the smooth, saturated, compositionally competent but experientially vacant imagery that dominates AI-generated visual culture. Craft, imperfection, and the traces of embodied making may acquire renewed cultural significance as markers of authenticity in contrast to this aesthetic regime.

Fourth, future generations of practitioners may make deliberate choices about the degree to which their work is accessible to AI training systems, choosing, in effect, forms of creative production that maintain a degree of withdrawal from the open web. This would represent a significant shift in the culture of sharing that has characterised digital creative communities over the past two decades.

7. Conclusion: Embodiment, Agency, and the Stakes of the Present Moment

This paper has argued that generative AI is best understood not as an autonomous or magical technology but as the crystallised output of extensive human labour, shaped by the power relations, cultural assumptions, and economic incentives of those who produce it. Its environmental costs are real and insufficiently disclosed. Its intellectual property implications are contested and unresolved. Its labour market effects are already materialising, if more gradually and unevenly than either enthusiasts or critics have predicted.

Against the tendency in some quarters to frame AI as an impending surpassing of human intelligence, we insist on the irreducible significance of embodiment. Human designers do not merely generate outputs: they inhabit careers, cultivate aesthetic sensibilities over time, navigate social contexts, advocate for clients, and exercise situated judgement. The AI system that "won" an art competition was submitted by a human who conceived the entry, refined the prompts, post-processed the output, and made the decision to compete. The human dimension is not incidental; it is constitutive.

The appropriate response to generative AI is neither uncritical adoption nor reflexive rejection, but engaged, historically informed, and critically aware participation: understanding the pipeline, questioning the power relations encoded in training data, advocating for energy transparency, insisting on the presence of designers in AI development teams, and cultivating the forms of skill and sensibility, including systemic thinking, craft, oral performance, and embodied presence, that remain distinctively and irreducibly human.

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Driving behavioural change: the role of data visualisation in optimising dormitory energy strategies

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ABSTRACT
Global climate change and the energy crisis are intensifying, prompting the search for effective responses. Energy-efficient technologies and green standards are crucial to sustainable campus initiatives, especially in living-intensive student dormitories.
The eco-feedback and visualisation of energy data are key to encouraging behavioural change, offering users real-time insights into consumption and potential savings. While substantial progress has been made towards applying visualisation feedback to enhance energy efficiency in residential sectors, research on student dormitories still faces challenges. Specifically, the complexity of students' energy consumption behaviours and preferences makes the effectiveness of tools to be verified.
This reviews relevant literature to assess the effectiveness of energy data visualisation tools in promoting energy-saving behaviours in dormitories. It also explores the impact of combining displays with other interventions, such as information prompts and incentives. Furthermore, future work will transit to maximise the efficiency of campus energy conservation approaches and support the transition towards more sustainable energy practices.

ECO-FEEDBACK | STUDENT DORMITORY | ENERGY-SAVING | BEHAVIOUR CHANGE

1. Introduction

As is widely known, the building sector accounts for over 30% of global energy consumption and emissions (European Environment Agency, 2013). However, current trends show that energy savings are not progressing at the necessary pace. Some research is shifting to user behaviour change; behavioural interventions alone have the potential to reduce direct household carbon dioxide emissions by 20% over the next decade (Dietz et al., 2009). Enhancing feedback mechanisms and fostering a better understanding and adjustment of individual energy use behaviours have become critical components of energy efficiency policies (Can We Save Energy by Changing Our Behaviour?, 2013). Moreover, younger generations often exhibit a more proactive attitude towards climate change-related issues, positioning them as potential leaders in driving the energy transition (Peng et al., 2024).

Eco-feedback, a data-driven approach that provides users with energy consumption information, encourages behavioural adjustments to promote savings (R. K. Jain et al., 2012). Existing studies confirm its effectiveness in shaping energy-efficient behaviour among building occupants (Francisco et al., 2018). Interdisciplinary research has also examined its integration with interventions such as social norms (Ramli, 2021), environmental psychology (Mozo-Reyes et al., 2016), gamification (Plichta et al., 2023), and social network influences (Romero et al., 2015). Moreover, university students, as they move out of their family homes to live independently, experience an increase in the autonomy of their energy-related behaviours. This period is typically more conducive to establishing new energy-saving behaviour patterns through interventions (Verplanken & Wood, 2006).

However, existing studies primarily focus on the behavioural effects of individual tools under specific interventions, with limited comparative analyses of the interactions between tool types, intervention strategies, and time dimensions. In particular, the effectiveness of different tool combinations under the influence of variables like interaction formats, feedback frequency, and user preferences has not been sufficiently explored. To address this gap, this article will systematically review empirical studies on visualisation behavioural interventions in student dormitory environments over the past decade. The review aims to critically analyse the design, combinations, and synergies of data visualisation tools, comparing the mechanisms and differences in the roles of different visualisation tools in guiding energy-saving behaviours in student dormitories.

Furthermore, it will discuss the combinations of these tools with behavioural intervention strategies (such as social norms, competitions, and information prompts) and their impact on behavioural outcomes, including an exploration of the performance of these interventions in fostering short and long-term behavioural changes.

Through this review, it is hoped that practical recommendations will be provided for designing and optimising energy behaviour interventions in university dormitories while advancing the application of eco-feedback in energy-saving contexts in a broader range of public buildings.

2. Methodology

The workflow of this study progresses through four main phases, as shown in figure 1. In the first phase, strings are defined to search the database and apply filtering criteria. The second phase retrieves articles that meet the scope of this study based on the selection criteria. The third phase involves quantitative analysis, showing the distribution trends of publications in this field. The fourth phase divides the results into different domains and critically discusses them.

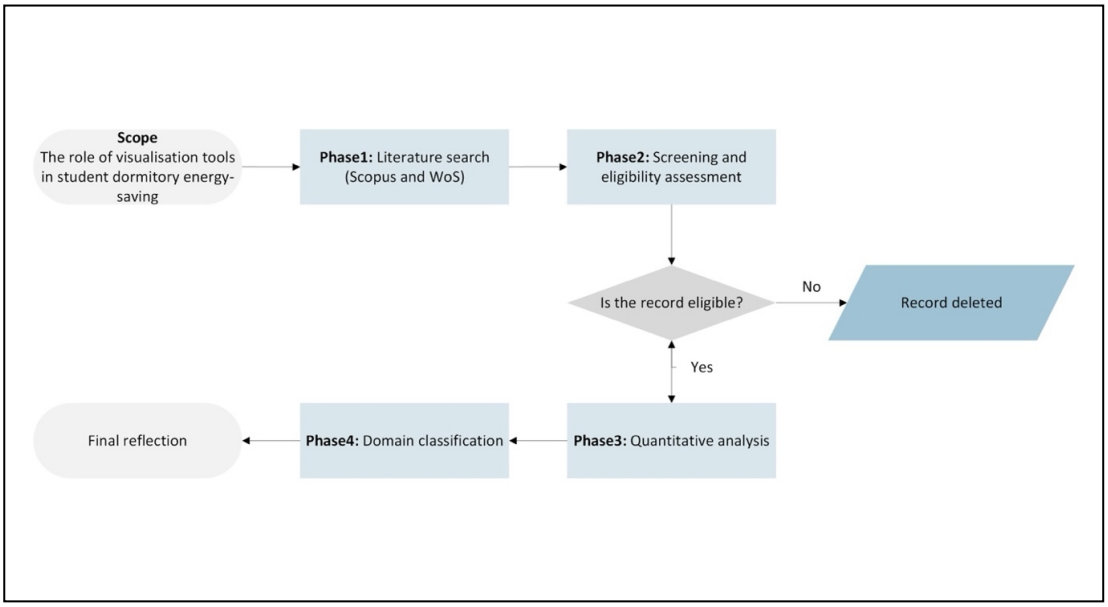

Fig. 1
The search workflow diagram.

In the first phase, the author manually searched major academic databases, Scopus and Web of Science (WoS), using a defined set of keywords and combinations to establish the core review scope on energy data visualisation in dormitories, focusing on energy use behaviour and related interventions. Boolean operators, the search string is defined as: (energy AND (feedback OR information feedback OR visuali* OR energy dashboard OR smart meter OR monitor OR energy display OR screen) AND (dormitory OR residence hall OR student housing OR campus housing) AND (behavio* OR behaviour change OR intervention OR competition OR prompts OR incentives)). It is worth noting that the format of the search string may be slightly adjusted according to the specific requirements of different datasets. Initial screening based on titles, abstracts, and keywords, with further filters applied as shown in figure 2.

Filters	Scopus	Web of Science (WoS)
Language	English	English
Time	2015-2025	2015-2025
Article Type	Article, Conference paper	Article, Proceeding Paper
Subject Areas	Engineering, Energy, Environmental Science	Architecture, Construction Building Technology, Energy Fuels, Green Sustainable Science Technology

Fig. 2
Applied the filter in databases.

In the first phase, 58 articles were retrieved through database searches (18 from Scopus and 40 from WoS). 9 duplicates were excluded, leaving 49 articles for the second phase. In the second phase, titles and abstracts were reviewed according to the criteria in figure 3, excluding 15 studies. The full texts were then reviewed.

Inclusion Criteria	Exclusion Criteria
Reason1: Use of data visualisation tools (e.g., dashboards, screens) for feedback.	**Reason1:** No use of visualisation tools, or only feedback methods such as questionnaires, verbal communication, or written prompts are employed.
Reason2: The research environment is campus dormitories or student housing.	**Reason2:** The research is not conducted in student housing environments (e.g., normal households, office buildings, commercial buildings).
Reason3: The primary objective is behavioural intervention.	**Reason3**: No behavioural intervention objectives are included, such as focusing only on system performance evaluation (e.g., HVAC) or discussing user cognition and attitudes rather than behaviour change.
Reason4: There is a clear description of how visualisation tools are used.	**Reason4:** Lack of detailed descriptions of the intervention tools.
Reason5: The research is empirical, based on actual data collection and analysis, with specific feedback on intervention effects in the results section.	**Reason5:** Non-empirical literature, with no field implementation or data analysis results.
Reason6: Full text is accessible.	**Reason6:** Full information is not accessible.

Fig. 3
Criteria for inclusion and exclusion of literature.

Following a full-text review, 34 articles were further assessed, and based on the same criteria as the previous step, 15 articles were included in the analysis of this review.
The third phase involved a quantitative analysis of the publication years of the included works. In the fourth phase, the selected literature was categorised according to the types of visualisation tools. Finally, a critical analysis was conducted, examining the role of different visualisation tools in promoting energy-saving behaviours in student dormitories. The discussion also explored the combined effects of these tools with other intervention strategies on both short- and long-term behavioural changes.

3. Results and Discussion

As illustrated in figure 4, a preliminary quantitative analysis of the 15 empirical studies indicates a peak in publications during 2016–2018, reflecting growing interest in energy visualisation and behavioural interventions. However, from 2019 to 2021, the number of research declined due to COVID-19-related disruptions such as remote learning and reduced dormitory occupancy, which likely hindered or interrupted the implementation or monitoring of experiments. Research output continued to decrease from 2022 to 2024, possibly reflecting both the incomplete recovery of research cycles post-pandemic and a shift in focus towards other areas of building energy conservation. Although articles were published in 2025, considering that the literature search concluded in early April 2025, only a few earlier released results are included from this year.

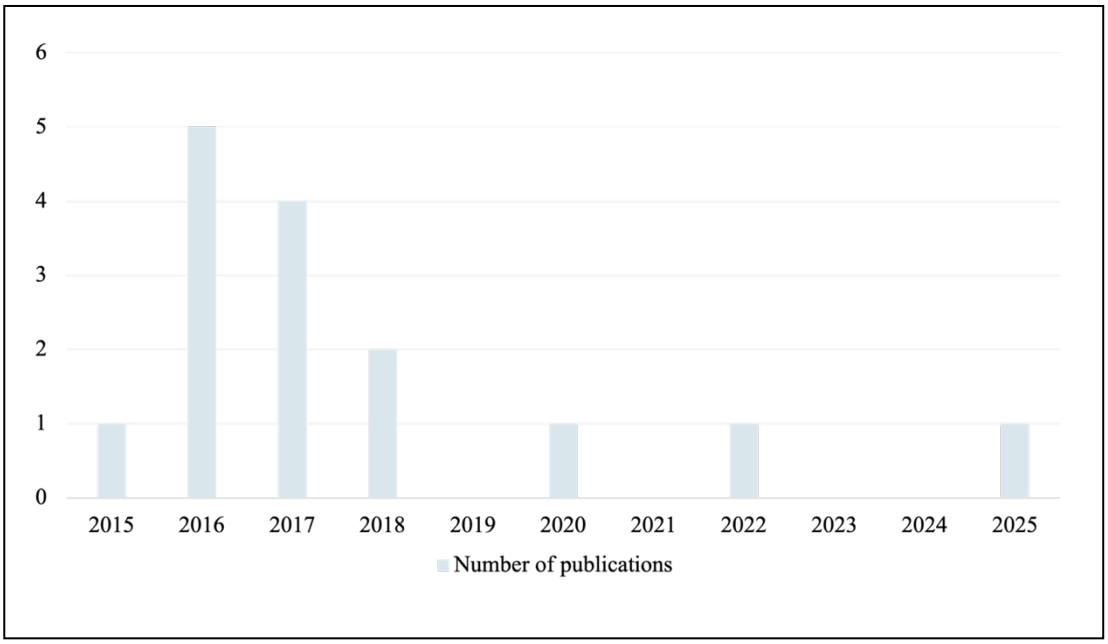

Fig. 4
Annual distribution of the articles selected for inclusion in this review.

Based on the previous findings, feedback tools are categorised into three domains: (a) Physical tools, including the dynamic feedback (touchscreen monitors/dashboards), which are installed in dormitory common areas. These tools, sometimes referred to as “kiosks”, allow users to view energy consumption data at any time. Another type is static feedback, where energy consumption

information is provided in a one-time release, like paper-based energy consumption reports or the posters in public areas. (b) Online tools, including web, emails, and mobile applications (App), which offer real-time energy consumption data and feedback. (c) Mixing tools, where both physical and online tools are used within the same intervention group.

Figure 5 illustrates that combining visual tools with informational prompts and social norm feedback is the most common intervention. Notably, some articles like Jain et al. (M. Jain et al., 2015) adopted multiple experimental groups, each using different visualisation tools. In such cases, intervention groups are treated as independent instances and are categorised by tool type.

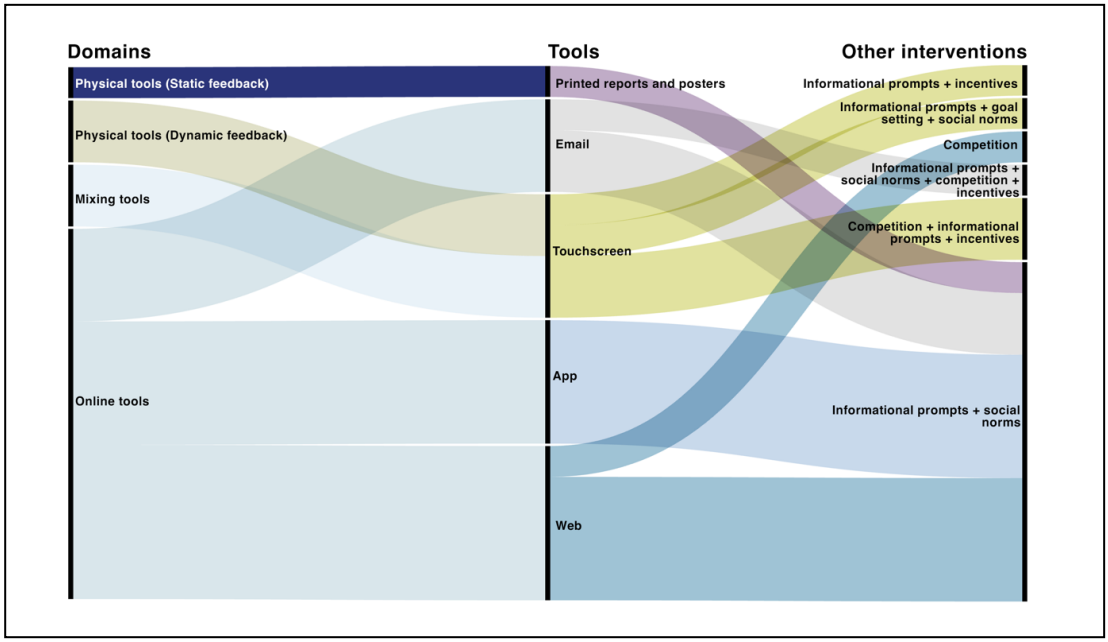

Fig. 5 Combination relationships between visual tools and other interventions.

Although physical and online tools have shown promise in raising energy awareness and encouraging behavioural change, their effectiveness varies across different contexts. The following sections critically examine the strengths and limitations of these visualisation tools and their combinations with other interventions.

As shown in Table 1, visualisation tools are categorised into three domains. To ensure consistency, all intervention durations have been standardised in weeks, except for one study recorded by academic cycle.

Visualisation	Other interventions	Research cycle	Reference
(a) Physical tools (Dynamic feedback)			
Touchscreen	Informational prompts + incentives	234 weeks	(Wisecup et al., 2017)
	Informational prompts + goal setting + social norms	7 weeks	(Karp et al., 2016)
(b) Physical tools (Static feedback)			

Printed reports and posters	Informational prompts + social norms	6 weeks	(M. Jain et al., 2015)
(c) Online tools			
Web	Competition	2014-2015 and 2015-2016 academic years	(Bull et al., 2018)
	Informational prompts + social norms	13 weeks	(Ma et al., 2017)
	Informational prompts + social norms	13 weeks	(Lin et al., 2016)
	Informational prompts + social norms	9 weeks	(Lin et al., 2017)
	Informational prompts + social norms	6 weeks	(M. Jain et al., 2015)
Email	Informational prompts + social norms + competition + incentives	10 weeks	(Alberts et al., 2016)
	Informational prompts + social norms	44 weeks	(Anderson et al., 2017)
	Informational prompts + social norms	15.5 weeks	(Myers & Souza, 2020)
App	Informational prompts + social norms	53 weeks	(Ma et al., 2018)
	Informational prompts + social norms	3 weeks	(M. Liu et al., 2022)
	Informational prompts + social norms	9 weeks	(Lin et al., 2017)
	Informational prompts + social norms	5 weeks	(N. Liu et al., 2025)
(d) Mixing tools			
Touchscreen and energy report	Competition + informational prompts + incentives	7 weeks	(Konis et al., 2016)
	Competition + informational prompts + incentives	7 weeks	(Sintov et al., 2016)

Tab. 1 Classification of visualisation tools into three domains.

3.1 Physical tools

Dynamic feedback, delivered via touchscreen displays in common areas, provides real-time data and comparisons. Static feedback includes paper-based reports and public posters.

Wisecup et al. (Wisecup et al., 2017) conducted a 234-week experiment; interestingly, informational prompts alone were more effective than combinations involving touchscreen feedback. Karp et al. (Karp et al., 2016) suggested declining user engagement with touchscreens over time, although an overall 3.5% reduction in energy consumption was observed. Touchscreens, incorporating colour coding and emojis for social comparison, effectively motivated users to save energy. However, detailed visual feedback did not lead to immediate behavioural change, likely because students needed time to process the feedback-behaviour connection.

In contrast, Jain et al. (M. Jain et al., 2015) found that static feedback, such as paper reports and posters with peer comparisons, outperformed online feedback in promoting stable behavioural change. Gender differences were observed, with paper reports reducing male students' energy use by 11.8%, compared to 7.6% for females.

Overall, physical tools show positive impacts but present challenges. Informational prompts can enhance outcomes, yet information overload may cause ignoring. Additionally, the long-term impact is uncertain, especially as novelty wears off, leading to a decline in interaction. Touchscreens also cause higher costs, and their return on investment remains debatable. Combining physical tools with social norm strategies, especially in shared spaces, more effectively stimulates energy-saving intentions. Data comprehension and gender preferences should be considered, as digital familiarity alone does not guarantee engagement.

3.2 Online tools

Online tools (web, email, Apps) offer flexible, real-time feedback and lower access barriers, particularly appealing to younger users.

Bull et al. (Bull et al., 2018) demonstrated that a web-based dashboard led to energy savings of 5.26% and 8.76% over two academic years, with behavioural change persisting six months post-dormitory departure. However, participants suggested improving accessibility, simplifying visuals, and integrating social media. Competition, often facilitated through peer comparison, was a key motivational factor. Ma et al. (Ma et al., 2017) and Lin et al. (Lin et al., 2016) found that normative comparisons and weekly email reminders effectively reduced energy use, though cross-cultural differences were significant; for example, savings ranged from 75.4% in Ethiopia to 62.0% in France. In a comparison between Chinese and international students, the former reduced usage by 16.7%, while the latter increased it by 23.7%. Cultural background also influenced feedback comprehension, sometimes initially increasing consumption. These findings show the importance of cultural alignment when deploying online interventions.

Lin et al. (Lin et al., 2017) reported minimal behavioural change using a web platform, attributed to limited accessibility and participants' inaccurate perceptions of their energy use. Similarly, M. Jain et al. (M. Jain et al., 2015) observed that real-time web feedback often went unchecked.

Alberts et al. (Alberts et al., 2016) showed that combining email, informational prompts with social norms achieved over 20% energy savings without financial incentives. However, the addition of competition or incentives in long-term interventions yielded unclear effects, suggesting that awareness, rather than rewards, is key to sustaining change. Contrarily, Anderson et al. (Anderson et al., 2017) found that normative content had a limited short-term impact; high-standard individuals saved 14%, while others increased consumption by 5%. Myers and Souza (Myers & Souza, 2020) similarly concluded that emails are effective, but social norms may have limited influence on students who do not pay for energy directly.

Apps indicated effectiveness over short (9 weeks) and medium (19 weeks) interventions. Ma et al. (Ma et al., 2018) reported that 92.31% of participants shifted to energy-saving behaviour when Apps were combined with prompts and social norms. Liu et al. (M. Liu et al., 2022) examined that daily notifications outperformed hourly feedback in promoting engagement. N. Liu et al. (N. Liu et al., 2025) further observed that positive, low-intensity normative feedback enhanced personal norms and achieved a 29.18% energy reduction.

In summary, online tools show potential for student dormitory interventions. Web tools depend on user-initiated access, highlighting the importance of usability and competitive elements. Email effectiveness varies with cultural and normative sensitivity, while Apps provide stable outcomes when combined with social norms, particularly in short- to medium-term interventions.

3.3 Mixing tools

Mixing tools combine touchscreen kiosks with customised weekly email reports. Interactive kiosks provide real-time graphical feedback, while weekly reports offer personalised consumption analysis.

Mixing tools, when combined with informational prompts, competition and incentives, can encourage peers to adopt energy-saving behaviours. Based on the same experiment, Konis et al. (Konis et al., 2016) and Sintov et al. (Sintov et al., 2016) reported a 6.4% average energy reduction during the intervention, rising to 9% two weeks post-competition, suggesting that fostering group identity enhances engagement. However, simple prize incentives may not sustain long-term behaviour change. More scientifically grounded incentive designs are needed to maintain motivation beyond short-term participation.

4. Conclusion

This review analysed the use of data visualisation tools in energy-saving behavioural interventions within student dormitories, particularly their integration with informational prompts and incentive mechanisms. Findings highlight contextual differences in the effectiveness of physical and online tools.

Physical tools, such as touchscreen devices, offer real-time interactivity and have shown positive short-term effects. However, declining novelty and information overload may limit long-term impact, and high installation costs necessitate careful cost-benefit evaluation. Static feedback, like paper reports, can be effective but lacks sustainability and should form part of greener strategies. Gender-based differences suggest a need for more targeted intervention designs. Publicly displayed feedback enhances the effectiveness of social norms, encouraging collective energy awareness.

Online tools, particularly web-based ones combined with peer competition, demonstrate strong potential in engaging students. Social media may further enhance interaction. When paired with

prompts and normative feedback, online tools can improve engagement, though effectiveness is affected by feedback frequency, accessibility, and cultural differences.

Mixing tools combine real-time and personalised feedback, further enhanced by incentives and competition. Students are incentivised by rewards for energy-saving performance, which increases their enthusiasm and helps maintain savings in the short to medium term. However, limited follow-up data means the long-term impact remains unclear, necessitating further investigation.

In conclusion, visualisation tools are effective in promoting short to medium-term behavioural change in student dormitories. Future research should focus on integrating different types of tools and developing scientifically grounded interventions tailored to various implementation contexts and user profiles. Although this review is constrained by the short-term nature of most included studies, it offers initial insights for advancing sustainable behaviour interventions in broader shared residential environments. Moreover, extending visual feedback tools to other sustainability-related behaviours, such as food waste reduction, could foster wider energy-conscious practices among younger generations.

Acknowledgments

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Mapping Industrial Intangible Heritage: a Design-Based Approach

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ABSTRACT

This research, which is part of the iNEST – Interconnected North-East Innovation Ecosystem, 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. Our research methodology incorporates field research activities, including interviews and workshops, which led to the development of a glossary of design-based indicators, which enabled the measurement of intangible heritage awareness and presence within a pilot group of companies operating in the Italian North-East territory through both qualitative and quantitative methodologies. Collected data and information will converge into a digital platform functioning as a collaborative ecosystem, in order to enhance the accessibility of industrial intangible heritage, reflecting its evolving and dynamic nature, as well as its connections with design practices.

INTANGIBLE ASSETS | INDUSTRIAL HERITAGE | DESIGN | MAPPING

1. A grey zone: industrial heritage vs. intangible capital

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 (Berger & High, 2019; Dell'Anna, 2022) and intangible capital (Haskel & Westlake 2018), that is, between the study of our industrial past and the recognition of its contemporary forms (Corò & Volpe, 2006; Volpe, 2018), as well as between theoretical studies and business strategies, between economy and culture, between politics and aesthetics (Bouchenaki 2003; 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 concerning 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, investments in design often include expenditures targeted to knowledge creation and management (Norman, 2023), taking forms such as, for instance, education and training, public and private scientific research, product research and development, communication and brand identity, quality of working and production spaces, and organisational efficiency (Cross, 2007; Harju, 2012). Such kinds of assets are generally difficult to measure and to assess: understanding the interactions between business and design, we argue, could lead to detecting features which are not recognizable in merely quantitative terms, outlining interpretive paradigms that could eventually go beyond those of traditional financial accounting and reporting.

While it is becoming increasingly clear that expanding knowledge management is crucial to enable a critical evaluation of companies' organisational base (Roverato, 1996; Brunetti, 2015), our research interprets design as a major carrier of encoded knowledge, in order to unveil an underlying immaterial heritage able to activate virtuous interactions. Such a perspective appears particularly significant at the time when Made in Italy needs to reinvent itself relocating beyond financial capitalism (Lees-Maffei & Fallan, 2013; Haskel & Westlake, 2018), bringing into play the relevance of intangible assets and capabilities in enhancing companies' economic and cultural value (Kirshenblatt-Gimblett, 2004) [Fig. 1].

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 and 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[1].

Representation highlighting the impact of intangible assets on the different actors operating in the Northeast industrial ecosystem

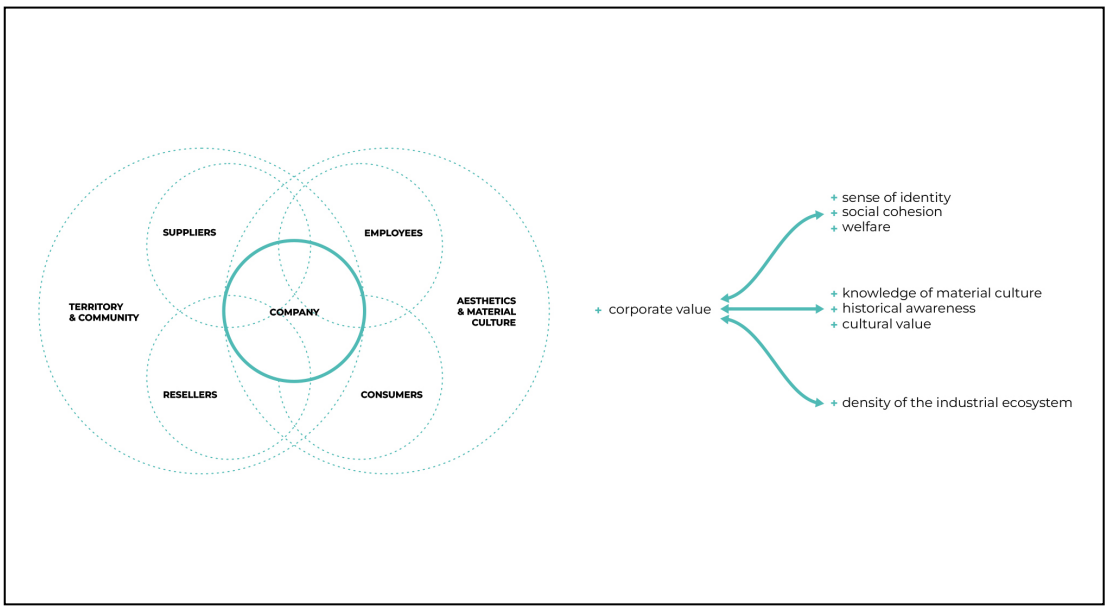

Fig. 1
Representation highlighting the impact of intangible assets on the different actors operating in the Northeast industrial ecosystem.

2. A mixed approach: an interdisciplinary and cross-sectorial mapping methodology

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. Our research methodology incorporates field research activities, including interviews and workshops, which has contributed to the development of a comprehensive glossary of design-based indicators [Fig. 2]:

- Design
- Research & Development
- Identity and Communication
- Cultural Heritage
- Territorial Context

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- Work Organization
- Company Spaces
- Welfare
- Relationships
- Education

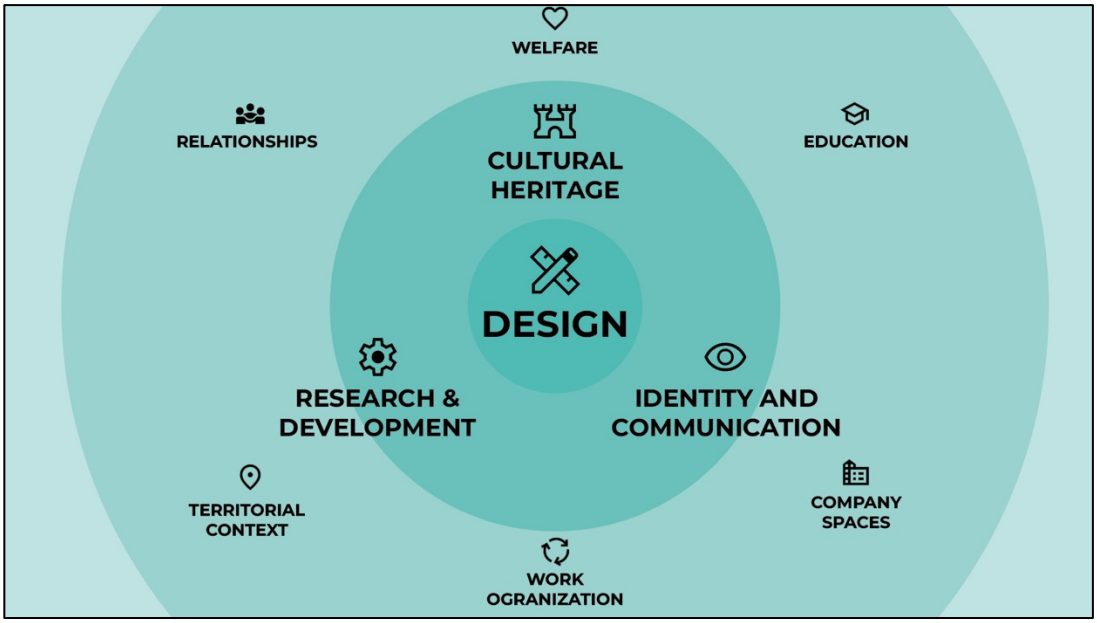

Fig. 2
Representation of the proposed design-based framework.

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.

The assets at the third level define the domains that could mainly benefit from the adoption of a design-driven management strategy. 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, to consider 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).

This glossary served as a foundation for data collection and analysis, enabling the measurement of intangible heritage (UNESCO, 2003) awareness and presence within corporate entities through both qualitative and quantitative methodologies.

Actually, to date there are no tools capable of systematically and exhaustively mapping crucial and determining aspects of a company's identity and success, such as design and project culture, visual identity, advertising and communication, research and development, human resources, welfare measures, architecture and design of work spaces, relations with the territory and the community, the density of the industrial ecosystems in which the company operates, the belonging to districts, the presence of archives, museums, libraries, institutions, foundations and exhibit, design and visual design practices (Bulegato & Dalla Mura, 2014; Ramírez Martín & Portela Filgueiras, 2022).

Design and project culture, visual identity, research, human resources, welfare, local relations, and cultural heritage are and can be drivers for increased competitiveness of individual companies and the entire region.

The ability to recognise and transmit one's own cultural heritage has multiple direct advantages also for the individual enterprise:

- it affects the ability to react to changes in markets and socio-cultural contexts
- it affects visibility, reputation, prestige and commercial and tourist attractiveness
- it facilitates connections with other public and private stakeholders and communities
- increases competitiveness in markets and for access to EU funding and tenders

In the initial phase of the project, we asked companies to help us define and articulate indicators of the company's intangible heritage, through in-depth interviews (Bottà, 2018) in which we attempted to appreciate the role played in the company by design, communication, research, human resources, networks of relations with stakeholders and the community, and other intangible assets (Forlizzi & Zimmerman, 2013).

We need to talk to companies in the area that are particularly virtuous in one or more intangible asset headings, in order to define indicators that are as precise and useful as possible for mapping, quantifying and enhancing these assets and addressing investment measures in this direction.

On the basis of the information and knowledge acquired in this first phase, we designed an interactive questionnaire aimed at a selection of companies and the communities of stakeholders

intercepted by them, with the aim of mapping also the connection with the territory. The collection and analysis of this data has the objectives of:

- offer companies tools to analyse and enhance their intangible heritage
- make companies aware of the competitive advantages offered by its various items
- stimulate cultural production on business intangible assets, fostering relations and collaborations with the art world, the specialised press, cultural and creative businesses, the third sector
- activate training and accompaniment paths for companies to enhance and strengthen intangible assets

3. First findings and expected results

The study involved multiple rounds of interviews with companies, focusing on their intangible assets and their potential for quantification and representation. Thanks to the mediation of the Iuav Foundation, we established a pilot group of companies[2] to test our design-based indicators: at this stage, a central aspect involved identifying managers capable of virtuously managing knowledge exchanges within their network of employees, partners, customers and suppliers, helping to build a shared innovation-oriented vision.

The selection of the case studies has been limited to a precise geographical area, the Veneto region in Italy, and to a relatively small number of a few dozen, to focus on a methodology that – looking at a variety of industrial sectors – could be able to develop a model of both data analysis and visual representation.

During the initial phase of company interviews, several key observations were made. Each company provided insights into its intangible heritage across various domains, demonstrating the multifaceted nature of industrial intangible assets. For example complexities and singularities have been highlighted regarding the role and the importance of having an archive or a museum, the specificities connected with a particular production sector have emerged, as well as the necessities of every industry.

Moreover, companies exhibited positive engagement with the research topic, expressing interest in further involvement in subsequent phases of the study.

Upon completion of the first round of interviews, several conclusions were drawn. A need was identified for developing quantitative measurement methodologies for intangible industrial heritage to complement qualitative assessments. Meta-values related to intangible assets, such as design, were formalized, elucidating their function within companies. The critical role of interconnections between various assets in defining a company's identity was recognized. Additionally, a set of

[2] In particular the following industries have been interviewed: ARPER, Lanificio Bottoli, CMP Campagnolo, Magis, Riso Melotti, Battistella Spa, Manifattura Valcismon, Salco, De Longhi, Formest, Selle Royal Group and Luxardo.

pragmatic questions was formulated regarding numerical data potentially capable of providing a more objective measure of each company's investment in its intangible heritage. The data will also be a means of control to avoid bias in the findings, considering the inevitable risk of subjectivity in the collected answers.

Data and information will converge into a digital platform functioning as a collaborative ecosystem, in order to enhance the accessibility of industrial intangible 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 [Fig. 3].

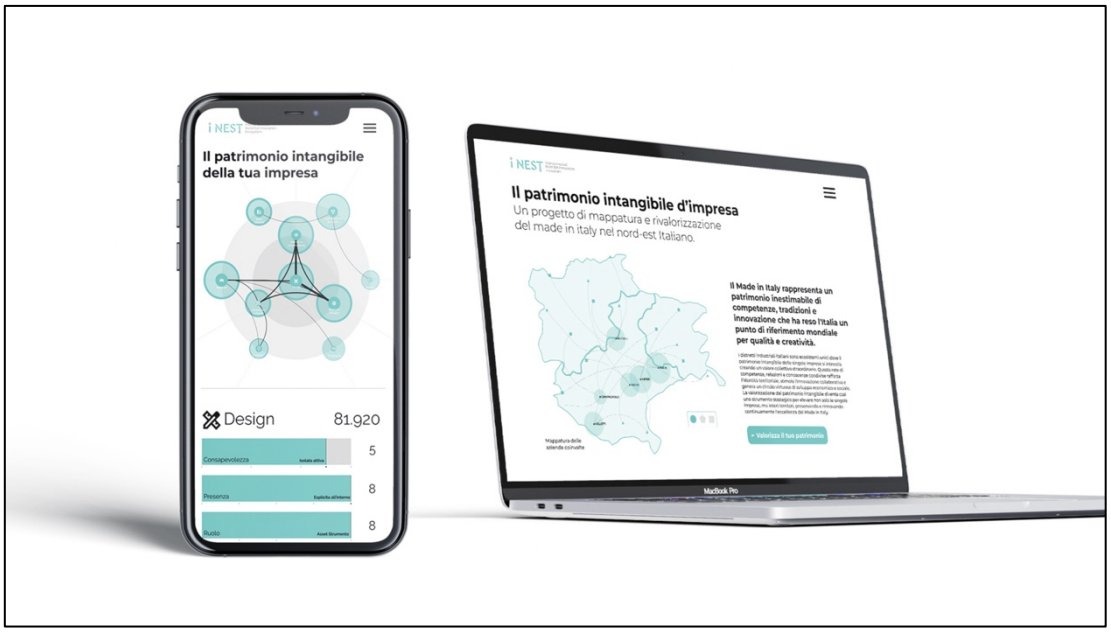

Fig. 3
Mock-up of the digital platform being designed and developed as part of the project.

Regarding the proposed platform, companies were identified as the primary users. The platform's objective was articulated as encouraging a shift (Drew et al., 2022) towards a holistic view of companies, to be integrated at a systemic level in an evolution from a financial model to a district-based model. The platform is designed to represent intangible heritage on two levels: a collective territorial level accessible to all users, and an "individual" level for each company, private for personal analysis. In order to allow an open and organized process (Valsecchi & Menichinelli, 2016), the platform's private area will be designed to allow continuous input from various company users. Future directions for the research include refining the model for quantifying intangible heritage through a second round of interviews, modeling automation systems (Luo et al., 2021) for company evaluation following a standardization of collected data types, evolving interview methodologies from semi-structured in-person interviews to a mixed online approach, and expanding the pool of companies involved in the study.

This research contributes to the growing body of knowledge on intangible industrial heritage and provides a foundation for developing innovative tools for its measurement and representation. The findings have significant implications for both academic understanding and practical applications in industrial heritage management.

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Designing the future of Public Services: Digital Twins for Inclusive and Accessible Experiences through Service Design

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ABSTRACT
Digital Twins (DT) are already considered an important technology of Industry 5.0, but to fulfill their promises, DT's future development should prioritize human-centricity. In parallel, the Public Sector is undergoing digital transformation, with DTs emerging as vital tools in government feasibility studies. The article aims to understand how the DT approach may enhance social innovation, inclusion, and accessibility for citizens in the Public Sector.
While the human-centricity of DT in Industry 5.0 is extensively studied, there is limited focus on its application in accessible public service experiences. To explore the potential of DT in this area, this research offers an integrative literature review. It was found that only a few studies delve into the use of the DT for social innovation, leaving a gap for Service Design with its consolidated methods and a Human-Centered approach. Therefore, this study proposes a new framework Digital Twin Approach for Social Innovation in Public Offices through Service Design. The latter in a given system is necessary to engage stakeholders, design their journeys through (in)tangible interactions, and develop scenarios and prototypes.

DIGITAL TRANSFORMATION | PUBLIC SECTOR | SOCIAL INNOVATION | ACCESSIBILITY

1. Introduction

Digital Twins (DT) are already considered significant technological tools of Industry 5.0, but to fulfill their promises, Digital Twins' future development should find applications for improving human health and safety, work assistance and error reduction, training, and fair decision-making (Barata & Kayser, 2024).

In parallel, the Public Sector is undergoing digital transformation (Alvarenga, Matos, Godina & CO Matias, 2020), and its potential can be enhanced with the DTs.

The article aims to understand how the DT approach may enhance social innovation, inclusion, and accessibility for citizens in the Public Sector supported by Service Design.

Although DTs' human-centered priorities for Industry 5.0 are well-discussed in the scientific literature, there is still limited attention on their applicability for fostering inclusive and accessible experiences in public services. Some cases that are related to this question use DTs to improve user interaction with equipment (Tu et al., 2023), to collect citizen feedback for smart cities (White, Zink, Codecá & Clarke, 2021), and to guarantee universal accessibility to architectural heritage (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022), suggest the untapped potential for broader application in the Public Sector.

Design can promote inclusion and accessibility across digital technologies, as shown by numerous projects from product design to participatory design. Service Design, with its Human-centered approach makes it uniquely suited for addressing the complexity of public services and creating flexible solutions.

In order to explore the potential of DTs for social innovation in the Public Sector through Service Design, this research offers an integrative literature review (Torraco, 2005) that deconstructs this topic into two basic elements: Digital Twins and Design, which were the main keywords for the literature search. Starting from 46 articles, the paper concentrated on the 18 more related to this emerging topic.

2. Digital Twins in the Public Sector and Digital Twins for Social Innovation

Starting with the first element of the literature review, the Digital Twin is a virtual representation of a physical asset that can be used for better decision-making, real-time prediction, optimization, monitoring, and controlling via data (Rasheed, San & Kvamsdal, 2020).

Research into DTs emphasizes leveraging technologies like AI, IoT, 5G, RFID, and cloud computing (Jones, Snider, Nassehi, Yon & Hicks, 2020). This study focuses on the DT approach, a theoretical framework for developing DTs.

Digital transformation is critical for public organizations, yet its full potential remains untapped (Alvarenga, Matos, Godina & Matias 2020). Some studies already highlight DT's application in this field; for example, a Digital Twin bureaucracy uses autonomous decision-making to manage

government affairs (Eom 2022), while DT for public policy uses simulation modeling to optimize a bike-sharing system (Hwang & Choi, 2023).

Despite these studies about DT for the Public Sector, there is a noticeable gap in exploring how it can drive social innovation, inclusion, and accessibility. All these concepts deal with human-centricity: social innovation from the general point of view of the beneficial for society services (Murray, Caulier-Grice & Mulgan, 2010); inclusion from the value for all individuals without no one remains excluded (Saviano, 2025); and accessibility from the goal of universal access (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal 2022).

Because the implementation of DTs for social innovation in the Public Sector remains untapped, the paper brings as one of the examples Industry 5.0, where DTs already focus on human-centricity. While Industry 4.0 integrated advanced technologies like AI, robotics, and IoT to enhance productivity, it did not cover concerns about automation, job displacement, and the need for reskilling. Industry 5.0 shifts the focus from replacing humans to fostering collaboration, emphasizing human expertise alongside intelligent systems by optimizing workflows to alleviate stress, offering insights to make informed decisions, and creating virtual training environments to acquire new skills and others (Barata & Kayser, 2024).

Enhancing DT human-centricity requires designing both tangible and intangible interactions. Examples include integrating extended reality to improve user interaction with equipment (Tu et al., 2023), or other tools like natural language processing (Barata & Kayser, 2024), metaverses, and gamification for achieving universal accessibility in DT for architectural heritage (Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022).

DT solutions also enable access to remote monitoring, vital for restricted locations or during crises like the COVID-19 pandemic (Singh et al., 2021) or becoming the platform for gathering citizen feedback to foster participation (White, Zink, Codecá & Clarke, 2021).

Inclusive DT solutions personalize services, such as human DTs that model behavior and characteristics through real-time sensor data (Asad et al., 2023), supporting data-driven ergonomics.

Therefore, the DT approach can foster social innovation in different fields. However, there is still limited literature that demonstrates how the DT approach can be a tool for inclusion and accessibility for the Public Sector.

3. Service Design in the Public Sector and Design for Inclusion

Thus, the literature review covers its second element, Service Design. Service designers are valued in the Public Sector thanks to their capacities to improve policy making (Mortati, Schmidt & Mullagh, 2022), to move towards necessary cultural and organizational changes, to train and build capacity among state employees, and to engage citizens through co-design sessions (Mager, 2016).

Moreover, for the successful integration of technologies, Service Design is becoming a necessity to create fruitful synergies between human operators and complex data structures (Colley & Häkkilä, 2018).

Design can promote inclusion and accessibility across digital technologies, as shown by numerous projects from product design to participatory design. Starting from Product Design, a significant example is the EASTIN Association, which provides expertise on assistive technology for people with disabilities, their families, and carers (Wouters, 2015). Another notable example comes from a Community-based Participatory design, called Commonfare.net, a platform enabling individuals in precarious conditions, such as poverty and unemployment, to share experiences and connect for mutual support (Lyle, Sciannamblo & Teli, 2018). Speaking of Design for social integration, a Digital Companion project uses AI-based profiling and chatbots to enhance public services for migrants and improve their quality of life through participatory co-creation approaches (Pollini & Caforio, 2021).

Despite these practices of using Service Design in the Public Sector and Design for inclusion, there is no Service Design literature yet on the integration of the DT approach for Social innovation in this area.

4. Framework of Digital Twin approach for Social Innovation in Public Offices

The integrative literature review finishes describing its two elements and results in tables 1, 2, and 3, which represent the new framework, building relationships between concepts of Digital twin and Service Design, that reveal 9 building blocks for Digital Twin function development within pre-service, service, and post-service (Stickdorn & Schneider, 2011). To focus the framework, the context was narrowed down from the Public Sector to public offices where the state employees communicate directly with the citizens, and thus, there is space for possible Social innovation intervention. The tables consist of five columns: the first is the possible DT function (what) in the public office [Fig. 1], the second and third are the (in)tangible interactions (how), the fourth is a benefit (why) associated with this DT function, the fifth is a possible role of Service designer and the last one is the similar case study. The description of the DT function is inspired by the Golden Circle model (Sinek, 2009).

The first table describes how DT functions within public pre-service can improve: accessibility evaluation through the office layout simulation for accessibility testing; inclusion training for employees to teach them handling diverse needs; service testing through the development of virtual experiment environments to service optimization. In this case, the Role of the Service designer is to develop scenarios and spaces to encourage engagement.

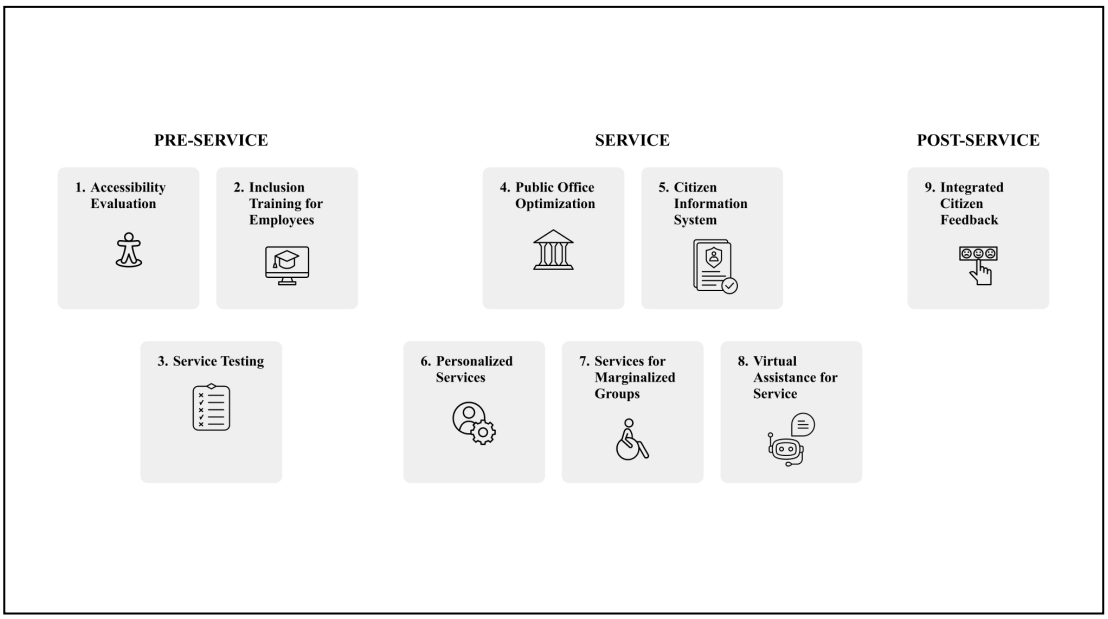

Fig. 1 DT functions within pre-service, service, and post-service in public office.

DT function (what)	Tangible Interactions (how)	Intangible Interactions (how)	Benefit (why)	Role of the Service Designer	Case study
1. Accessibility Evaluation	Simulate office layouts for accessibility testing	Collect and analyze citizen feedback to refine accessibility	Create an inclusive physical environment	Test and improve layouts, thanks to user feedback	Wouters, 2015; Hwang & Choi, 2023
2. Inclusion Training for Employees	Utilize XR simulations to train employees in handling diverse needs	Deliver AI-driven adaptive training programs	Improve inclusion of services	Design inclusive training scenarios	Barata & Kayser, 2024; Mager, 2016
3. Service Testing	Develop physical prototypes and virtual test environments	Aggregate real-time user interaction data to optimize services	Reduce risks and costs by initial validating, ensuring accessibility	Design participatory prototypes enabling citizen interaction	Barata & Kayser, 2024

Tab. 1 Pre-service in the public office improved by the DT approach and the role of the Service designer.

The second table describes how DT functions within public service can improve public office optimization that monitors physical flows of citizens/employees to manage queues; citizen information system that centralizes citizen data for easy access at service desks; personalized services that offer customized service recommendations at desks; services for marginalized groups that enable remote access for citizens with mobility challenges; virtual assistance that provides help at service desks. In this case, the Role of the Service designer is to develop data-driven user journeys and user-friendly systems.

DT function (what)	Tangible Interactions (how)	Intangible Interactions (how)	Benefit (why)	Role of the Service Designer	Case study
4. Public Office Optimization	Monitor the physical flow of citizens/employees to manage queues	Predict peak times and distribute staff	Reduce waiting times, predict problems, enhance citizen satisfaction	Design user journeys based on data	Barata & Kayser, 2024
5. Citizen Information System	Centralize citizen data for easy access at service desks	Track and update citizen profiles	Simplify interactions, improve transparency, and save time by consolidating information	Develop a centralized and user-friendly system	Eom, 2022; Asad et al., 2023
6. Personalized Services	Offer customized service recommendations at service desks	Analyze citizen interaction histories to tailor services	Increase satisfaction	Develop adaptive interfaces that personalize information	Pollini & Caforio, 2021
7. Services for Marginalized Groups	Enable remote access for citizens with mobility challenges	Provide adaptive digital interfaces for accessibility	Increase inclusivity for citizens unable to visit public offices	Design user-friendly remote service options	Singh et al., 2021; Tu et al., 2023; Cruz Franco, Rueda Márquez de la Plata & Gómez Bernal, 2022
8. Virtual Assistance for Service	Assist at service desks	Use a virtual assistant to guide citizens and provide solutions	Enhance transparency and empower citizens to navigate independently	Design accessible virtual assistants that provide support	Barata & Kayser, 2024; Pollini & Caforio, 2021

Tab. 2 Service in the public office improved by the DT approach and the role of the Service designer.

The third table describes how DT functions within public post-service can integrate citizen feedback to collect it through service desks. In this case, the Role of the Service designer is to develop accessible systems to ensure feedback informs decision-making.

DT function (what)	Tangible Interactions (how)	Intangible Interactions (how)	Benefit (why)	Role of the Service Designer	Case study
9. Integrated Citizen Feedback	Collect citizen feedback through service desks	Analyze feedback data to inform service adjustments and improvements	Promote transparency and foster citizen involvement and trust	Develop accessible systems to ensure feedback informs decision-making	Lyle, Sciannamblo & Teli, 2018; White, Zink, Codecá & Clarke, 2021

Tab. 3 Post-service in the public office improved by the DT approach and the role of the Service designer.

5. Discussions and Conclusion

The Framework of the Digital Twin Approach for Social Innovation in Public Offices proposes 9 building blocks for Digital Twin function development. Some of these blocks can be combined and integrated into existing Building DTs depending on the necessities.

The role of Service designers in fostering social innovation, inclusion, and accessibility through the DT approach is described for each DT function in the tables, and overall, their responsibilities can be summarized as follows:

- Engaging stakeholders and users, particularly marginalized groups: developing inclusive feedback loops using tangible and intangible interactions.
- Designing data-driven stakeholder journeys: plan their experience and develop inclusive tangible and intangible interfaces for DT systems.
- Prototyping and scenario development: designing them to test concepts and train employees.

The findings of this research help designers and public stakeholders understand the social, spatial, and relational impacts of DT systems, fostering deeper connections between citizens and public services. This research can have an impact on the democratization of technology, as Service Design promotes inclusivity and stakeholder participation, ensuring that their needs are taken into account when designing DT systems. This approach promotes collaboration and transparency in the Public Sector, improving service delivery and public good.

However, when implementing DT for social innovation, some ethical and technical challenges must be taken into account. Thus, future studies could be aimed at creating recommendations for policymakers to develop inclusive policies for public services, taking into account ethical and technical issues such as algorithmic bias and discrimination, privacy and surveillance issues, and large-scale data collection (Vesnic-Alujevic et al., 2019).

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Tangible Interfaces for Intangible Experiences: the Role of the UX Specialist in the Software Development Team

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ABSTRACT
The term "technology" originates from the Greek words téchnē (art) and lógos (science), highlighting the link between creativity and scientific knowledge, which forms the basis for understanding the relationship between technology and design today. Technology is no longer just a set of tools; it is an ecosystem where both aesthetic and functional principles shape design. Design goes beyond the visible, influencing how individuals interact with technology, particularly on the Web, where interface design impacts the intangible element of User Experience (UX). This research explores the responsibilities of UX specialists within software design, showing how their expertise enhances web product development. A case study of an Italian hospital's web platform compares user satisfaction between two versions of the same interface - one developed with a UX specialist and one without - demonstrating the benefits of integrating UX expertise. The study highlights how incorporating usability and accessibility as core values in IT companies fosters both product quality and a collaborative, innovative culture, contributing to a more inclusive, user-focused future.

USER EXPERIENCE SPECIALIST | HUMAN CENTERED DESIGN | ACCESSIBILITY | USER SATISFACTION

1. Balancing function and form: the essential role of UX in digital design

In the rapidly evolving domain of digital technology, the relationship between design and technology has become increasingly pronounced. Technology is no longer merely a collection of tools or processes; it now constitutes an integrated ecosystem where experiences, interfaces, and products are shaped by principles that harmonize aesthetics and functionality. Design transcends the visible elements of objects or interfaces and encompasses the nuanced ways in which individuals engage with technology. This interplay is particularly evident in web-based contexts, where the tangible dimensions of user interface design significantly influence the intangible domain of user experience (UX). The importance of human-centered design lies in its capacity to address the persistent gap between user needs and developer outputs. This gap, often attributed to miscommunication and an inadequate understanding of user requirements, can compromise the success of digital projects. This highlights the critical role of designers in balancing functionality with aesthetics and of UX specialists in transforming implicit user needs into actionable design solutions.
Incorporating a preliminary design phase grounded in human-computer interaction principles generates substantial benefits throughout the lifecycle of digital services. Empirical evidence shows that software developers spend nearly half their time reworking tasks that could have been avoided, resulting in significant resource inefficiencies, particularly when errors are identified post-production (Ramdoo & Huzooree, 2015) (Aleryani, 2020).

This study, conducted in collaboration with an IT company, advocates for embedding accessibility and user satisfaction as fundamental values in corporate design practices, achieved through the systematic integration of UX specialists into organizational workflows.
The development of digital products involves distinct phases, including conception, design, development, and deployment, each of which presents unique challenges. These challenges become more complex when user input is not effectively incorporated during the initial stages of the process. This research argues that the early involvement of UX specialists provides a strategic response to these challenges by aligning user needs with technological possibilities. Their expertise allows for the identification of critical interaction details, minimizing errors and reducing the need for subsequent revisions. Rather than simply collecting requirements, UX specialists foster a comprehensive understanding of user expectations, ensuring their seamless integration into the design process.

Through a case study on the development of a web platform for an Italian hospital service, this research illustrates the transformative impact of involving UX specialists from the outset. A comparison of two interface versions, one developed with UX input and the other without it,

demonstrates substantial improvements in user satisfaction, workflow efficiency, and error reduction. The findings also emphasize how usability and accessibility contribute to fostering a culture of collaboration and innovation within IT organizations, ultimately enhancing both product quality and organizational practices.

In an era where technology permeates everyday life, designing user-centered digital solutions has become a necessity. This study contributes to academic discussions on the role of design in technological development, highlighting the importance of addressing user needs while promoting innovation, collaboration, and satisfaction within the digital industry.

2. Analyzing the design process: a case study of a hospital website

This research advances the discussion by presenting a case study centered on the analysis of a hospital web application developed by ManyDesigns, an Italian software company. The service, initially designed and implemented by a programmer, is analyzed in depth to identify areas for improvement. Following this analysis, an alternative solution is proposed and developed with the involvement of UX specialists and web designers. This new approach integrates principles of usability and web accessibility into the interface design.

The next phase of the study involves user testing to assess preferences and determine which solution is perceived as more effective and satisfying. In addition to assessing user satisfaction, the research will look at wider impacts, including the social well-being of staff involved in the development process and the optimization of workflows. In particular, it investigates improvements in time and resource allocation and proposes a collaborative team model that improves efficiency and outcomes.

The service being studied, called Self-Accettazione (Self-Acceptance), addresses a critical need in the healthcare sector: streamlining and expediting access to medical facilities. By allowing insured patients to complete registration and payment for services remotely, the platform reduces queues at hospital counters, increases service efficiency and improves overall patient satisfaction.

Since its launch in July 2021, the Self-Acceptance platform has operated as part of a broader and more complex user journey [Fig. 1].

This journey typically starts with a doctor's prescription, continues with appointment booking through the central booking office (CUP), and culminates in the consultation or medical procedure. Within this framework, the Self-Acceptance service addresses the administrative phase of the patient journey, encompassing tasks such as submitting medical claims, registering patients, and processing payments for insured services.

Traditionally, these steps are performed in person at the hospital reception on the day of the appointment. By transitioning to a digital platform, the service seeks to streamline this process, enhancing efficiency and improving outcomes for both users and healthcare organizations.

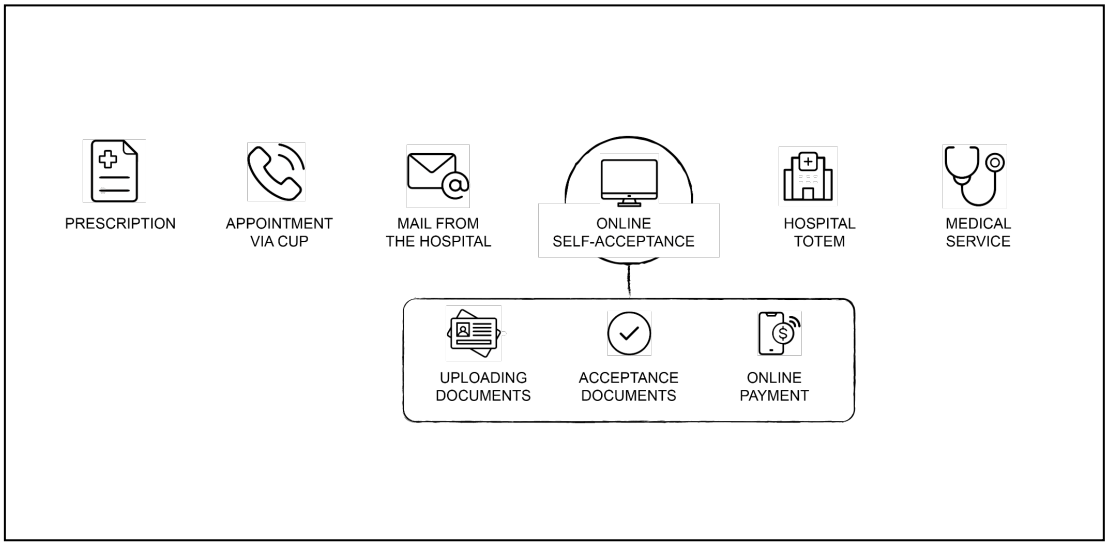

Fig. 1
User journey illustrating the steps the patient follows to book a medical service through the Self-Acceptance service.

In addition, this study examines how adopting a UX-oriented approach fosters collaboration between designers and developers. This collaborative model not only enhances the quality of the digital solution but also contributes to the creation of more sustainable and human-centered technologies, aligning with broader goals of accessibility and inclusivity in the healthcare sector.

3. Exploring user needs: research activities and insights

The case study was analyzed through various user research activities: analytics, interviews, and expert analysis.

3.1 Analytics

A review of the analytical data from the platform's launch in July 2021 to November 2023 revealed a total of 172,130 processed performances, providing a substantial dataset for evaluating service efficacy and user behavior. The age distribution of users, ranging from infants to a 104-year-old, was analyzed due to its relevance in understanding the target audience. This analysis is essential for adapting the service's communication strategies and design to meet the needs of different age groups. Notably, the data identified a peak in usage around the age of 54, offering insights into key demographics for optimizing user engagement and service effectiveness [Fig. 2].

Upon classifying the users into age groups, with one group for those under 18 and another for those over 95, and dividing the intermediate ages into 10-year intervals, the most active user segments were found to be those between 46 and 65 years of age [Fig. 3].

The data analysis also provided a comprehensive overview of the overall success rate of the service. The data revealed a significant problem with both document upload and payment: only 15,053 users successfully uploaded the required documents (8.75%) and only 7,613 completed the

required payments (4.42%). These results indicate the need to further investigate the barriers users face during the process in order to improve the service and increase completion rates.

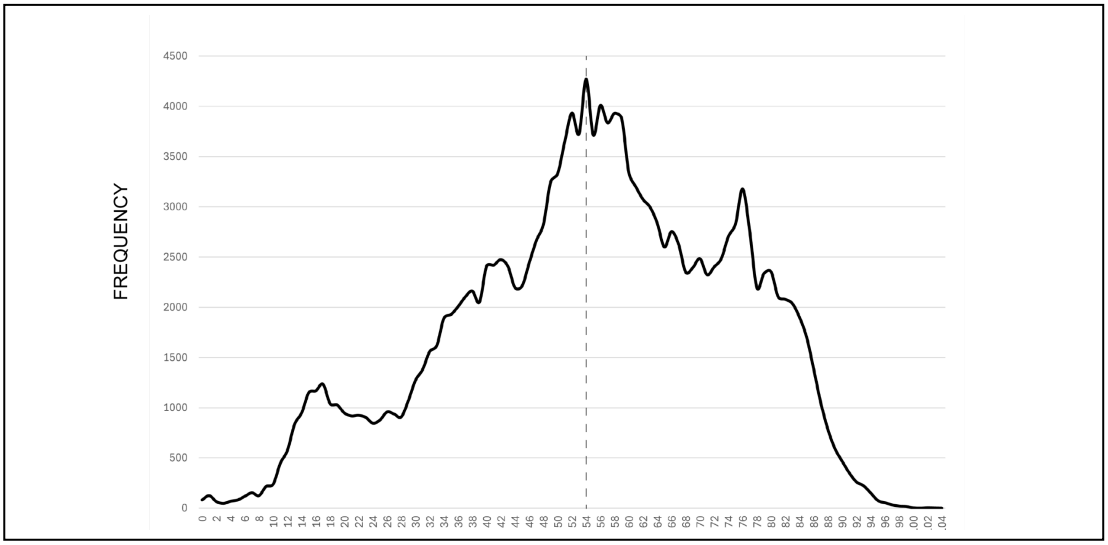

Fig. 2
The chart illustrates the number of interactions performed by users for each age, spanning from 0 to 104 years, with a peak in usage observed at the age of 54.

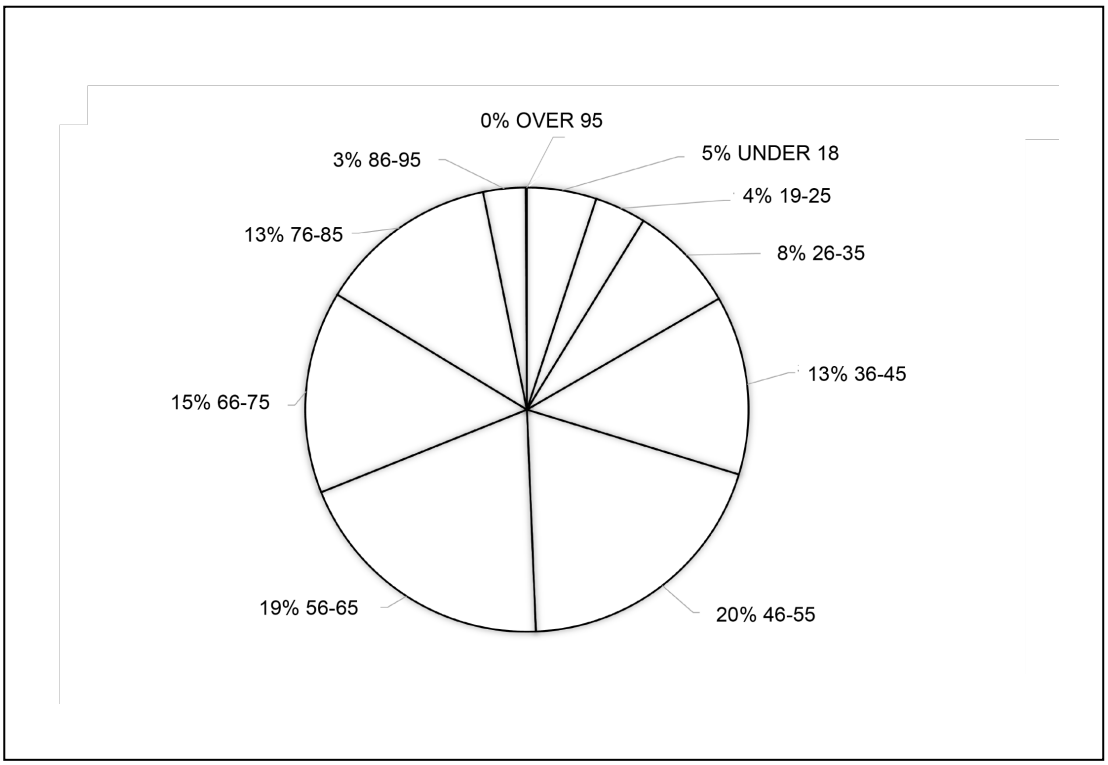

Fig. 3
The pie chart represents the percentage of interactions divided into different age groups, highlighting higher activity among users aged 46 to 65. Data is grouped into 10-year age ranges, with separate categories for users under 18 and over 95 years old.

3.2 Interviews

In order to gain a full understanding of the development process and the challenges encountered during the creation of the website, an anonymous interview was conducted in July 2024 with the developer responsible for the design and realization of the website. The aim was to explore the methods used in the development, the difficulties encountered and the organisational aspects of

the work, from the initial concept to the final implementation. A number of key points about the development of the project emerged from the interview.

Firstly, the developer noted that although aware of the overall project objectives, there was limited communication with the client and access to strategic decisions made prior to the start of the project. This lack of direct interaction with business decision-makers may have contributed to the initial specifications being unclear, compromising alignment with the client's real needs, which in turn affected both the timing and quality of the final product. The urgency to complete the project meant that the developer worked largely in isolation, with little opportunity for feedback or collaboration with more experienced colleagues or end users. This limited approach resulted in an initial product that fell short of expectations and required significant restructuring of the code to improve security, configurability, and management.

The visual design phase also suffered from limited resources, as the developer explained that the design was based on general guidelines rather than detailed mock-ups. This lack of clarity and visual consistency required further revisions, highlighting the importance of clearer initial documentation. Dissatisfaction with the outcome was expressed, with quality problems attributed to tight deadlines and a lack of timely feedback from a team of experts. A more collaborative management approach and additional time were suggested as factors that would have led to a better result. A significant issue raised was the lack of attention to accessibility and usability. The developer admitted a lack of knowledge of the Web Content Accessibility Guidelines (W3C, 2018), an area that represents a crucial opportunity for improvement. Compliance with accessibility standards is essential not only to ensure the inclusiveness of the website, but also to meet legal obligations, making it a priority for future improvements.

3.3 Expert Analysis

The final phase of the user research involved an expert evaluation of the current graphical user interfaces of the service to assess their usability and accessibility. The evaluation considered several parameters of the user interface and user experience, such as user flow, needs coherence, accessibility, service flexibility, layout and visual content hierarchy, visual consistency, interactivity and responsiveness, and finally aesthetics.

The analysis was carried out according to core UX design principles, web design guidelines and human-computer interaction concepts, including Jakob Nielsen's usability heuristics (Nielsen,1993).

The main problems identified were a lack of visibility of system status, an excess of redundant information and a non-intuitive visual hierarchy, which resulted in a sub-optimal user experience. In addition to the aforementioned interface issues, the lack of clear feedback and system information compartmentalized the user experience in terms of reliability and security. For example, the platform

did not provide a confirmation email at the end of the process, which would have reassured users and provided a clear record of their actions. Furthermore, there were no clear instructions on what to do on the day of the visit, nor explicit information on the importance of using the service, with an effective communication strategy to convey the benefits of the platform.

4. Redesigning the user interface: a focus on usability and accessibility

Following a thorough analysis of the issues identified in the current version of the service, a redesigned set of interfaces was developed. This proposal was presented as mockups, prepared by a web designer under the direction and supervision of a UX specialist. The redesign process utilized Adobe XD, which enabled detailed visualizations of the updated system architecture, simulations of navigation flows, and preliminary evaluations of user interactions to be produced before the development phase. These prototypes function as comprehensive visual references and essential tools for gathering feedback, supporting an iterative and user-centered design process.

The proposed improvements focus on simplifying and enhancing user communication, adopting a more accessible and reassuring language, and optimizing the reading flow to highlight key interface elements requiring user action.

For each stage of interaction, a comparative visualization is provided, with the current interface displayed on the left and the proposed interface on the right [Fig. 4-11].

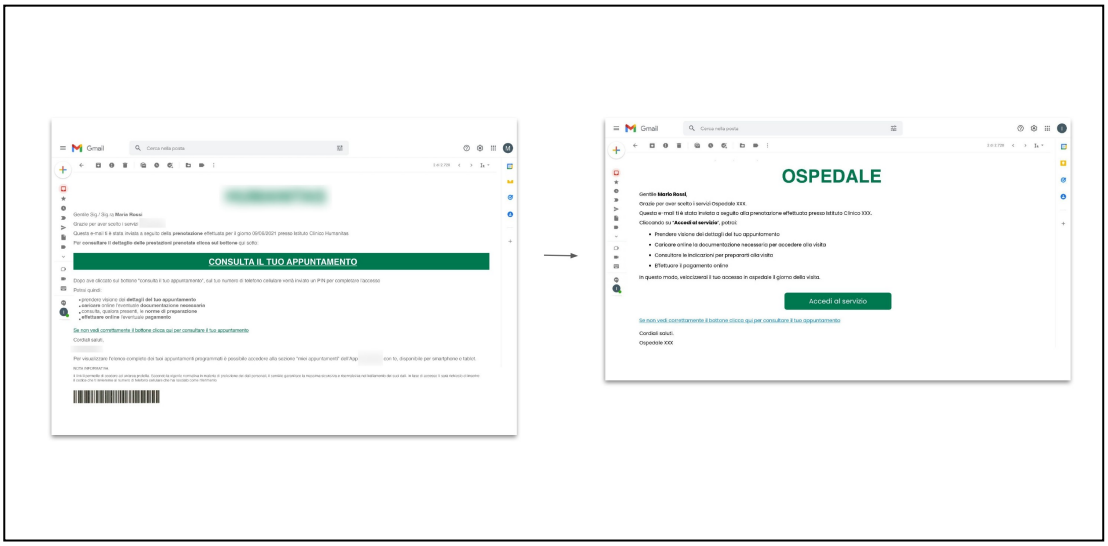

Fig. 4
Step 1: After scheduling the appointment, the user receives an email to access the service.

Fig. 5
Step 2: To access the secure area, the user must enter the code received via SMS.

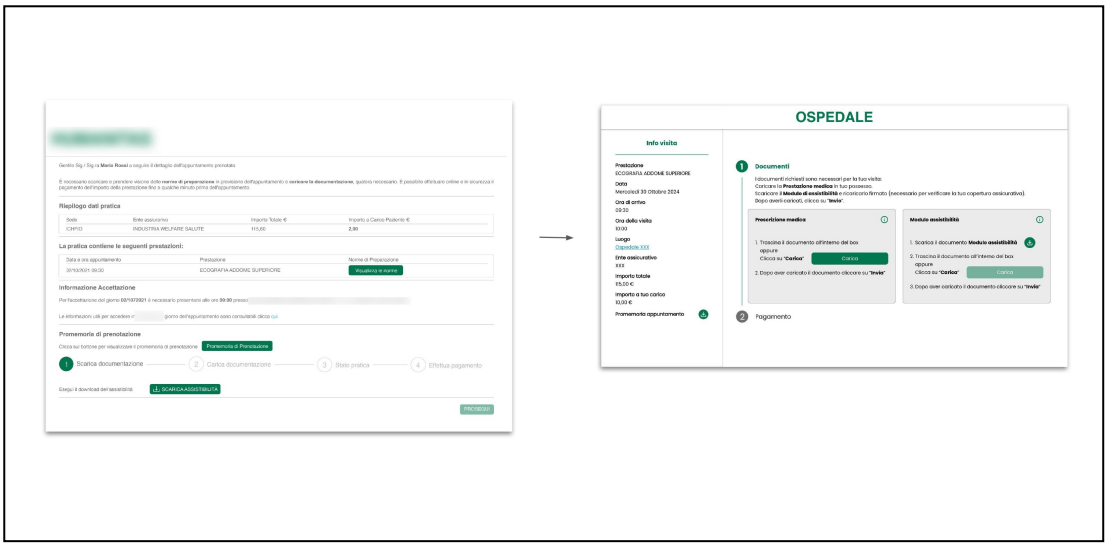

Fig. 6
Step 3: The user is provided with a summary of their booking. This screen prompts the user to download the necessary documentation for acceptance.

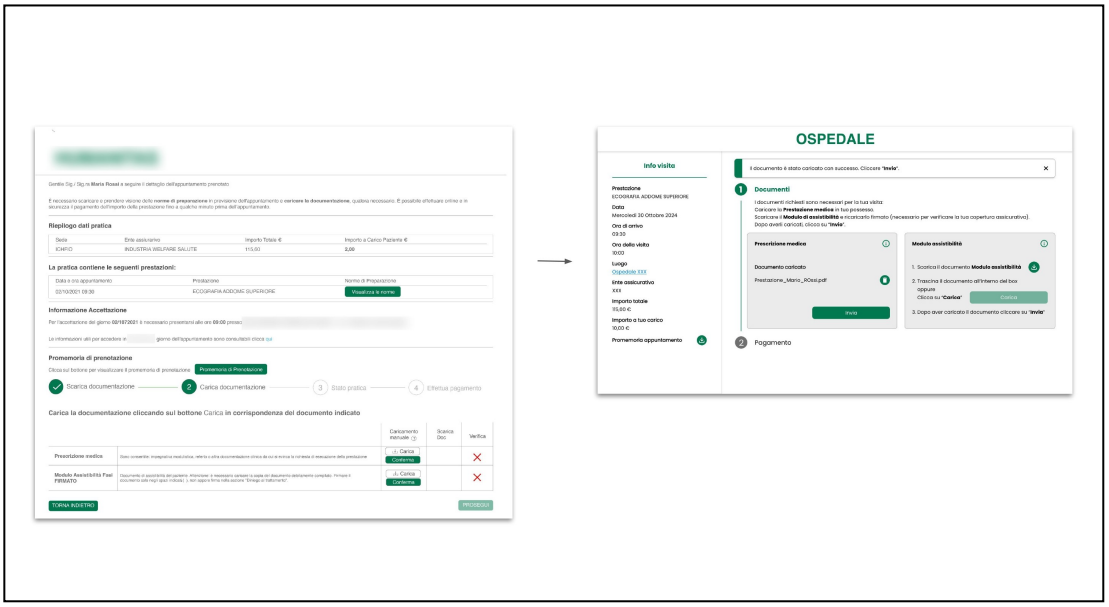

Fig. 7
Step 4: After uploading the documents, the current interface does not allow the user to modify the file. The proposed interface, however, enables the user to review and confirm the accuracy of the uploaded file.

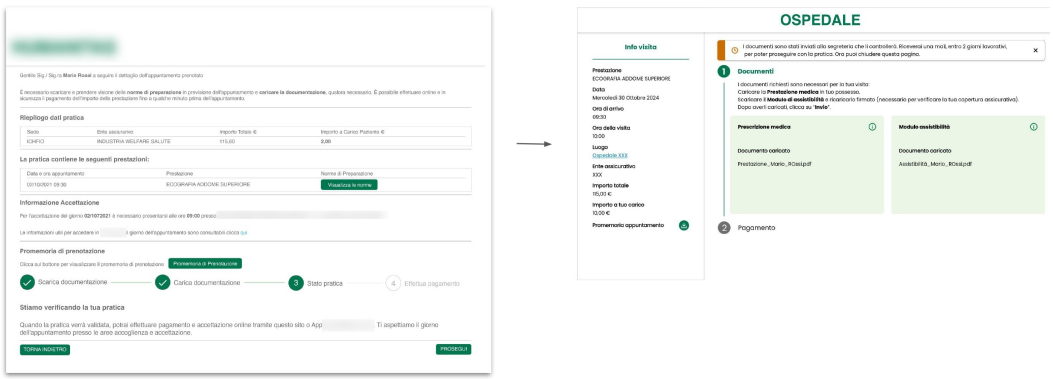

Fig. 8
Step 5: After appropriately completing the PDF documents, the user must upload them to the platform. The user is then notified that they must wait a few days for the application to be validated.

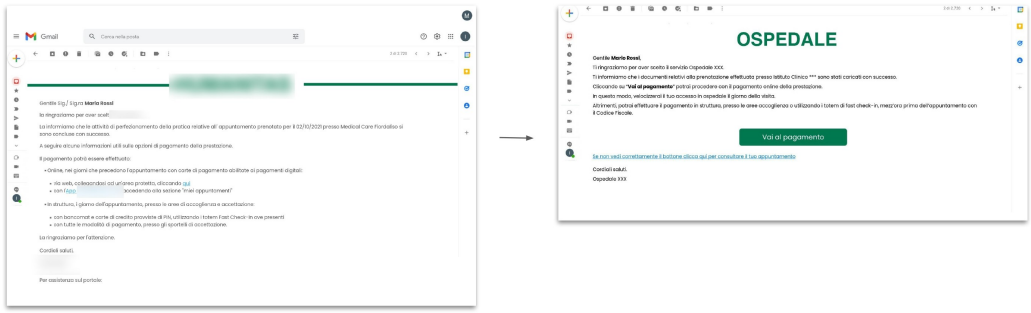

Fig. 9
Step 6: The user receives another email prompting them to proceed with the payment. This section is not analyzed here, as it falls outside the scope of the company and is managed externally.

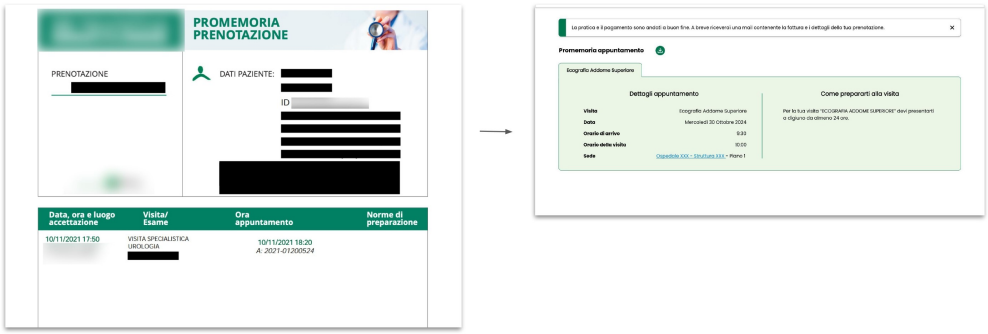

Fig. 10
Step 7: Once payment is completed, the user can view a summary of the application.

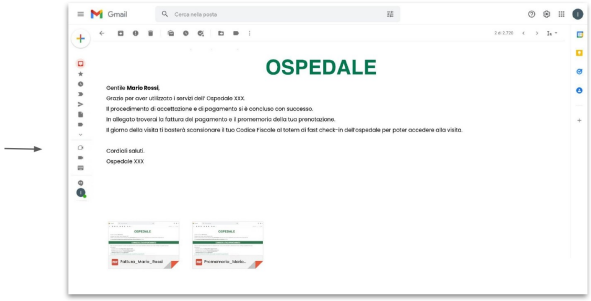

Fig. 11
Step 8: An additional communication summarizing the information for attending the appointment on the day of the visit has been implemented, which was not previously included.

5. Conclusions and future testing phases

The work detailed in this paper illustrates a comprehensive interface redesign process aimed at enhancing usability, accessibility, and overall user experience, alongside a refined workflow implemented by the company to achieve these outcomes. By addressing critical pain points in the existing version and aligning with established design principles, the newly developed interfaces mark a significant step forward in improving service quality.

The next phase involves conducting an A/B test to compare the proposed interfaces with the current version. This evaluation will not only capture user preferences and satisfaction but also assess usability and interaction flow efficiency. Through a combination of quantitative metrics and qualitative feedback, the testing phase will provide actionable insights, guiding further refinements and ensuring the final implementation is both user-centric and functionally robust.

Key to the success of this process has been the adoption of mockup-level changes, which enabled faster iterations, reduced development time, and streamlined prototyping. This approach, combined with a clear division of roles within the team, ensured that each stage of the redesign benefited from specialized expertise, fostering collaboration and boosting productivity. The efficient handover between design and development teams further enhanced the quality and smoothness of the workflow.

Looking ahead, this methodology will extend beyond the Self-Acceptance project, serving as the foundation for upcoming initiatives. By integrating UX specialists into IT teams from the outset and moving away from direct code-based workflows, the company is embracing a more structured and effective design approach. This shift not only underscores the importance of user-centered design but also demonstrates its potential to elevate the efficiency and impact of software development projects.

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Towards an Equal, Sustainable and Aware Multi-level Mobility

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ABSTRACT
Urban mobility is an evolving context characterized by the rise of smart cities, digital connectivity, and on-demand transportation services. While these innovations enhance efficiency, they often overlook human needs and in particular those of elderly individuals—a demographic category that is expanding due to the ageing society. In fact, older adults play a crucial role in the economy and society, yet they frequently face barriers in accessing modern transportation systems, which are often designed without their physical, cognitive, and digital capabilities in mind. This paper examines the intersection of aging and mobility, emphasizing the importance of including elderly people's needs in transportation infrastructures. It explores three case studies - DIGNITY, TRIPS, and Urban Sherpa - analyzing mobility solutions at different levels: system, service, and product. These projects highlight key factors such as accessibility, user-centered innovation, and equitable transport policies. Findings suggest that while technological advancements offer new mobility possibilities, they must be integrated with human-centered approaches to ensure elderly users can navigate urban spaces safely and independently.
The research underscores the need for holistic urban planning that balances efficiency with inclusivity. Future mobility systems must be designed with a multi-level perspective that prioritizes equity, sustainability, awareness and intergenerational accessibility. By incorporating these principles, cities can develop transportation networks that accommodate all users, reinforcing mobility as a fundamental right rather than a privilege.

INCLUSIVE MOBILITY | AGING POPULATION | ACCESSIBILITY | URBAN INFRASTRUCTURE TRANSFORMATION

1. Introduction

In contemporary times, urban mobility and its related infrastructure is becoming an increasingly complex place. A place which is governed by numerous phenomena closely interconnected such as: the transition towards the smart city or smart city (Dameri, 2013), the return to living in proximity following the concept of the 15-minute city (Manzini, 2021), the transition from the use of a car owned to an on-demand mobility service (BMW, 2019). Mobility as a service often referred to as 'MaaS' (TTS Italia, 2021; Petrocchi, 2023) and the ultra-connectivity of vehicles increasingly able both to receive information from the outside and to communicate with personal devices such as smartphones (Deloitte, 2024). In this context of sudden transitions in urban mobility, this contribution focuses in particular on the mobility of an important category of users: the elderly. This category is decisive for the future for several reasons such as: the ageing of the world population, their economic potential, the related ethical and inclusive duty. WHO is confirming this trend reporting in their statistics that by 2030 16 % of the population will be older than 60 years old, passing from 1 to 1.4 billion of elderly people.The aging of the world's population will be a lasting phenomenon and will increase in the coming years with a forecasted 2,1 billion of elderly all over the world. Last but not least, also seniors over 80 years old are expected to rise by 300% reaching the amount of 426 million in the timeframe between 2020 and 2050 (WHO, 2022). According to the Nielsen and Norman Studio (2013), older people are an important category for the design future, not only because they represent, and will increasingly represent, a considerable part of the world's population, but also because they are users who have the economic capacity to invest in new mobility solutions which solve their problems, especially when it comes to maintaining their daily routines and their health. Another important reason comes from Umberto Eco, one of the greatest Italian professors, journalists and writers of the 19th century, who states that elderly are the social memory keepers. Especially in the past, elderly were heard to provide wise advice and to increase the experience of young adults with their family history. In this way, even an inexperienced young man could benefit from the same knowledge of those who lived before him, becoming more wise and understand its role linked to the past, present and future (Eco, 2000).

2. Methodology

In light of the fluid context and the general ageing of the global population, the most appropriate approach to address this issue appears to be inclusive. This type of approach is helpful not only as a form of charity for fragile, weak or unlucky people but it is also useful to accept life in all its forms within the community boundaries. Furthermore equality and non-discrimination are the founding values of the European Union, as expressed in Article 2 of the Treaty on European Union (Equinet, 2024). Moreover, the inclusive approach is consistent with human-centred methods, which are based on the study of human needs and propose a design solution that takes into account not only

the technical-functional component, but also the needs of human interaction with the machine (Tosi, 2018; Petrocchi et al., 2021). Taking into account these reasons and the inclusive perspective this contribution objective is to focus on the mismatch (Holmes, 2020) between the high-tech mobility and a progressively ageing citizenry that requires ways, times and mobility that are more suitable and inclusive of their needs. Three case studies of inclusive mobility will be analyzed taking into account three levels: the system level, the service level and the product level. The three cases will be selected in order to prove that mobility infrastructures, service and products can have an impact from a large to a small scale and in terms of equity, sustainability, and awareness.

3. Case studies

In the context of mobility, the rapid development of physical and digital technology has been shown to favour economic criteria while neglecting human aspects such as people's needs, behaviour, attitudes and social conventions. This design phenomenon is particularly pronounced in the context of vulnerable groups, such as the elderly. The selection of three case studies presented here was guided by the objective of elucidating the significance of inclusive mobility design. The selection of projects is guided by a shared vision of enhancing accessibility to mobility for vulnerable individuals, encompassing diverse scales ranging from systemic frameworks to specific services and digital mobility solutions. A commonality across all projects presented is a human-centred approach, predicated on user needs.

3.1 Case Study 1 - System level

Inclusive Mobility Design – The DIGNITY Project[1]

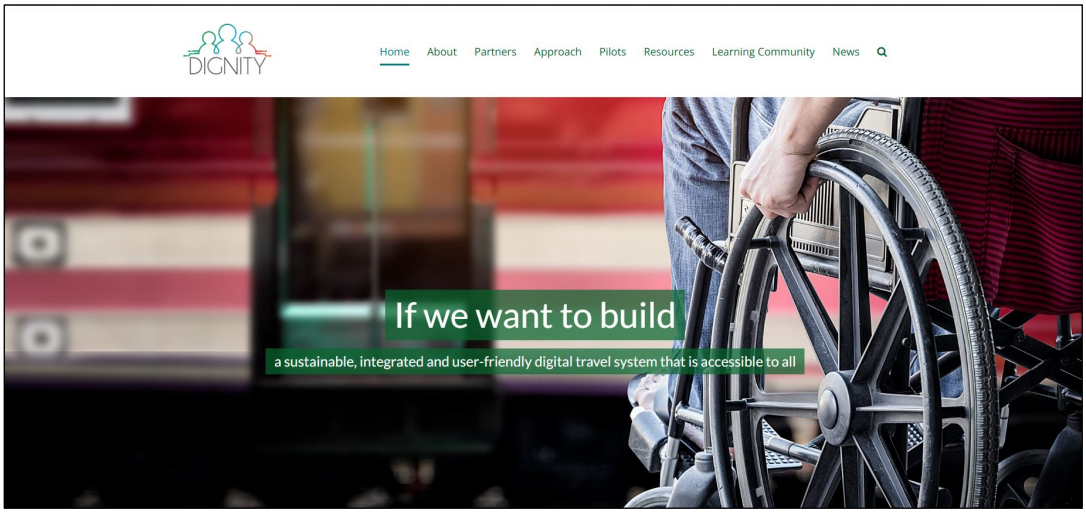

Fig. 1
The DIGNITY project.

[1] More info at thttps://www.dignity-project.eu/

The DIGNITY project (Digital Transport Inclusion) addresses the digital divide in urban mobility by promoting inclusive digital solutions for all, particularly vulnerable groups such as the elderly and individuals with disabilities. As urban transport increasingly incorporates digital platforms for navigation, ticketing, and real-time updates, DIGNITY ensures that these advancements remain accessible to everyone, regardless of digital literacy or access to technology. By developing an inclusive framework for mobility innovation, DIGNITY collaborates with stakeholders, including policymakers, technology developers, and mobility providers. This multidisciplinary approach emphasizes co-creation and user-centered design, ensuring that digital tools align with the diverse needs of urban populations. The project serves as a model for integrating social equity into the development of smart mobility systems, advocating for accessible and user-friendly technologies as essential components of future transport infrastructure.

3.2 Case Study 2 - Service level

User-Centered Mobility – TRIPS (Transport Innovation for Persons with Disabilities)[2]

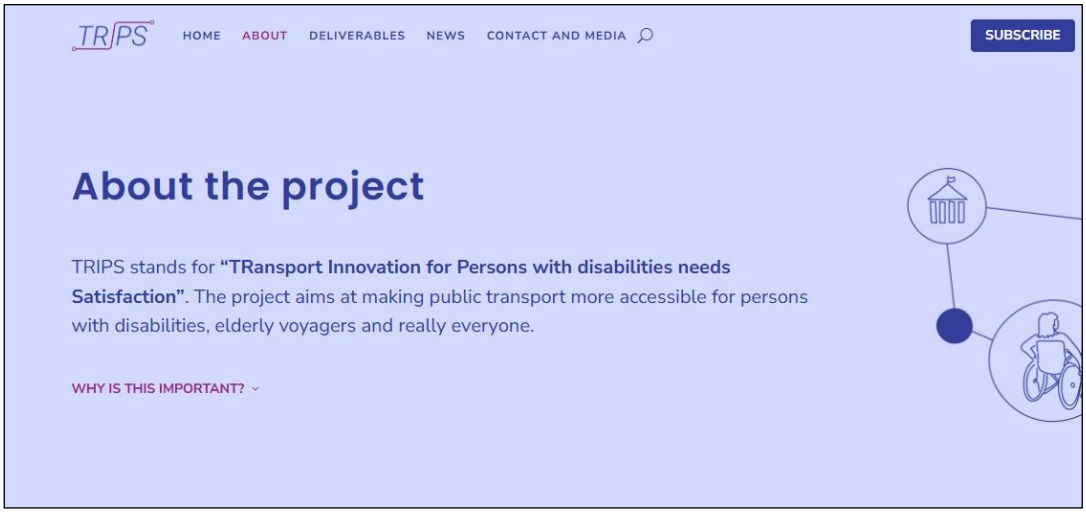

Fig. 2
The TRIPS project.

The TRIPS project exemplifies a participatory design approach to inclusive public transport. Operating across seven European cities - Lisbon, Zagreb, Bologna, Cagliari, Brussels, Sofia, and Stockholm - the initiative engages people with disabilities, like elderly, in the co-design of mobility solutions. This collaborative framework ensures that their specific challenges and insights directly inform the development of transport systems. TRIPS focuses on overcoming barriers to accessibility through solutions such as improved wayfinding systems, redesigned public transport vehicles, and user-friendly digital interfaces. By incorporating the perspectives of marginalized users, TRIPS fosters transport innovations that address real-world issues. Furthermore, the project

[2] More info at https://trips-project.eu/about-the-project/

offers policy recommendations to urban planners and transport operators, advocating for inclusivity as a central criterion in mobility design. Its participatory methodology demonstrates how inclusive practices can lead to practical, scalable solutions that benefit broader demographics.

3.3 Case Study 3 - Digital product level

The Urban Sherpa project[3]

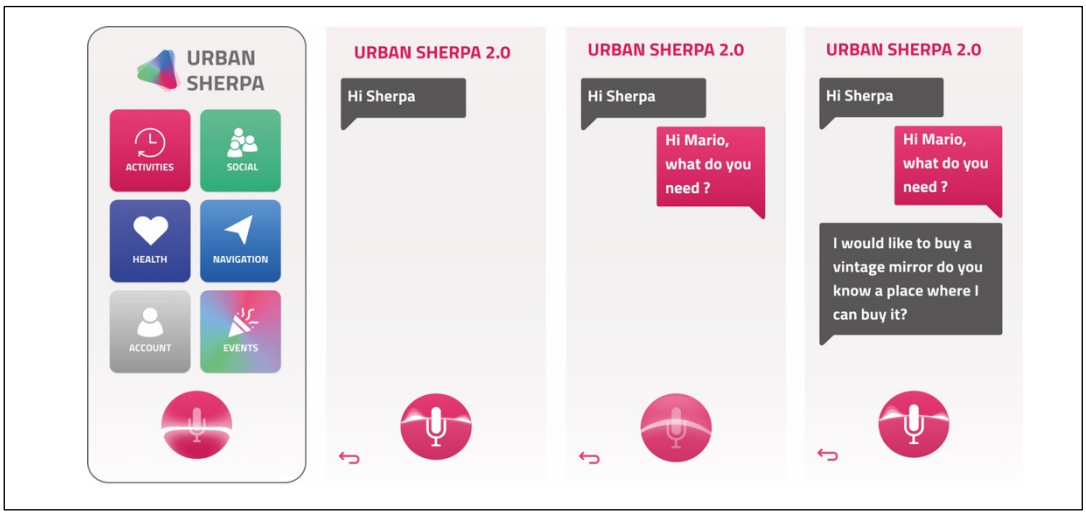

Fig. 3
The Urban Sherpa project.

The Urban Sherpa project addresses the issue of mobility for the elderly in large urban centres. In particular, the project proposes the establishment of a mobility system that would facilitate the elderly user's integration into the mobility landscape by proactively encouraging their engagement in activities that promote physical, mental, social, and recreational wellbeing. The urban sherpa project is a mobility system designed to facilitate the inclusion of the elderly user in the urban mobility landscape. It does so by providing a digital platform that not only enables safe navigation but also encourages the user to engage with new people, explore new places and attend significant events in the city. Furthermore, the project is enhanced by the incorporation of artificial intelligence, which facilitates communication between the user and the system through voice interaction. This mode of communication was selected due to its efficacy and multimodality, which enables effective communication between the elderly user and the machine. In essence, the visual interface of the monitor is complemented by the auditory feedback provided by the artificial intelligence, allowing the user to interact with the system to navigate, interact with new individuals, access health-related information, and organize their routines.

[3] More info at https://sfera.unife.it/handle/11392/2576671

4. Discussion

Once described, the projects are analysed here by considering three main evaluation criteria: equity, sustainability and awareness [Table 1].

Criteria / Case study	DIGNITY	TRIPS	URBAN SHERPA
Equity	Aims to provide a system which is inclusive to all frail people (elderly included).	Aims to include all the people with disabilities, (elderly included).	Aims to include elderly in the society by an inclusive digital product for elderly mobility.
Sustainability	By providing a digital platform accessible to all, the project aims to make frail people more independent and make mobility more sustainable.	It aims to improve public transportation by including disable needs into the design criteria of mobility.	Linked to the mobility as a service the project aims to reduce private mobility and increase public mobility.
Awareness	The project dignity make more aware how important is to provide access, by leveraging to mobility tools to the vast majority of people.	By include people with disabilities, the project aim to increase the awareness and the importance of include those people into the society by make them autonomous and independent.	The project aims to make the mobility ecosystem more aware of the demographic shift that the current society is facing and will face in the future.

Tab. 1 The three case studies compared with the criteria of equity, sustainability and awareness.

The concepts of sustainability equity and awareness emerge in all three illustrated projects concerning inclusive mobility for the frail and elderly. The concept of equity is present in the DIGNITY mobility system where the main aim is to provide the majority of the population with access to a mobility platform capable of taking into account the needs of the most fragile categories in the design and implementation of the mobility system. We also find this concept in the TRIPS mobility service whose main objective is to provide broad accessibility to mobility for people with disabilities and the elderly in order to include them in society. Finally, the digital product URBAN SHERPA also has the objective of promoting equity, as it aims to provide concrete digital help to elderly persons who have to move within the metropolis and in an increasingly digital context. The concept of sustainability is also present in all three projects. DIGNITY, TRIPS, AND URBAN SHERPA all aim, albeit at different levels, to promote public transport. DIGNITY promotes an accessible digital system that aims to integrate existing mobility services through the digital platform tool. TRIPS is a mobility service focused on elderly and disabled people which aims to

make them autonomous and able to book and use digital services. URBAN SHERPA is a digital product which helps elderly people to get around, socialise, and be autonomous in their routines and movements without the help of third party stakeholders. Furthermore, the project is related to mobility as a service or MaaS which aims at a more sustainable mobility in cities by favouring the integration of public transport and new mobility models. The concept of awareness is also present in the illustrated projects. The DIGNITY, TRIPS,and URBAN SHERPA projects not only aim for greater equity and sustainability but also focus on making the user and the mobility system more aware. The user is made more aware through the use of mobility tools that make him better aware of the context in which he operates and the consequences of his movements. The system for its part through these projects has the potential to include fragile users in the design and planning criteria.

5. Conclusions

The changing landscape of urban mobility presents many challenges and opportunities for all people who use it, and the advent of new technologies accelerates the process of changing mobility patterns, increasing the risk of excluding many people including the elderly or disabled. Equity, Sustainability and awareness are therefore significant concept. Equity is a key concept to coordinate technological and economic development opportunities with elderly people's mobility needs. This considering not only the ethical aspect but also the progressive ageing of the world. Sustainability is an important factor for the future mobility system not only in terms of preserving the natural environment but also in economic terms. A mobility system that can offer the possibility to move also to persons with disabilities or fragility in moving presents a strategic advantage especially in a society that is progressively ageing. Awareness is also a strong and important concept for the mobility future. Only a community which is aware of their weakness is able to deal and avoid future mobility issues. All the future mobility infrastructures should be redesigned to make it intuitive, fast and inclusive not only for young or adult people but also for older seniors.

Finally, it should be emphasised that such a conception linked not only to the technological and economic world but also to the needs of the user (and thus Human Centered) is important at different levels of design. In designing the mobility of the future, it will be decisive not only to take into account an inclusive but also a multi-level perspective. A perspective that does not only act in the problem-solution logic but deals holistically with the entire system, the entire service and only finally with the related product-solution.

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In/active. The Role of Design in the Creation and Transmission of Collective Memory

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ABSTRACT
Intangible cultural heritage (ICH) refers to practices, expressions, and knowledge recognized by communities as part of their cultural identity (UNESCO, 2003). Unlike tangible heritage, ICH is a living, distributed knowledge embedded in people, places, and actions. Central to its transmission is the concept of memory, which becomes collective and dialogic when activated in cultural contexts. This paper explores how inclusive design can support the activation and intergenerational transmission of ICH, especially by involving older adults as cultural mediators. Rather than viewing them as passive custodians, the study frames them as active agents capable of engaging in storytelling, reinterpretation, and co-creation. By leveraging participatory methods and digital tools, even home-based individuals can contribute to shared heritage-making processes. Through case studies such as Mingei and iHERITAGE, the paper highlights how design can foster social inclusion, strengthen community bonds, and promote heritage as a dynamic, evolving practice.

INCLUSIVE DESIGN | INTANGIBLE CULTURAL HERITAGE | COLLECTIVE MEMORY | DIGITAL HERITAGE INITIATIVES

1. Introduction

Intangible Cultural Heritage (ICH) represents a fundamental pillar in the preservation and transmission of collective identity. It encompasses traditions, practices, expressions, knowledge, and skills recognized and shared by communities. According to the 2003 UNESCO Convention, ICH includes performing arts, social practices, rituals, festive events, and traditional ecological knowledge, all capable of evolving and adapting over time to remain relevant in contemporary life (Lenzerini, 2011). Unlike tangible heritage, ICH exists as a distributed system of knowledge, continually reinvented through interaction with cultural and technological contexts. For instance, the adoption of tools such as augmented reality and interactive storytelling has enhanced community accessibility and engagement in the safeguarding and valorization of ICH, as explored by Alivizatou-Barakou et al. (2017) and Liu & Pan (2023). These approaches facilitate intergenerational transmission, fostering new cultural expressions that address the challenges posed by globalization and cultural homogenization.

Furthermore, as discussed by Lupo (2011; 2023), design plays a crucial role in activating the value of ICH, conceived as an 'open-ended knowledge system'. Through participatory and collaborative practices, design can reinterpret living heritage, emphasizing its authenticity and enabling its sustainable integration into contemporary contexts. This perspective underlines the importance of transdisciplinary approaches, where design operates as a bridge between tradition and innovation (Koenig et al., 1991; Papanek et al., 1972).

Within this framework, the contribution proposes an operational model that emphasizes the active role of older adults, even within domestic contexts, thereby expanding participation opportunities through inclusive design practices and accessible technologies. The approach considers design not only as a tool for preservation but also as a relational device capable of stimulating intergenerational dialogue and the shared reinterpretation of heritage. The three-phase articulation (collection, mediation, and transmission) offers a replicable design framework supported by European case studies that demonstrate the vitality of this perspective.

On these grounds, the paper explores collective remembering as a central practice for activating shared memory processes and strengthening the connections between identity, place, and community.

2. Collective remembering as a form of ICH activation

Collective remembering refers to the process through which groups or communities share memories, often through social interactions, narratives, or rituals (Meade et al., 2020; Rajaram, 2024). Unlike individual memory, it emerges from social negotiation, a dialectical process involving the comparison of different experiences and interpretations, which enriches collective memory with

new perspectives. This practice contributes to structuring cultural memory, influencing collective narratives and perception of cultural identity (Abel et al., 2018).

Design plays a role not only as a facilitator of these dynamics but also as an active agent in creating platforms and spaces that stimulate shared remembering. For instance, participatory design techniques (Simonsen & Robertson, 2013) are effective tools for engaging people in the co-creation of collective memory experiences. These techniques leverage technologies and methodologies that encourage dialogue, collaboration, and storytelling, thereby helping to preserve and contemporize intangible cultural heritage (Meade et al., 2020).

A particularly relevant aspect is the impact that such activities have on individuals and communities as a whole. When mediated by design, collaborative remembering can generate a range of positive effects, such as strengthening cultural identity, fostering inclusion, and affirming diversity through the valorization of multiple perspectives and narratives. Furthermore, these practices open up innovative modes of transmission, enabling reinterpretations of heritage that adapt to contemporary contexts and ensure its long-term sustainability.

In this light, design is not merely an operational tool but becomes a cultural mediator, capable of connecting past, present, and future (Celaschi, 2008).

3. Designing for home-based participation in inclusive community practices

Innovative approaches to transmitting, adapting, and reinterpreting intangible heritage are essential to preserving it for future generations, ensuring it remains alive and meaningful in a fast-changing, globalized world. In this context, design becomes not only a process of archiving or documentation but also a means of activating cultural heritage, stimulating intergenerational reflection, and ensuring the longevity of traditions. Similarly, through the principles and practices of Design for All, it is possible to engage individuals who, for various reasons, are confined to their homes but can nonetheless contribute meaningfully to the discourse around intangible heritage.

During the COVID-19 pandemic, collective remembering was explored in various contexts, with design contributing to activating collective memory, even under conditions of physical distancing and limited social interaction (Bosco et al., 2022).

Home-based participation, enabled by digital tools, represents an innovative modality for including individuals who cannot physically access cultural spaces. This approach promotes the preservation and activation of intangible cultural heritage, fostering the development of inclusive communities in which personal stories, memories, and experiences contribute to a shared cultural dialogue.

Burkley (2019) uses ‘Digital Heritage Initiatives’ to describe heritage-related activities and content produced and shared through digital platforms. These initiatives leverage multimedia formats and user-generated contributions, creating spaces of cultural co-creation. As Cameron (2007) points

out, digital storytelling subverts traditional top-down models of cultural narration, favoring instead an active negotiation of meaning by the community.

Within the framework of collective remembering, this democratization of digital heritage allows individuals to participate not only as passive recipients but as active creators of shared narratives, a process that Kansteiner (2002) defines as essential for intergenerational heritage transmission. This approach is further enriched by the concept of participatory ius archivi (Valacchi, 2018), which advocates for community co-creation and inclusion in the management and reinterpretation of archival materials. According to Valacchi, active engagement in archival practices enables greater appropriation of heritage and contributes to the construction of more inclusive and dynamic collective memories. In this sense, participatory archival rights provide a means to ensure that diverse cultural narratives are adequately represented and passed on to future generations.

To structure the design of such initiatives, the activation of intangible culture can be divided into three main phases: collection, mediation, and transmission. Depending on the variables involved at each stage, appropriate tools, languages, and design strategies can be selected. This process is summarized in the following figure [Fig.1], which illustrates the active role of older adults and how they can contribute, particularly from home, to the activation and transmission of intangible cultural heritage.

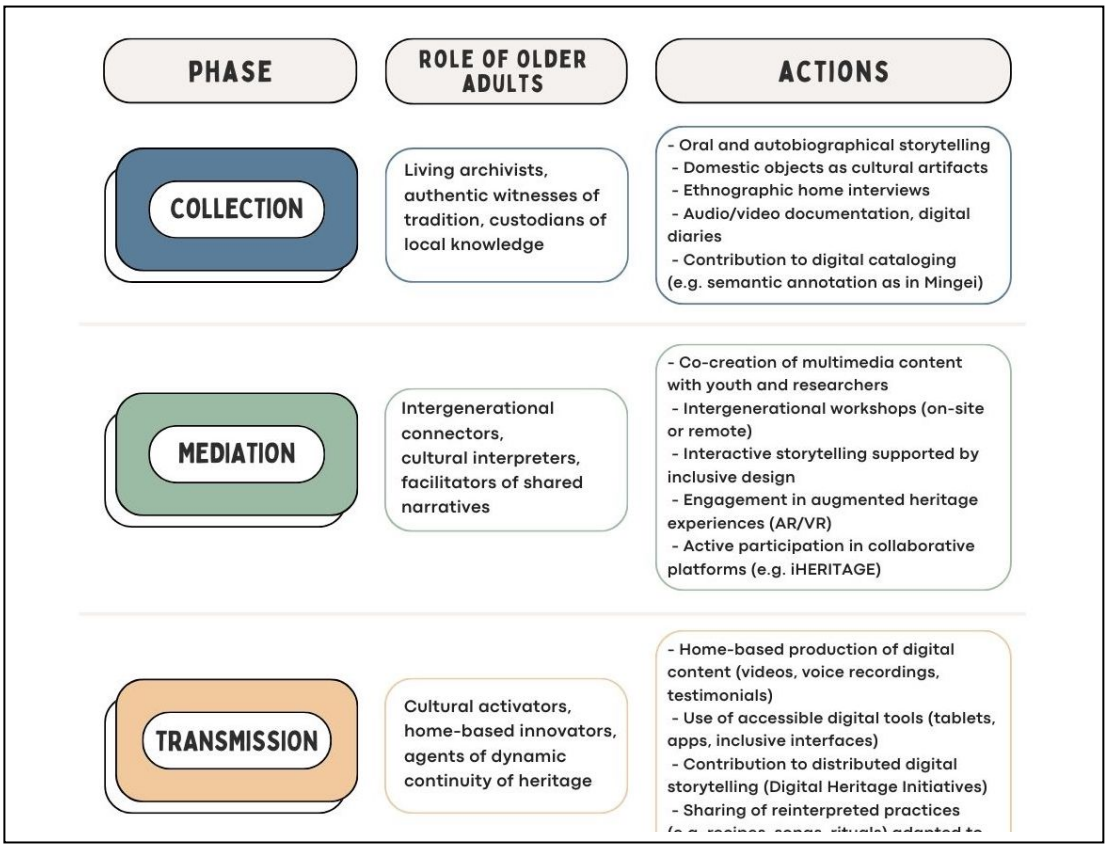

Fig. 1
Role of older adults in activating the Intangible Cultural Heritage (ICH). This diagram outlines the contribution of older adults to the three key phases of ICH activation .(collection, mediation, and transmission), emphasizing their active roles and the design-enabled tools that support participation from home. The process highlights how inclusive design transforms passive recipients into cultural protagonists.

4. Discussion

Older adults represent not only custodians of intangible cultural heritage (ICH) but also potential innovators in its transmission and reinterpretation. Their lived experience and memory, often rooted in the domestic environment, position them as central figures in the collection, mediation, and dissemination of traditional knowledge. As illustrated in figure 1, the role of older adults unfolds along a structured process in which they evolve from witnesses to mediators and, ultimately, to cultural innovators. Through design and digital technologies, older adults can be actively involved in this process, challenging and transforming the perception of their "inactivity," a stereotype that cultural heritage has the potential to confront and overturn.

4.1 Phase 1: collection. Older adults as living archivists

Collection represents the first step toward the active preservation of intangible cultural heritage (ICH). It involves documenting practices, stories, rituals, and knowledge through both traditional methods (such as interviews and oral archives) and technological tools (including digital platforms and immersive technologies). The domestic environment often serves as a rich archive of artifacts, narratives, and practices that embody this type of heritage.

A significant example is the Mingei project[1], which brought together older artisans, researchers, designers, and digital developers in a collaborative process to document traditional craft techniques. Older adults, as bearers of practical knowledge, transmitted gestures, stories, and contextual insights through demonstrations, interviews, and narratives. These were subsequently mediated by the technical and curatorial team. Designers played a key role in the semiotic translation of the material, making it accessible in digital formats, while developers created interactive interfaces and semantic annotations (Kaplanidi et al., 2019).

The project highlighted the value of older adults as sources of knowledge and conscious cultural actors actively engaged in all phases of the collection and modeling of traditional knowledge (Zabulis et al., 2022).

4.2 Phase 2: mediation. Intergenerational connectors

Mediation is the phase in which the collected heritage is reinterpreted and made accessible to younger generations. In this stage, older adults are facilitators of shared narratives, becoming true intergenerational connectors. Through participatory design approaches (Simonsen & Robertson, 2013), they can contribute to co-creating cultural content by offering context, meaning, and interpretations of traditional knowledge.

Through interactive workshops, reciprocal interviews, or guided production of digital materials (such as audio, video, or augmented storytelling), older adults collaborate directly with younger

[1] Mingei – Representation and preservation of heritage crafts is a project funded under Horizon 2020, aimed at documenting and enhancing traditional European crafts through digital technologies. https://www.mingei-project.eu

people, designers, or cultural mediators, transforming their experience into an educational and collective resource. In these contexts, mediation is not a vertical or one-way transmission but rather a dialogical process in which listeners are invited to question, reinterpret, and actively contribute to the narrative. Design acts as a relational infrastructure, enabling physical and digital environments where generations can come together to rework and regenerate the meaning of shared heritage (Celaschi, 2008).

Contemporary technologies offer new possibilities for mediating intangible cultural heritage, facilitating intergenerational interaction, and providing access to knowledge that might otherwise be difficult to transmit. Tools such as virtual and augmented reality, interactive games, and digital storytelling enable the reinterpretation of cultural content in immersive and participatory ways. The use of 3D representations, touch-sensitive or motion-based interfaces (MoCap), and the integration of semantic data reinforce the dialogical potential of these experiences, turning cultural engagement into a co-creative process (Hou et al., 2022).

A concrete example is the iHERITAGE project[2], which involved older adults, youth, and researchers in the co-creation of digital cultural content through user-friendly interfaces and augmented reality tools. In this context, older adults served as narrative mentors, guiding the interpretation of local traditions and contributing to their contemporary reimagining (Corrao, 2023). The design of co-creative and inclusive environments enabled a distributed form of cultural mediation in which traditional knowledge is not merely transmitted but also collectively reinterpreted.

4.3 Phase 3: transmission. Elders as pioneers of cultural innovation from home

The transmission of intangible cultural heritage is not solely about preserving traditions, it is about transforming them into living, shared experiences accessible to diverse communities, including marginalized groups and individuals with physical limitations. Traditionally seen as passive conservators, older adults become innovators when they actively participate in the cultural transmission process. This transformation was particularly evident during the pandemic, when many older individuals found new ways to share their cultural heritage by using digital technologies to overcome physical and social barriers.

Active participation in knowledge transmission engages older adults in an ongoing process of learning and interaction. When an elder tells a story or shares a tradition, it is not merely a one-way transfer of information but part of a dynamic and iterative process. Listeners learn, reflect, and contribute, enriching the narrative with new interpretations, experiences, and perspectives.

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[2] iHERITAGE – ICT Mediterranean Platform for UNESCO Cultural Heritage is a project funded by the ENI CBC MED programme. It aims to enhance the intangible cultural heritage of the Mediterranean through immersive technologies (AR/VR), digital platforms, and participatory storytelling. Older adults were involved as co-creators and cultural interpreters at various stages of the design process. More information: https://www.enicbcmed.eu/projects/iheritage

This reciprocal exchange fuels the transmission of heritage, strengthening interpersonal connections where past and present are interwoven into a shared flow of knowledge. Participating in these moments makes older adults active agents, not only as keepers of knowledge but as protagonists in a living culture that evolves through intergenerational dialogue. In this process, culture is not simply preserved; it is continuously re-created and adapted, reinforcing social bonds and enriching the collective heritage.

5. Conclusions and future directions

The activation of intangible cultural heritage (ICH) through inclusive design practices offers unique opportunities to enrich the social and cultural lives of individuals, particularly older adults. This form of activation proves valuable not only for preserving cultural diversity but also for transforming how older people are perceived in society. Thanks to design, they can be recognized as co-creators of cultural meaning, a role that goes beyond their more traditional image as memory keepers or bearers of stories and traditions. Far from being “inactive” or mere recipients of cultural initiatives, older adults can become key agents in cultural creation and reinterpretation while simultaneously fostering a sense of belonging and identity. The human and cultural heritage they embody, made up of lived experiences, stories, and traditions, can provide fresh perspectives and stimulate intergenerational interaction, nurturing meaningful connections between different generations and cultural backgrounds.

Within this scenario, design and technology can play a vital role: by shaping appropriate tools and environments, it becomes possible to stimulate communication and collaboration. As demonstrated by projects such as Mingei and iHERITAGE, the thoughtful use of interactive technologies and user-centered design can transform the domestic space into a dynamic environment that promotes dialogue and mutual learning. These projects allow older adults to express their creativity and encourage them to explore and reinterpret cultural heritage in new and meaningful ways.

Looking ahead, inclusive design can become a powerful tool for social cohesion and cultural vitality, recognizing older adults as active agents of change and contributing to the development of more resilient and cohesive communities where each individual has a meaningful role (Agenda 2030, 2015, Goal 10). It is an invitation to rethink the value of lived experience and to consider intangible cultural heritage as a living, evolving element rather than a static set of traditions to be preserved.

Future developments, by way of example rather than limitation, may include:

- Experimenting with scenarios in which intangible heritage is activated through emerging technologies (e.g., generative artificial intelligence, mixed reality, decentralized cultural archives);

- Designing co-curated platforms where older adults can not only share their stories but actively participate in the selection, categorization, and reinterpretation of cultural content;
- Creating new hybrid formats (analog-digital) that enhance both physical artifacts and digital narratives;
- Transforming the home into an interactive storytelling environment, using augmented objects, voice interfaces, ambient sensors, or lightweight immersive devices to stimulate spontaneous, everyday narration;
- Developing design tools that foster ongoing intergenerational interaction, where the roles of transmitting and receiving knowledge are fluid and shared;
- Promoting a view of heritage as a relational asset, where design acts as an infrastructure of cultural citizenship, reinforcing belonging and social cohesion.

However, several barriers continue to hinder this transformation. These include a prevailing 'youth culture' that prioritizes innovation and novelty while overlooking the value of experience and wisdom (Harrison, 2016). Cultural stereotypes and biases persist, depicting older adults as incapable of adapting to change, thus undermining their perceived contribution to cultural production (Gullette, 2022). In addition, a lack of opportunities for older individuals to share their knowledge, coupled with various forms of social isolation, makes their involvement more difficult. Many have not received adequate training on how to effectively share what they know or may simply never have been encouraged to do so (Carstensen, 2021).

In conclusion, the integration of intangible cultural heritage through design-driven methodologies enriches society as a whole while offering older adults the opportunity to become protagonists in shaping and narrating contemporary culture. This approach marks a significant step toward a more inclusive society, one in which every story is heard and valued.

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Heritage Landscapes – Interactions and Transition

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ABSTRACT
Landscape is a complex entity in which the tangible and intangible are intertwined in a network of dynamic interactions. Material elements, such as territories, monuments and infrastructure, are not simply static containers, but supports through which intangible values such as memory, traditions, identity and knowledge are expressed. This mutual interaction shapes a living heritage, capable of evolving over time and responding to contemporary challenges. In the context of the Anthropocene, understanding the relationship between the tangible and intangible becomes crucial to promote collective care practices that foster a balance among different ecosystem actors. Through a planet centered vision, innovative and inclusive design driven approaches, it is possible to preserve and reinterpret these connections, strengthening a sense of belonging, spreading awareness, and promoting participatory management of heritage as a cultural and symbolic ecosystem.

LANDSCAPE | CULTURAL HERITAGE | TRANSITION | PRACTICES

1. Introduction

The landscape is a privileged context for analyzing and researching the interactions existing among the different agents of an ecosystem: it is the place where contemporary hybrid ecosystems co-evolve. At the same time, it guards tangible and intangible heritage values capable of representing memory and ecological consciousness: as it was defined by Eugenio Turri a *landscape-theater* (Turri, 1998) in which culture and nature meet and knit together. Investigating in the landscape the interrelationships present between human, artificial and environmental, delving into innovative research approaches that can pursue a vision of ecological balance represent the initial prerequisites of a research path interested in identifying new collective care practices for the Anthropocene that are able to find new ways of fruition and enhancement of natural and cultural heritage. What does it mean to analyze a landscape starting from interactions?

A first step could be the search for those landscapes that are still able to express the concept of wilderness, the desire for the wild as an anthropological category of the imaginary (Rametta, 2011). Places that characterize unprecedented, hybrid landscapes in which wilderness meets the built environment, giving rise to what is referred to as a *fourth nature* (Kowarik, Körner, 2005): a form of nature that emerges spontaneously within urban and anthropized environments, shaped by human presence yet not intentionally designed. These spaces become a fertile ground for experimentation and innovation. Carefully analyzing typologies of built and unbuilt space highlights the need to study and experiment with the interactions existing between these different typologies to record the intensity of relationships present within the artificial, human and environmental contexts and try to experiment/generate the same intensity of relationships within the generated encounter space (Metta, Olivetti, 2019).

These are often interstitial spaces that, from a *planetary garden* perspective (Clément, 2008), assume a particularly important role in the process of ecological transition. At the European level, the launching of the *Green Deal* policies and its operational declination of the *New European Bauhaus*, has set the course for European cities to follow and to be on to facilitate the process to a just transition that is able to repair the damage done in the past and create new relationships of interest for the future. In doing so, we move away from the crystallized vision of time stability to embrace a new active perspective, of socio-ecological ecosystem, a complex system where the basis is instability (Manigrasso, 2022). The hoped-for ecological transition process espouses the multidimensional morphology that territories are assuming given the constant ongoing mutations involving territories, citizens, communication and production patterns, consumption and services. Consequently, innovation processes are also increasingly conceived as open systems where different actors collaborate and interact thanks to an equally open and inclusive governance system aimed at supporting the participation of all actors, old and new, in innovation.

A second step is to recognize the fact that climate change is a major global challenge and threat affecting every aspect of our life on the planet, including World Heritage: according to IUCN's World Heritage Outlook 3, which monitors the conservation of all World Heritage natural sites published in 2020, climate change is assessed as a high or very high threat in 33 percent of World Heritage natural sites (Osipova, et al., 2020). Climate change generally affects all types of tangible and intangible cultural heritage (Borotová, 2022). The division between tangible and intangible cultural heritage (Buonincontri, et al., 2013), as indicated by Article 2 of the relevant 2003 Convention[1], highlights the dynamic character of heritage by drawing attention to people as creators and active agents of a constantly changing and evolving culture (UNESCO, 2009). We often link the concept of heritage to the past, as a means of accessing, remembering or celebrating, but it is necessary to highlight its value as a dynamic process: heritage is about the present, lives in the present and is received, practiced and consumed today (Rodney, 2010) and as such can assume an important role in future processes of ecological transition. Reference to the intangible is not explicitly associated with natural heritage as well, but it is evident how nature can express intangible value, enshrined within the complexity of landscapes (Jakob, 2009). A complexity that sees the territory itself as complex cultural heritage where the production of value and the enhancement of territorial heritage are closely linked to both the identity factors of the territory and its community (Gaddi, 2018).

The next step is to recognize the complexity of this overlapping of interactions present in landscapes that requires innovative knowledge mediation skills; skills that design has historically assumed through its ability to explicate the relationship between functions, forms, values, and meanings (Celaschi, 2008).

The following article summarizes the initial phase of a doctoral research focused on the study of design - driven practices for ecological transition, delving into innovative approaches related to the enhancement and fruition of complex cultural heritage starting precisely from the tangible and intangible interactions present in hybrid ecosystems. This research adopts a qualitative and experimental approach, combining case study analysis, field observation, and mapping tools to investigate the interactions between human, artificial, and environmental components of the landscape. The methodology draws from design research practices and systems thinking, aiming to identify emerging patterns of collective care and spatial transformation. These tools allow for a situated understanding of landscape dynamics, supporting the formulation of context-sensitive design strategies.

[1] UNESCO, Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, Paris

2. Interactions

Fig. 1
Cityscape.
Bologna, spring 2024.
Credit: the Author.

To map the existing interactions between nature and culture, it is necessary to take up the approach to design brought forward by Posthuman Design (Forlano, 2016) and reconsider the relationship between nature and culture. No longer a relationship of duality, but rather an interaction in continuum, in a cooperative (Braidotti, 2013), collaborative alignment between human culture and nonhuman nature. The call to overcome the dichotomy between culture and nature is based on the idea that both dimensions are closely interconnected, forming a unique heritage that includes both cultural and natural elements. In this view, cultural heritage is not limited to monuments or works of art, but also includes natural landscapes and the environment, as their value is enriched by human interactions over time. This action delineates a new horizon of interaction with the nonhuman, namely the postnatural (Institute for Postnatural Studies, 2023), in which nature is not described in opposition to humans and in which it is recognized that the processes of which we are a part derive from humans as well as from what is not human. A vision of nature that includes within it that of culture (Bernardi, Labor, 2023), but above all a plural vision that embodies a horizontal idea of an ecosystem in which different actors move within a network of equal exchanges.

Moving beyond the centrality of the human subject means embracing a planet-centered method and vision rooted in the ecosystem concept. The dimension represented by sustainable development, which promotes environmental, social and economic well-being in an integrated way that arose with the first signs of ecological crisis in the 1960s and 1970s and was later formalized with the publication of the Bruntland Report in 1987, has seen a strong evolution since those very years. The concept of sustainability contained within the report started from a strongly anthropocentric view, paying particular attention to the issue of social justice and human needs, framing sustainability within a particularly static definition. Thanks to the productions and literature offered in the following decades by environmental movements, institutions, and the world of

research, the term has increasingly taken on an environmental prerogative, recognizing this dimension as a kind of sine qua non capable of defining the other aspects of development as well, particularly by providing necessary sources for economic and technological development (Gaziulusoy, et al., 2019). In this way, the concept has evolved from a dimension of static to a strongly more dynamic one that identifies sustainability as a goal that can respond to the growing understanding of the interdependencies between social and ecological systems.

A planet-centered vision generates an operational mode that can engage humans and nonhumans, entrusting project cultures with the responsibility of aggregating creative practices and facilitating the co-evolution of sociotechnical aspects underlying transitional phenomena (Geels, 2005). This vision shifts the focus from human-centered frameworks to a broader perspective where both human and nonhuman elements—such as ecosystems, climate, and natural processes—are seen as interconnected and co-dependent. It emphasizes a holistic approach to design, one that integrates the needs of the planet alongside those of human society, recognizing that our actions must align with the ecological limits and systems that sustain all life forms. Diversity is a key element in developing a planet centered design approach that can foster sustainable transformations guided by the idea of maintaining a socio-ecological balance. Paola Antonelli, in the introductory essay to the XXII Milan Triennale entitled Broken nature, emphasizes, through the definition of reconstituent design, the political act that design thinking assumes in a context of paradigm upheaval. A design that seeks empathy and awareness that we are also part of nature and not its masters (Antonelli, Tannir, 2019).

Foundational within this vision are the networks of relationships that are generated: value is generated from exchange. It is precisely on this concept of value that the development of ecosystem services is based (Millenium Ecosystem Assessment, 2005), a way to give economic value to the services that nature offers for free and that human activities increasingly put at risk, but that we sorely need (Metta, Olivetti, 2019). An anthropocentric concept at first glance, but one that, when delved into, leads us to recognize the value of such natural goods/services unrelated to their use; a relative value given simply by their existence. The research approach we want to build espouses the planet centered view and starts from the framework proposed by Transition Design (Irwin, 2015), trying to overlay it with the conceptual models of Responsible Innovation and Advanced Design (Formia, et al., 2023). Transition Design is also a useful process and methodology for establishing interactions, linking different types of solutions by identifying numerous tools that can support the application of Responsible Innovation in real-world contexts: co-design processes have been the most widely used to bring the principles of Responsible Research and Innovation from conceptual visions to experimentation contexts (Formia, et al., 2023). Among these, the promotion of participatory co-design practices that can promote the well-being of territories and

the formation of new multi-species alliances is of paramount importance (Institute for Postnatural Studies, 2023).

The very places where these actions of relational exchange and interweaving take place today are very different from premodern community organizations, explicitly linked to the spatial dimension of the village or neighborhood, to which members usually belonged by birthright (Manzini, 2018). Today, this type of community is joined by new types of communities that are more open, dynamic, and intentionally built around a project. More important, these modern communities exist by choice: they often arise from a need or desire that acts as a catalyst and shapes an idea to be realized collaboratively. When the goal of the community is the production of organized, quality knowledge, we speak of communities of practice (Montévil, 2024). In these communities, each member aims for continuous learning through awareness of his or her own knowledge and that of others (Wenger, 2009). Awareness is an excellent starting point: providing information, data and insights that can foster a sufficient level of understanding is essential to facilitate a participatory experience that can promote change. Change is a multidimensional process, and the transition from individual to community change is far from linear. To foster these dynamics, it is essential to offer participatory experiences based on meaningful and conscious exchanges that promote innovative and responsible collective action (Formia et al., 2023). Through these virtuous co-design processes, it is possible to include communities in the enhancement of tangible and intangible cultural heritage, fostering territorial innovation centered precisely on community processes.

We have already anticipated the theme of landscape/territory as a form of complex cultural heritage in which to find aspects of identity and value for the communities that pass through it, live in it. It is also an interesting aspect to analyze the representative tools that can illustrate this network of interactions, visible and invisible, that are established within the landscape. Among these, it is worth mentioning the tool of community maps, born in England in the early 1980s under the name of Parrish Maps (Bianchetti, 2013). These are maps built with the active participation of the population and serve to represent the heritage, tangible and intangible to which the community attaches value, with the aim of strengthening local identity and as an active and dynamic working tool for planning future transformations. They are temporally dynamic representations, where the tangible and intangible are layered, capable of containing traces of a widespread heritage and able to dialogue with those who consult them (Bolletti, 2022). A permanent and always updatable archive that includes memories, often collective ones, actions and relationships, values and facts that are often closer to the actors of the territory than to the geography itself (Magnaghi, 2010). This is only one of several existing tools capable of narrating important and identity-related aspects of a territory, such as collective memory, and that can represent and translate the visible and invisible stratifications of systems of interactions hidden in a landscape. Collective memory through responsible and innovative curation practices can promote greater environmental and cultural

awareness (Succini, et al., 2021), similarly the analysis of the tangible and intangible interactions existing between the different actors in a landscape, thanks to a design-driven approach, can become a tool/agent for change.

3. Practices

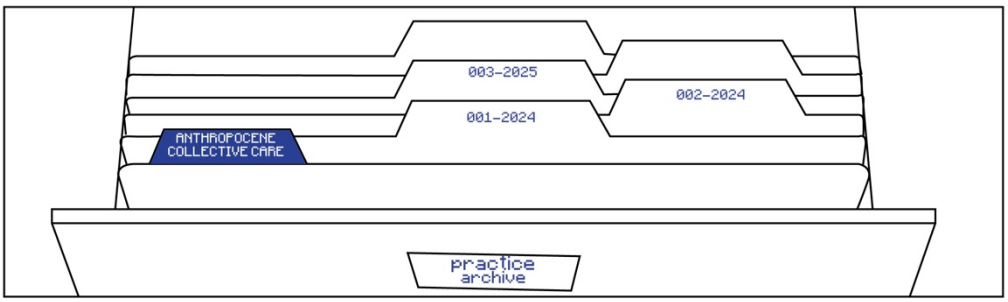

Fig. 2
Archive of projects. Anthropocene section. Credit: the Author.

Building on this conceptual foundation, the following section explores how these principles of planetary design can be translated into real-world practices. Through the examination of experimental case studies, we will see how the theoretical ideas discussed earlier are being put into practice.

The following experimentations of practices are the result of project processes, the first concluded, the second and third still ongoing, related to the theme of ecological transition, responsible and sustainable choices, and climate change adaptation measures. These practices emerge from the analysis of interactions between tangible and intangible elements, focusing particularly on cultural productions (such as exhibitions, festivals, and workshops) as tools for promoting awareness and collecting data. The aim is to harness these cultural tools to make the practices not only agents of change but also vehicles for engagement and collective action. By emphasizing the use of these cultural platforms, the practices encourage a high level of audience interaction and participation, thereby fostering a greater sense of ownership and responsibility for ecological issues. They are systematized and synthesized into cards, useful for cataloging and future creation of an archive. Archiving becomes an action to systematize and promote enabling processes. In fact, the proposed experiments of practices aim to define conscious design guidelines, evaluating what to archive, what to eliminate and what to enhance, to maximize the positive impact on communities and the environment in favor of collective care practices for the Anthropocene. The archive, from this point of view, is not merely reduced to a container of memories/memories, but is transformed into an organic, almost living tool, capable of changing and growing together with the communities that interrogate and nurture it.

4. Final remarks

Expressing the awareness that the climate crisis we are experiencing, characterized by its strong impacts and consequences, is changing and redrawing the geography of risks in our territories (Manigrasso, 2022) allows us to define a new approach to design, which makes adaptability an

001–2024

TITLE: SCEGLILO SFUSO O RICICLABILE_Experience
TYPE: Exhibition
DATE: May 17–18_2024
LOCATION: Milan_Italy
KEYWORDS: circularity_packaging_experience_responsibility, sustainability

DESCRIPTION: Project curated by Altroconsumo on the theme of packaging and responsible consumer choices involved the Advanced Design Unit, Archeoplastica, and the studio il Vespaio. An interactive exhibition at the spaces of the Milan Triennale to engage visitors in stimulating experiences and practices capable of generating reflections on the themes of waste, the end of life of objects and responsible choices. The collaboration realized with Archeoplastica provides the starting point to witness how musealization practices are assimilated to the idea of "living archives" whose goal is to document and enhance forms of collective care for the Anthropocene.

TOOLS:
_Qualitative and quantitative data collection
_Starting from individual experience to define collective practices
_Exposure as a tool for bringing individual and collective experiences to life

Fig. 3
Case 001–2024. Credit: the Author.

002–2024

TITLE: CULT-UP Upcycling and Cultural Heritage
TYPE: Workshop
DATE: March 2024_Ongoing
LOCATION: Bologna_Turin
KEYWORDS: reuse_end of life_circularity_memory_archive

DESCRIPTION: CULT-UP is a project that promotes upcycling as a form of cultural enhancement, focusing on waste such as plastic and textiles. It aims to create critical reflection on waste management by collecting best practices and proposing upcycling strategies and benefits to stakeholders through a "white paper." The practice focuses on creating moments of interaction and co-design with different audiences to test dynamic digital archiving modes based on the concept of collective memory

TOOLS:
_Identify creative and responsible upcycling techniques
_Define the architecture of a shared archive
_Identify forms of evolution related to the concept of waste-patrimony and linked to collective memory

Fig. 4
Case 002–2024. Credit: the Author.

003–2025

TITLE: Po River Blue Fest
TYPE: Festival
DATE: May 16_17_2025
LOCATION: Bologna_Ravenna
KEYWORDS: water_excess_climate_heritage_culture

DESCRIPTION: The first edition of the Po River Blue Fest is one of the actions of a complex multi-target awareness campaign on the issues of river landscapes and climate change. Embedded within the Life Climax Po project, the festival presents itself as an opportunity to build a co-design pathway with local stakeholders belonging to different cultural and creative industries to promote processes of raising awareness of climate issues using cultural productions as a medium and to present project progress data in a widespread way.

TOOLS:
_Multi target awarness campaign
_Co-design processes
_Investigate the relationship between the world of Cultural and Creative Industries, adaptation measures and the enhancement of territories
_Create a dynamic observatory on the relationship between landscape and cultural productions.

Fig. 5
Case 003–2025. Credit: the Author.

increasingly essential variable. Adaptation measures do not cure the causes of climate change, but are concerned with curing the symptoms, with making our territories fit for the many changes to which climate change is forcing us: an adaptive design approach serves to anticipate change. This study focuses on exploring the dynamic interactions between tangible and intangible heritage, and how these can be harnessed to strengthen community-driven adaptation processes. It aims to delve into how innovative hybrid ecosystems within landscapes can promote multi-species alliances and sustainable coexistence, proposing new design strategies to foster interdisciplinary collaboration between cultural, environmental, and social systems.
When we talk about adaptation, the themes of uncertainty, the temporal dimension, the tangible and the intangible turn out to be particularly important aspects offering a new meaning to design actions (Manigrasso, 2022). Adaptation to climate change forces us to revise the linear dimension of time to embrace a perspective of strongly evolving scenarios. The time horizon opens identifying a multifaceted, multidirectional and no recursive conception of time (Manigrasso, 2022). This perspective determines an increasingly open system, which tries to relate problems and solutions, policy makers, technicians, with the intention of anticipating the evolving context and being prepared for unexpected events. Cultural heritage if enhanced in innovative ways can

also contribute to strengthening resilience, promote adaptation actions, support transitions to sustainable development, and stimulate social awareness and encourage participation (UAEU, 2021).

Emphasizing that spreading awareness is itself a measure of adaptation gives us the opportunity to enhance co-evolutionary interactions among different actors in hybrid ecosystems and archive useful data to make these interactions the subject of new practices and actions for change. However, concrete common measures that recognize tangible and intangible heritage as having this transformative power are still lacking. Investigating the scenarios offered by cultural heritage, in light of the reformulation of the culture-nature dualism, would allow its unexpressed potential to emerge and be exploited, for example, by unearthing in landscapes a privileged place for the creation of communities of practice that foster the exchange of interactions, the diffusion of awareness, imagining a new multi-species alliance capable of promoting unusual forms of co-inhabitation and co-existence between human, artificial and natural.

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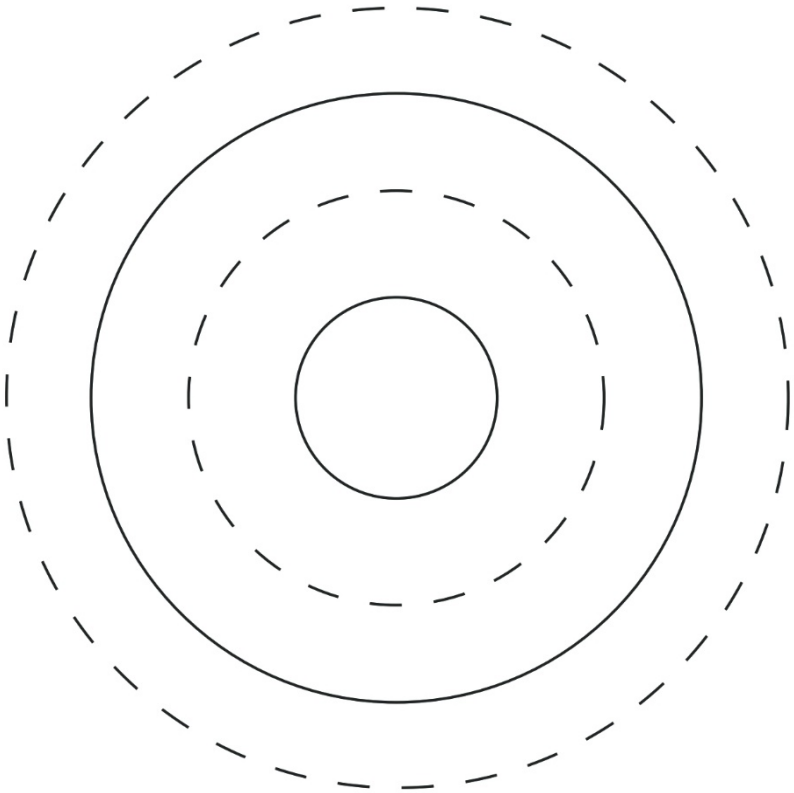
[In]tangible projects



[In]tangible projects

In contemporary cities, the boundaries between tangible and intangible, visible and invisible, physical and abstract are increasingly blurred, creating a continuum of interactions between individuals, society, and urban space. [In]tangible proposes a research framework that embraces this grey zone, where architecture operates both as a tool for interpreting current dynamics and as a catalyst for transformation. Specifically, [In]tangible projects highlights how unbuilt or theoretical architectural proposals have contributed to the evolution of the architectural and urban discourse, influencing real environments despite remaining unconstructed. In this perspective, representation and drawing become critical tools for envisioning alternative scenarios, understanding transformations, and reclaiming the role of architecture as a form of knowledge capable of critiquing and reshaping the spaces where we live.
Taken together, the four contributions by Traeger and Delli Ponti, Skerl, Lucchi, and Veronese all articulate a shared concern with the role of architectural and urban design that operate beyond immediate materialization, yet actively shape spatial, political, and environmental realities. While approaching different scales, contexts, methods, and disciplinary fields, the papers explore how unrealized projects continue to inform the contemporary design discourse and act as catalysts for reimagining the city. They interrogate the tension between the intangible and the tangible, though they do so from markedly different positions. Rather than treating unbuilt or speculative projects as autonomous exercises, the contributions emphasize their embeddedness within existing territorial, cultural, institutional, and ecological frameworks. In this sense, intangibility is not opposed to reality, instead it becomes a mode of engaging it critically.
In their contribution *Exploring the Seasteading Hypothesis: a Floating utopia for the Techno-solutionist age?*, Isabella Traeger and Alessandro Delli Ponti identify water as the generative matrix of a speculative field oriented toward alternative futures, complex imaginaries, as well as utopian and dystopian scenarios. Within this perspective, the sea operates as “a seemingly frictionless and bountiful medium”, capable of hosting experimental forms of thought and design. Water and its qualities thus become both tangible and intangible tools capable of informing the project, enabling the exploration of alternative modes of urbanization in response to the contemporary condition of polycrisis.
Traeger and Delli Ponti focus on the Seasteading movement as a specific evolution of marine utopianism. They frame it as the convergence of anarchic secessionist ideologies and floating-city models, configurating in offshore micro-realities strongly shaped by techno-solutionist imaginaries. At the same time, they echo the legacy of both Japanese Metabolist experiments of the 1970s as well as anarcho-secessionist practices, albeit in a significantly transformed and often distorted form.
According to the authors, under the rhetoric of “alternative realities”, the Seastanding experimentatio ns reproduce an extractivist logic in which the marine environment is reduced

to a new surface for urbanization. This process unfolds through highly selective and fragmented operations of spatial and social parcelization where access is limited, and economic costs are prohibitive. The sea is thus conceived through a functionalist lens, as a territory to be colonized to evade the crises of the contemporary world. Rather than addressing these conditions, the project displaces them elsewhere. Even more urban-oriented proposals, such as those advanced by BIG and OCEANIX, remain embedded in a similar narrative. They promote a form of escapism from land-based civilization which implicitly normalizes a condition of permanent catastrophe on land. Habitability is confined to isolated and supposedly secure enclaves, surrounded by an inhospitable outside.

The work of Traeger and Delli Ponti therefore invites a critical reassessment of how architecture engages with both water and the state of contemporary crisis. It calls for models of coexistence that move beyond escapist and extractive paradigms. Such models should confront the realities of the present more directly, while critically reworking the lessons of past speculative and experimental visions.

As Francesco Lucchi observes in his contribution *The Possible Milan of Giuseppe De Finetti*, De Finetti's work offers a concrete way of reflecting both the tangible and intangible dimensions of urban space. His projects reveal a deliberate relationship with the built environment, guided by a clear intention: the construction and transformation of the city. Many of his proposals engage directly with existing parts of Milan, demonstrating an active dialogue with the consolidated urban fabric and exploring how renovation and transformation can become tools for rethinking the city.

Thanks to Lucchi's original analyses and drawings, this attitude is visible in several of his transformation schemes, from the redesign of Fontana and Beccaria squares to the proposal La strada Lombarda, where classical compositional logic meets the functional requirements of the contemporary city. De Finetti's proposal reimagines an existing urban block by introducing a new east–west train line beneath it and reorganizing the public space above through a system of streets, courtyards, and squares. The project reflects his recurring strategy of reconnecting Milan through direct, linear routes that pass through the city's core, diverging from administrative plans when necessary to restore urban continuity. While the overall composition remains modern in intent, specific collective spaces incorporate explicit references to classical architecture, demonstrating how historical forms are used as tools to articulate a contemporary urban vision.

As Lucchi observes, the project for the Arena Civica and its surroundings reveals De Finetti's attempt to bind architecture and public space to infrastructural systems, constructing a connective tissue between the historical city and its future development.

De Finetti envisions this project as an opportunity to address what he considers as an unresolved area of the city, using the renovation of the stadium as a catalyst for broader urban reform. The stadium becomes a pretext for reimagining the surrounding district, introducing a larger urban reorganization centered on new public spaces. Taken as a whole, these proposals outline an urban vision where theoretical speculation becomes an operative tool, offering design strategies that negotiate between historical continuity and modern urban needs.

According to Ursula Skerl's *Imaginations: Public Good is Uberarchitecture*, utopias have often operated within an intangible dimension, suspended between project and vision, generating lasting and tangible effects
despite remaining unbuilt. Such proposals have addressed the city as a global system, challenging conventional distinctions between public and private, natural and artificial, local and global. Within these experiences, architecture emerges as a critical instrument able to act on the conditions of space possibility rather than on its immediate formal outcome. The intangibility of the project thus becomes an operative condition through which the invisible structures governing territory – often preceding and shaping any material transformation – are rendered visible.
Building on this legacy, Skerl's contribution examines a series of projects that engage the theme of large-scale urban visions through a universalist ambition, while confronting the concrete constraints that have historically limited their implementation. These projects envision planetary cities, continuous infrastructures, and new forms of collective life. In doing so, they reveal the megastructures produced by legal and administrative frameworks that organize space and determine the development and fate of territories. Through the mapping of infrastructures, land, and regimes of access, a latent territorial continuity comes into view, grounded in spaces oriented toward common use and withdrawn from the logic of property.
Utopia is thus reconfigured as an intangible yet situated project, capable of both operating from within existing structures and transforming control instruments into tools for imagining new forms of shared spaces.
Starting from the utopian proposals for the urban countryside developed by the French landscape architect Pierre Donadieu, and from a critical analysis of selected theoretical, methodological, and design-related elements, Emma Veronese's contribution *An Interdisciplinary Model for the Next Nature-based City* explores the possibility of outlining an intervention model capable of integrating theoretical and applied dimensions, thereby linking the tangible and intangible aspects of the urban and design realm. The overarching aim is to stimulate a dialogue on potential future scenarios for urban projects within a context increasingly shaped by profound ecological and social crises. In particular, the paper focuses on the growing frequency and intensity of hydrogeological instability affecting the European territory, with reference to the recent flood events and landslides.
The contribution adopts a deliberately interdisciplinary perspective, integrating insights from urban planning, landscape architecture, geography, environmental sciences, and social sciences, based on the assumption that the complexity of these phenomena cannot be adequately addressed through sectorial approaches. Within this framework, the agro-urban landscape is interpreted as a strategic infrastructure capable of reorganizing the relationship between the natural environment and the settlement system, placing soil and its permeability at the core of climate change mitigation policies and resource management strategies, particularly regarding water.
The paper draws on the comparative analysis of significant case studies, including the Continuous Productive Urban Landscape model, to assess the transferability and adaptability of the proposed theoretical principles to real-world contexts. Through the comparison of utopian visions, design practices, and concrete territorial conditions, the research provides operational insights for a sustainable reorganization of the European landscape, capable of

responding to current environmental emergencies while simultaneously promoting new forms of balance between city, countryside, and society. The four contributions gathered in this section investigate the intersection between intangible practices related to architectural and urban design – such as theoretical frameworks, cultural narratives, and methodological approaches – and their capacity to structure, mediate, and inform material transformations of space. Rather than treating abstraction and speculation as autonomous domains, the papers examine how these practices are received, negotiated, and translated into operative frameworks that shape spatial strategies, design processes, and territorial transformations.
By analyzing this interplay between immaterial constructs and their material outcomes, the four contributions emphasize the project's role as a form of knowledge capable of acting on the conditions of spatial production. In this perspective, [In]tangible projects foster a deeper understanding of the mechanisms through which urban and architectural theory is operationalized, ultimately contributing to the development of more informed, responsive, and context-sensitive approaches to contemporary challenges.

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A catalog in the shape of a map. Piranesi's and the Campus Martius

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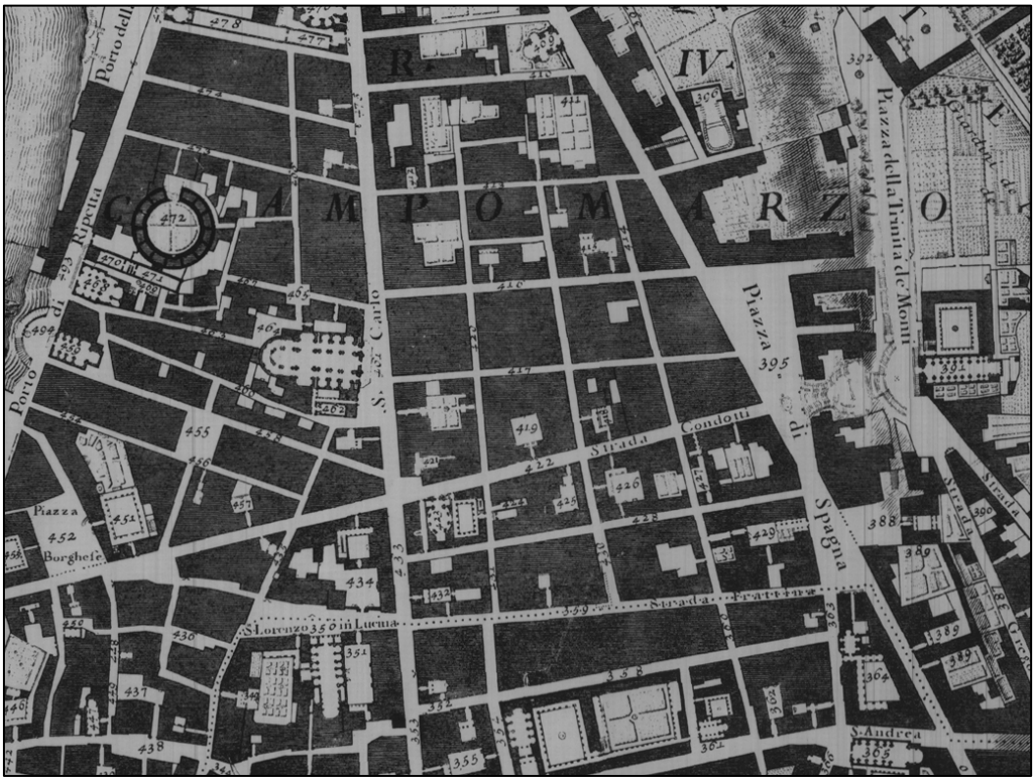
Upon its initial publication in the early months of 1762, the *Ichnographia Campi Martii Antiquae Urbis* was construed as a work of fantasy. The first to do so was Charles Joseph Natoire, director of the French Academy in Rome, who on April 7 of the same year wrote to the Marquis de Marigny that Giovanni Battista Piranesi (1720-1778) "works within imaginary spaces." The impression that this plan is a work of invention persists in almost all those who have studied it, perhaps also due to its undeniable allure. It is usually interpreted as the megalomaniacal and hallucinatory exercise of a melancholic mind, and even today the most renowned interpretations, including those by Manfredo Tafuri and Pier Vittorio Aureli, view the *Campus Martius* as a compulsive accumulation of fragments or an exercise in the realm of invention of forms devoid of any respite. Piranesi himself is aware that the proposed reconstructions may seem "invented at whim (inventate a capriccio)," and to preempt this criticism, in the dedication of the work, he warns the reader that he has worked "with solid foundation and reasonable conjecture (con sodo fondamento e con ragionevole congettura)," although few will try to believe him. Subsequently, an attempt is made to understand what he might have meant when he reiterated that this map is the result of passionate, profound, and meticulous study of Roman antiquities.

The idea of creating a topographic plan of ancient Rome can be traced back to Leon Battista Alberti or Raphael Sanzio and recurs several times thereafter. It certainly undergoes an acceleration with the topographic work carried out by Giovanni Battista Nolli between 1736 and 1748. Piranesi, who arrived in Rome at the end of 1740, immediately began collaborating with Nolli and perhaps followed his attempt to create a plan of ancient Rome that also integrated the famous Severan Marble Plan. This plan of ancient Rome, although announced in 1743, will never see the light of day, and in 1748 Nolli will publish the *Nuova Pianta di Roma* where, along with the Rome of the

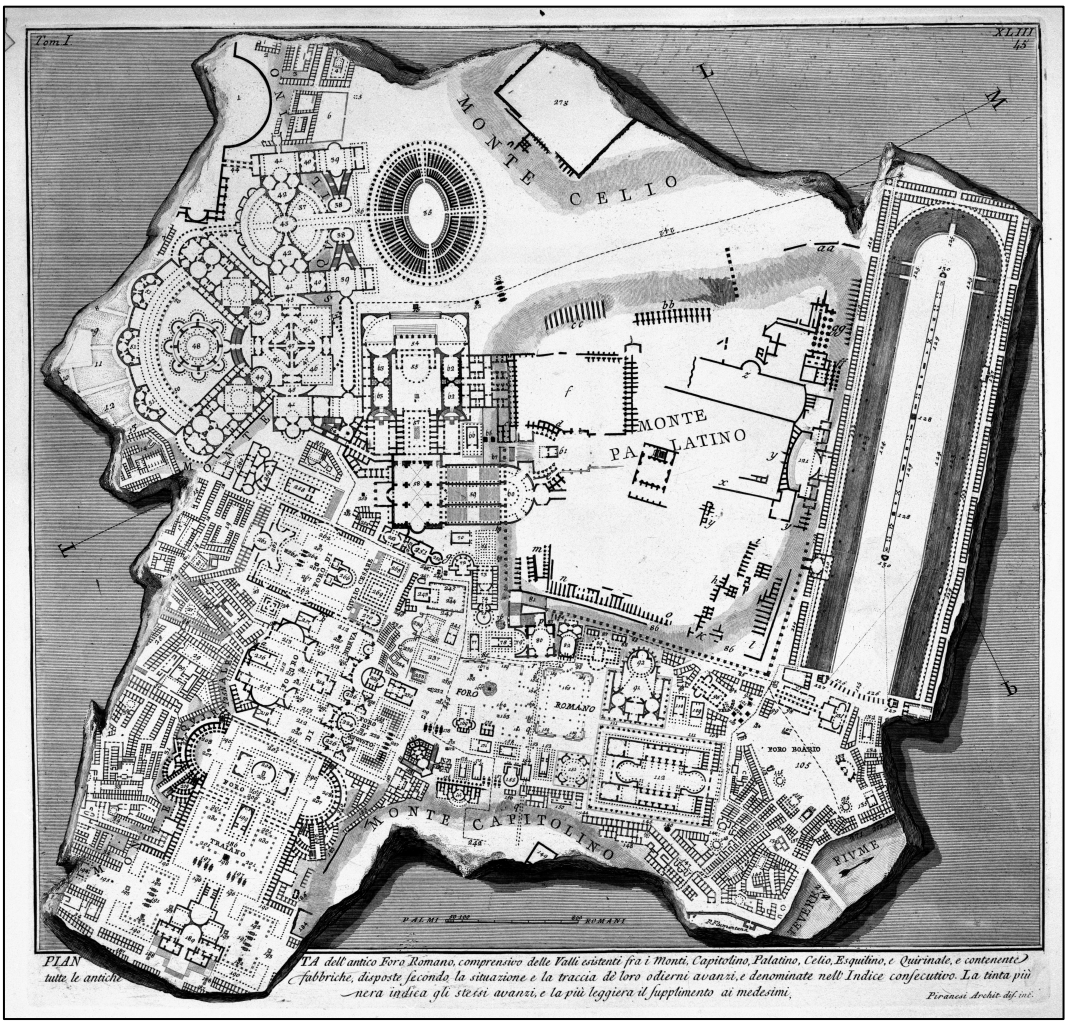
time, he also represents the ancient ruins, sometimes integrating them with reconstructions not always precise [Img. 1].



Img. 1
G. B. Nolli, Nuova Pianta di Roma, Roma, 1748, detail

Piranesi seems not to abandon this idea. The volumes entitled *Le Antichità Romane*, which he works on in the following years, seem to prepare him for this objective. In this publication, one finds not only meticulous reconstructions of views of the principal surviving monuments. Within *Le Antichità Romane* he presented not only a map of the *Campus Martius* depicting the few surviving ruins (Antichità Romane, vol. I, II), but also a reconstruction of the layout of the urban aqueducts derived from a close study of Frontinus' treatise (Antichità Romane, vol. I, tav. XXXVIII), that is a necessary starting point for a more precise reconstruction of the topography of the ancient city (Wilton-Ely 2008). Moreover, at the conclusion of the publication, Piranesi included a reconstruction of the Roman Forum in which the extant ruins are rendered in black, while the portions of the buildings integrated by Piranesi himself appear in grey (Antichità Romane, vol. I, tav. XLII, Img. 2). This represents a genuinely archaeological attempt to reconstitute the form of the ancient city and the most interesting precedent for the work at the *Campus Martius*.

In *Le Antichità Romane* (1756) Piranesi also announced a forthcoming map of ancient Rome. Although this project ultimately remained unrealized, the announcement indicates that work on such an undertaking was already at an advanced stage.

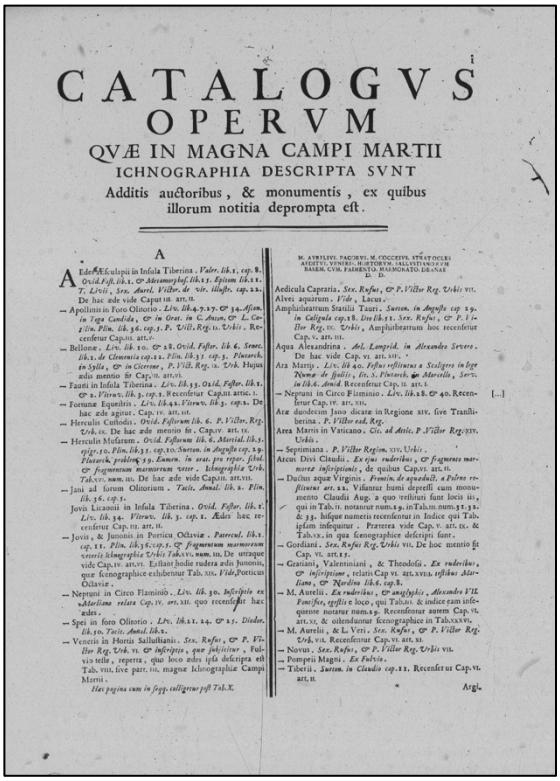


Img. 2
G. B. Piranesi, Le Antichità Romane, vol. I, tav. XLII, Roma, 1784.

An important impetus for creating a map of ancient Rome came from the Scottish architect Robert Adam, who arrived in Rome in 1755 and by June of the same year could already claim to have become an intimate friend of Piranesi. Their friendship seems to stem from a passion "very similar, indeed twin (somigliantissima, anzi gemella)" for Roman antiquities, as reported in the dedication of the volume, and reinforced by the contemporary trend which was instead leaning towards Greek classicism. During their meetings, Piranesi spoke to Adam about the idea of creating a map of ancient Rome and was encouraged by him to undertake this venture, perhaps even with mutual benefit. In 1757, perhaps recognising the challenge of creating a map of the entire city of Rome, Piranesi decided to scale back his objectives and shift his attention to *Campus Martius*. The *Ichnographia* of the *Campus Martius* was published in 1762 and, as a sign of continuity with the project of a map of the whole ancient Rome, it retained the dedication to Robert Adam. This dedication was notably very unusual, as it was more common to dadicate such works to a patron rather than to a fellow architect. The choice of the *Campus Martius* is only apparently senseless because, although ancient remains are less frequent in this area of Rome, there is a concentration of buildings and monuments that are described or mentioned in classical texts. This choice takes on meaning or not depending on the type of archaeological source one refers to, whether to stones

or to words. The nascent archaeology of the time had not yet taken the path it would later embark on, and the words of ancient authors retained high documentary value, also because they did not require expensive excavation campaigns. When, during the Roman Empire, the *Campus Martius* ended its function of housing the roman militias, the area was transformed into a large monumental space to showcase imperial power and to offer parks and gardens for communal use. This programme was so majestic that the *Campus Martius* no longer seemed like a part of Rome; rather, Rome itself became a part of the *Campus Martius*, if we believe to Livy and Strabo as Piranesi did. The *Ichnographia* of the *Campus Martius*, on which Piranesi worked from 1757 to 1762, seems guided by an objective different from that of many other preceding or subsequent maps: it does not aim so much to restore the material ruins of antiquity, which are less frequent in this area, but rather to compose in a comprehensive and unified image the enormous quantity of monuments and buildings mentioned by classical authors, precisely and meticulously arranged by Piranesi and by those who assisted him in compiling the impressive catalogue [fig. 3]. It might even be said that the catalogue does not constitute the caption to the *Ichnographia*; if anything, the opposite is true: the *Ichnographia* produces a unified visual image allowing to understand at a glance the quantity of works that, according to the sources quoted in the catalogue, had to find a place in this part of Rome.

The name and number of the buildings are attested by written sources. The area of the city is delimited by the surrounding hills, and indeed is interpreted to its maximum extent. Certainly, the form of the buildings cannot be reconstructed except from the tiniest remaining fragments, but "with reasonable conjecture," Piranesi can, or rather must, fit into this part of the city all the monuments attested for this area. It is possible that the depicted architectures may seem "invented at whim," or distant from the "ancient manner of architecture," or close to "the custom of our times," but in the dedication of the volume, Piranesi rhetorically questions whether they are indeed more extravagant than what is observed in Villa Adriana in Tivoli, in the baths, and in the tombs outside Porta Capena. The *Ichnographia* is fundamentally a verification of the physical possibility of coexisting in the *Campus Martius* area all the works cited by ancient writers (Marletta 2016).



CATALOGVS
OPERVM
QVÆ IN MAGNA CAMPI MARTII
ICHNOGRAPHIA DESCRIPTA SVNT
Additis auctoribus, & monumentis, ex quibus
illorum notitia deprompta est.

A

Aedes Æsculapii in Insula Tiberina. *Valer. lib. 1. cap. 8. Ovid. Fast. lib. 1. & Metamorphos. lib. 15. Epitom. lib. 11. T. Livii, Sex. Aurel. Victor. de vir. illustr. cap. 22.* De hac ade vide Caput III. art. II.

— Apollinis in Foro Olitorio. *Liv. lib. 4. 7. 27. & 34. Asson. in Toga Candida, & in Orat. in C. Anum, & L. Cassilin. Plin. lib. 36. cap. 5. P. Vell. Reg. II. Urbis.* Recenfetur Cap. III. art. V.

— Bellonæ. *Liv. lib. 10. & 28. Ovid. Fastor. lib. 6. Senec. lib. 1. de Clementia cap. 12. Plin. lib. 31. cap. 3. Plutarch. in Sylla, & in Cicerone, P. Vell. Reg. II. Urb.* Hujus ædis mentio fit Cap. II. art. VI.

— Faunii in Insula Tiberina. *Liv. lib. 35. Ovid. Fastor. lib. 2. & 2. Vitruv. lib. 3. cap. 3.* Recenfetur Cap. III. artic. I.

— Fortunæ Equestris. *Liv. lib. 42. Vitruv. lib. 3. cap. 2.* De hac ade agitur. Cap. IV. art. III.

— Herculis Custodis. *Ovid. Fastorum lib. 6. P. Vellor. Reg. Urb. II.* De hac ade mentio fit. Cap. IV. art. II.

— Herculis Musarum. *Ovid. Fastorum lib. 6. Martial. lib. 3. epigr. 20. Plin. lib. 35. cap. 10. Sueton. in Augusto cap. 29. Plutarch. problem. 39. Eumen. in orat. pro restor. schol. & fragmentum marmoreum veter. Ichnographiæ Urb. Tab. VII. num. III.* De hac ade vide Caput III. art. VII.

— Jani ad forum Olitorium. *Tacit. Annal. lib. 2. Plin. lib. 36. cap. 5.*

Jovis Licaonii in Insula Tiberina. *Ovid. Fastor. lib. 2. Liv. lib. 34. Vitruv. lib. 3. cap. 2.* Ædes hæc recenfetur Cap. III. art. II.

— Jovis, & Junonis in Porticu Octaviæ. *Parercul. lib. 2. cap. 11. Plin. lib. 36. cap. 5. & fragmentum marmoreum veteris Ichnographiæ Urbis Tab. VII. num. III.* De utraque vide Cap. IV. art. VI. Exstant hodie rudera ædis Junonis, quæ scenographice exhibentur Tab. XIII. *Vide,* Porticus Octaviæ.

— Neptuni in Circo Flaminio. *Liv. lib. 30. Inscriptio ex Maforiana relata Cap. IV. art. XII.* quo recenfetur hæc ædes.

— Spei in foro Olitorio. *Liv. lib. 22. 24. & 25. Diodor. lib. 20. Tacit. Annal. lib. 2.*

— Veneris in Hortis Sallustianis. *Sex. Rufus, & P. Vellor Reg. Urb. VI. & inscriptio, quæ subjicitur,* Fulvius tetle, reperta, quo loco ædes ipsa descripta est Tab. VIII. sive part. III. magnæ Ichnographiæ Campi Martii.

Hæc pagina cum in sqqq. colligenda pst Tab. X.

M. AVRELIVS. PACORVS. M. COCCEIVS. STRATOCLES
ADDITVS. VENERI. HISTORVM. SALLVSTIANO. CIR
BAEBI. CVIR. PARENTIS. MARMORATO DEANAE
D. D.

Aedicula Capraria. *Sex. Rufus, & P. Vellor Reg. Urbis VII.*

Alvei aquarum. *Vide,* Lacus.

Amphitheatrum Statilii Tauri. *Sueton. in Augusto cap. 29. in Caligula cap. 18. Dio lib. 51. Sex. Rufus, & P. Vellor Reg. III. Urbis,* Amphitheatrum hoc recenfetur Cap. V. art. III.

Aqua Alexandrina. *Ael. Lamprid. in Alexandro Severo.* De hac vide Cap. VI. art. XIII.

Ara Martis. *Liv. lib. 40. Fastus restituens a Scaligero in lege Numæ de spoliis, lib. 3. Plutarch. in Marcello, Serv. in lib. 8. Aenid.* Recenfetur Cap. II. art. I.

— Neptuni in Circo Flaminio. *Liv. lib. 28. & 40.* Recenfetur Cap. IV. art. XII.

Ara duodecim Jano dicata in Regione XIV. sive Transtiberina. *P. Vellor cod. Reg.*

Area Martis in Vaticano. *Cic. ad Attic. P. Vellor Reg. XIV. Urbis.*

— Septimiana. *P. Vellor Region. XIV. Urbis.*

Arcus Divi Claudii. *Ex ejus ruderibus, & fragmentis marmoreis inscriptionis,* de quibus Cap. VI. art. II.

— Duchus æquæ Virginis. *Frontin. de aquaduct. a Palma restitutus art. 22.* Visuntur humi depressi cum monumento Claudii Aug. a quo restituti sunt locis iis, qui in Tab. II. notantur num. 29. in Tab. III. num. 31. 32. & 33. hisque numeris recenfentur in Indice qui Tab. ipsam insequitur. Præterea vide Cap. V. art. IX. & Tab. XX. in qua scenographice descripti sunt.

— Gordiani. *Sex. Rufus Reg. Urbis VII.* De hoc mentio fit Cap. VI. art. II.

— Graziani, Valentiniani, & Theodosii. *Ex ruderibus, & inscriptione,* relata Cap. VI. art. XVII. *restitutus Martiano, & Nardino lib. 6. cap. 8.*

— M. Aurelii. *Ex ruderibus, & amaphiphis, Alexandro VII. Pontifice, egestis e loco,* qui Tab. III. & indice eam insequente notatur num. 29. Recenfentur autem Cap. VI. art. XI. & ostendunturque scenographice in Tab. XXXVI.

— M. Aurelii, & L. Veri. *Sex. Rufus, & P. Vellor Reg. Urb. VII.* Recenfentur Cap. VI. art. XI.

— Novus. *Sex. Rufus, & P. Vellor Reg. Urbis VII.*

— Pompeii Magni. *Ex Fulvio.*

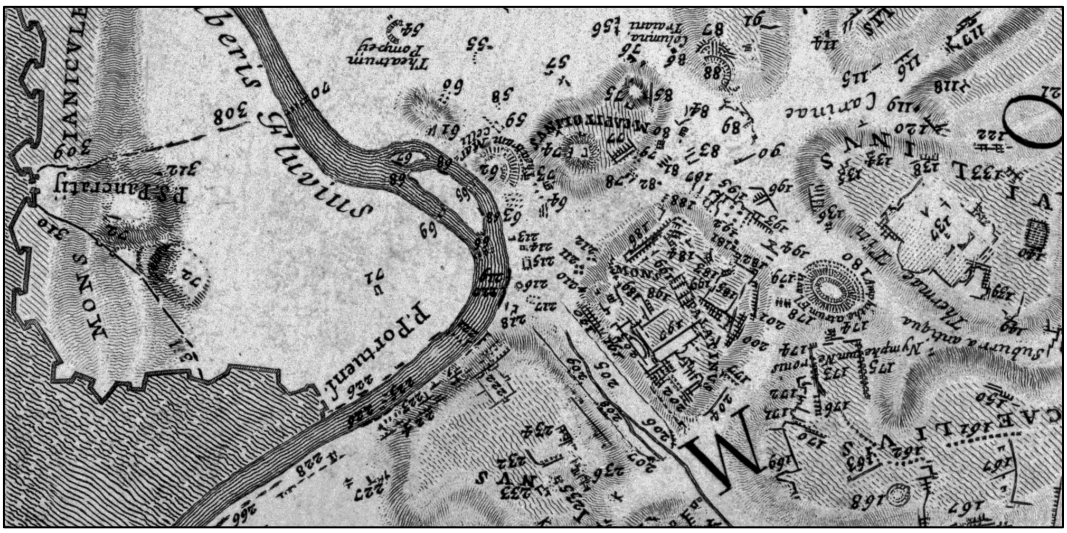
— Tiberii. *Sueton. in Claudio cap. 21.* Recenfet ur Cap. VI. art. II.

Argi.

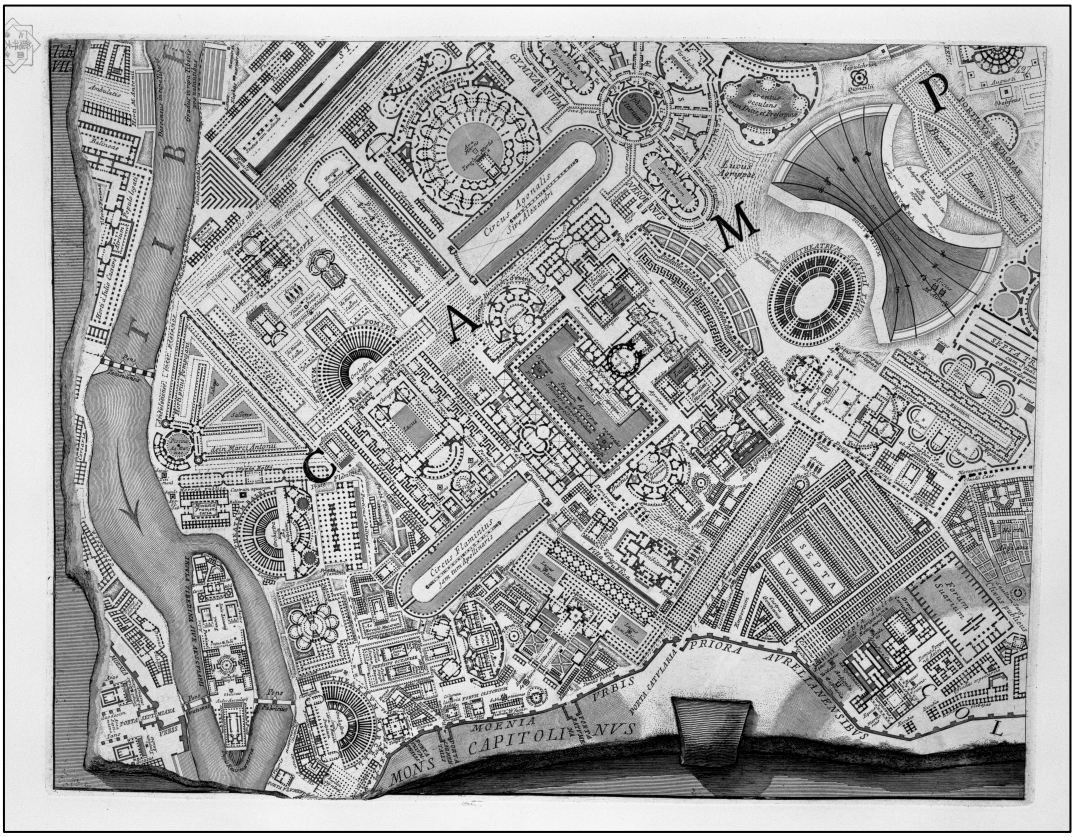
Img. 3
G. B. Piranesi, "Catalogus operum quae in magna Campi Martii ichnographia descripta sunt", in Campus Martius Antiquae Urbis, Roma, 1762.

The necessity of integrating literary information, that derived from the few surviving remains, and many of the fragments of the Severan Marble Plan, leads Piranesi to make some forced interpretations. The most obvious is certainly the elimination of the layout of *Via del Corso* (Connors 2012), but - even in the face of errors that appear gross today - it is necessary to recognize a great precision in placing many of the monuments represented on the map, to the point that there are not infrequent cases in which it proves to be substantially correct (Connors 2012, Marletta 2016).
In the volume titled *Campus Martius Antiquae Urbis* of 1762, the catalogue of works is published, along with the *Ichnographia*, in both Italian and Latin versions. Here alongside is reproduced the catalogue in Latin titled: *Catalogus operum quae in magna Campi Martii ichnographia descripta sunt, additis auctoribus, & monumentis, ex quibus illorum notitia deprompta est*. Next to each architectural work mentioned, Piranesi indicates the names of the authors and the texts in which they are mentioned. In the same volume, another map of Rome appears, the *Topographia vestigiorum veteris Urbis et Campi Martii* (Table III, Img. 4), usually overlooked in favor of the more impressive *Ichnographia*. Those who criticize Piranesi's lack of archaeological accuracy should perhaps read the entire volume on the *Campus Martius* more carefully. In fact, the *Topographia* is precisely the archaeological map advocated by many critics, where the ruins and remnants of ancient Roman architecture are accurately indicated, accompanied here as well by an index of denominations, the *Index ruinarum Romae veteris et Campi Martii*. Despite the archaeological accuracy of this map, or perhaps precisely because of it, it is evident that it would not be possible to reconstruct a comprehensive map of ancient Rome based on such scant information. Starting

from this path more attentive to the still-existing stones, Piranesi will publish in 1774 the *Pianta di Roma e del Campo Marzio* [Img. 5]. In it, he will develop the work outlined in the *Topographia* by placing the ancient ruins, like Nolli, within the context of the modern city (Bevilacqua 2024). The *Ichnographia*, on the other hand, followed a different path, as its purpose was to provide a comprehensive, albeit hypothetical, image of how a portion of ancient Rome might have appeared.



Img. 4
G. B. Piranesi, "Topographia vestigiorum veteris Urbis et Campi Martii", in Campus Martius Antiquae Urbis, Roma, 1762, detail.



Img. 5
G. B. Piranesi, Campus Martius Antiquae Urbis, tav. VII, Roma, 1762, detail.

The idea of a comprehensive map probably derives from the impression that the view of the fragments of the old Severan Marble Plan must have produced. Even though the reassembly of

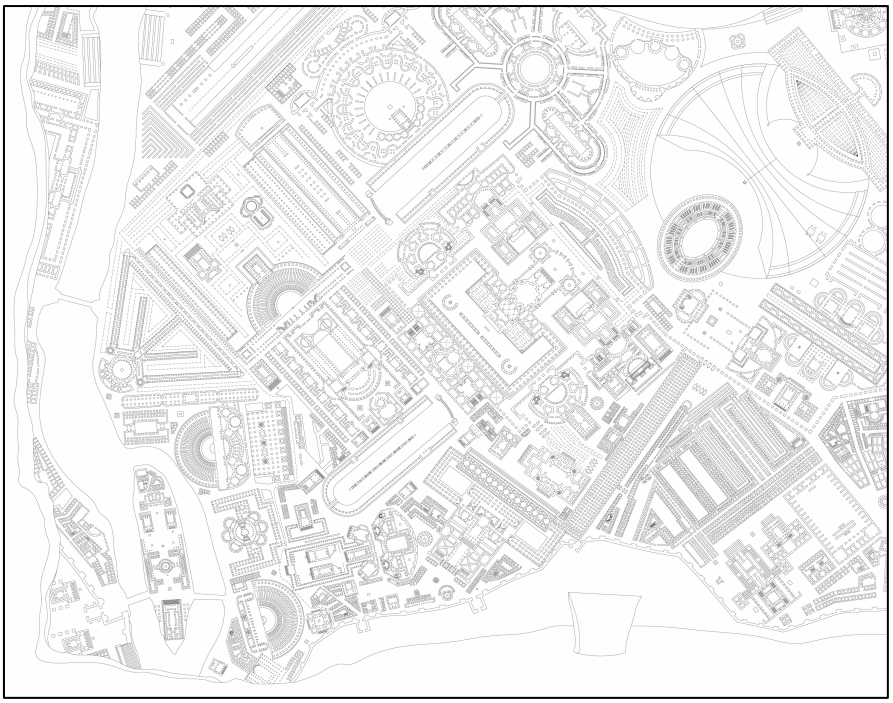
these fragments remains an unachieved goal to this day, the very idea of a map of the entire city of Rome, sectioned at ground level, could not fail to fascinate.

Indeed, such a depiction of a city sectioned at ground level is quite rare in the history of architectural representation, although it seems that no one has noticed this aspect. A common thread could link together those works that have adopted this specific type of drawing: the Severan Marble Plan, the plan of the *Campus Martius*, and the plans of the cities of Venice and Rome published by Saverio Muratori in 1960 and 1963. The Severan plan distinguishes between simpler buildings, where the walls are drawn with a single line, and more complex buildings, where the thickness of the walls is represented. Piranesi depicts all structures in the same manner: the walls are always drawn with a double line, with no distinction between monumental structures and simpler urban structures (though rare, they are present in the map). In Piranesi each building contributes to the magnificence of the city. Muratori follows Piranesi's more accurate example. Yet, in his theoretical work, he seems to adopt from the Severan plan the distinction between 'basic building' and 'special building', which he places at the foundation of his work on the city. The relationship between these three representations of the city, although interesting, would deserve a more extensive discussion and cannot be fully explored in this short essay.

The *Ichnographia* is etched on 6 different plates and published in the volume on the *Campus Martius* from plate V to plate X. The overall measurement of the six adjoining plates is approximately 145 x 158.5 cm. In the top left corner, the graphic scale in Roman palms, *Regula Palmorum*, is indicated, while from the print, it can be deduced that the scale of representation is 1:2,500. In order to frame the *Campus Martius* better, the map is rotated 45 degrees relative to the north-south axis, so that the vertical is facing northwest. The name 'ichnographia' derives from Vitruvius, who used it to indicate the plan as a horizontal section of a building.

By examining each building, one can verify how much of the Ichnographia was invented by Piranesi and how much is the result of an archaeological–or otherwise 'scientific'–approach [Img. 6]. Of the 433 buildings drawn in the table, 271 appear in the catalogue, while only 162 are not present in it.The out-of-scale map reproduced here alongside depicts all 162 of these buildings. However, a notable 132 of them, despite not appearing in the catalogue, are named on the map: among them are also those buildings indicated by a generic denomination within the catalogue, such as the 39 tombs of illustrious men, *Sepulchrum Virorum Illustrium*, whose specific names are indicated only in the *Ichnographia*. If we were to subtract from this count the buildings that are named on the map, instead of 162 buildings, only 30 would remain: they lack a denomination both in the *Ichnographia* and in the catalogue and are indicated in the table with an asterisk. These are evidently buildings with a connecting function between different fragments, in order not to leave few empty spaces in an arrangement where almost everything is filled with constructions mentioned by ancient authors. The map presented here, reproducing the 162 buildings in question, provides a visual measure of

how much within the *Ichnographia* can truly be said to be invented, while another even more diaphanous image, with only 30 buildings, would provide a measure of what finds no justification in classical texts [Img. 7].



Img. 6
M. Giannini, V. Pizzigoni, Campus Martius Piranesi's Map of Ancient Rome, Genova 2024, detail.

Img. 7
M. Giannini, V. Pizzigoni, "Buildings not listed in the Catalogus operum, as represented in the Ichnographia Campi Martii", in Campus Martius Piranesi's Map of Ancient Rome, Genova, 2024.

Piranesi adds a minimal number of buildings to those he found quoted as present in the *Campus Martius*. Their forms are plausible, especially when compared to the ruins of Hadrian's Villa in Tivoli. However, to determine how closely Piranesi adhered to the descriptions he had studied, and how much he diverged from them, further research is needed: it would be necessary to trace the written passages quoted in the *Catalogus operum…* for each individual building, taking care to use eighteenth-century editions. This would allow for a comparison between the forms reconstructed by Piranesi and the sparse and often generic formal indications that classical authors sometimes included in their descriptions. If Piranesi indeed respected the generic formal indications emerging from the ancient texts, this would confirm his archaeological interest, albeit pursued with different means than those available later. But this will be the task of those who wish to continue this study. The fact that even today there exists no comprehensive map of ancient Rome confirms the validity of Piranesi's approach. Even after the extensive excavation campaigns of the last centuries, the maps of Rome produced by Luigi Canina, Rodolfo Lanciani, Giuseppe Lugli and Italo Gismondi fall far short of providing a comprehensive image of the city like the one imaginable when looking at the fragments of the Severan Marble Plan. Instead of basing his reconstruction on scanty and fragmentary material data, Piranesi bases his map on literary sources: knowing that all the architectures mentioned by the ancients had to find a place in the area of the *Campus Martius*, he attempts to visualize the consequences. In this operation, knowledge related to ancient passages, surveyed ruins, and notations of the Severan Marble Plan intertwine, but formal, compositional, and typological considerations are also added, which are still a method of knowledge and which, if sometimes leading him to errors, other times allow him to place the works in a plausible position.
It is precisely the plausibility of this map that, in our view, Piranesi himself emphasizes insistently when he denies regarding it as a 'caprice': certainly, the ancient *Campus Martius* could have had buildings of different forms, but for Piranesi, it had to contain all those buildings mentioned and roughly in the positions and with the forms proposed by him.

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The possible Milan of Giuseppe de Finetti

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ABSTRACT
Unrealized architectural projects often spark academic debate, yet they hold a unique potential: to evoke alternative visions of the built environment. Giuseppe de Finetti, for Milan, presents alternative visions that reveal reflections about urban form and development. The architect's early 20th-century proposals bridge architectural and urban scales, integrating public spaces and infrastructure. Instead of ring roads, he envisions main roads traversing the city, inspired by Roman principles to meet modern mobility needs. This approach is evident in many of his transformation proposals for Milan, such as the projects for Fontana and Beccaria squares, or the proposal La *strada Lombarda*. In his urban proposal, de Finetti blends the logical compositional principles of the Classic Era with the modern needs of the city. The proposal for the transformation of the *Arena Civica* and the surrounding area shows more explicitly how de Finetti links architecture and public spaces with infrastructures to connect the city's past and future. As a whole his vision offers practical design solutions that balance historical continuity with modern urban needs.

URBAN TRANSFORMATION | PUBLIC SPACES | UNREALIZED PROJECTS | GIUSEPPE DE FINETTI | MILAN

1. The de Finetti ideology

The construction of the city is the concept that moves the entire research about the work of the architect Giuseppe de Finetti. Through the analysis of his unrealized projects, it can be seized the architect's possible vision for Milan. This paper's objective is to provide an overview of how such vision can be inferred by taking into consideration works of de Finetti that allow to outline key concepts of the architect's vision and, at the same time, to illustrate key features of de Finetti's approach to urban composition through the analysis of relevant representative cases.

The architect is mainly known for several realized projects such as Casa La Meridiana in Milan and other interiors and exterior architectural works. However, de Finetti has also done extensive research on an urban scale for several possible proposals for Milan. One of his first projects is represented by the work, made with Club degli Urbanisti, for the Masterplan proposal competition of the 1926-27, in which it emerges an intellectual and clear position on the city's form composition. This proposal, titled Forma Urbis Mediolani, tries to define a new transport connection with a new stretch of road called Racchetta. This road, on the built environment, passes around the most central historic area of Milan and connects the streets passing by Porta Nuova and Porta Venezia (at north-east) with Corso Sempione (at north-west). The intention is to define a different way system of roads and public spaces across the city, so to transform the form of the city for its present necessities. The urban expansions made by Beruto and Masera across the 19th and the 20th centuries are omni-directional and conceive Milan as a monocentric core which can be perpetually expanded in every direction. De Finetti, instead, supports the idea according to which the expansion of the city needs to be realized in specific directions: the primary direction is the north-west and the secondary one the north-east. This vision, despite its relations with the Roman implant of Milan and its cardo and decumano, underlies the modern necessities represented by the mobility from and to the town. The clear image of cities defined by their defensive walls, over the natural landscape, was a typical European conformation until the industrial revolution. Since the 18th and 19th centuries, many of these city walls, like Milan's, have been demolished, changing radically their urban form. For de Finetti, the urban expansion for Milan cannot just be defined by a physical limit which does not exist anymore: what can define the future form of the city is the relationship between public spaces, the built environment and the landscape or, in other words, the construction of the city.

Img. 1
"La città possible di Giuseppe de Finetti".
An invented collage realized by Francesco Lucchi and created by re-drawing selected projects by the architect Giuseppe de Finetti.
Copyright: Francesco Lucchi

2. The construction of the city

Since its early history, Milan has been a hub for commerce and multicultural exchanges, earning the title "la città sulle vie delle genti" in literature. This romantic description underscores an important point, namely that urban mobility has consistently been a crucial theme in Milan's urban planning. De Finetti addresses this point through an approach that integrates architecture with mobility. The architect envisions Milan's development through the definition of public spaces that serve simultaneously as infrastructures for mobility and as defining elements of the city's

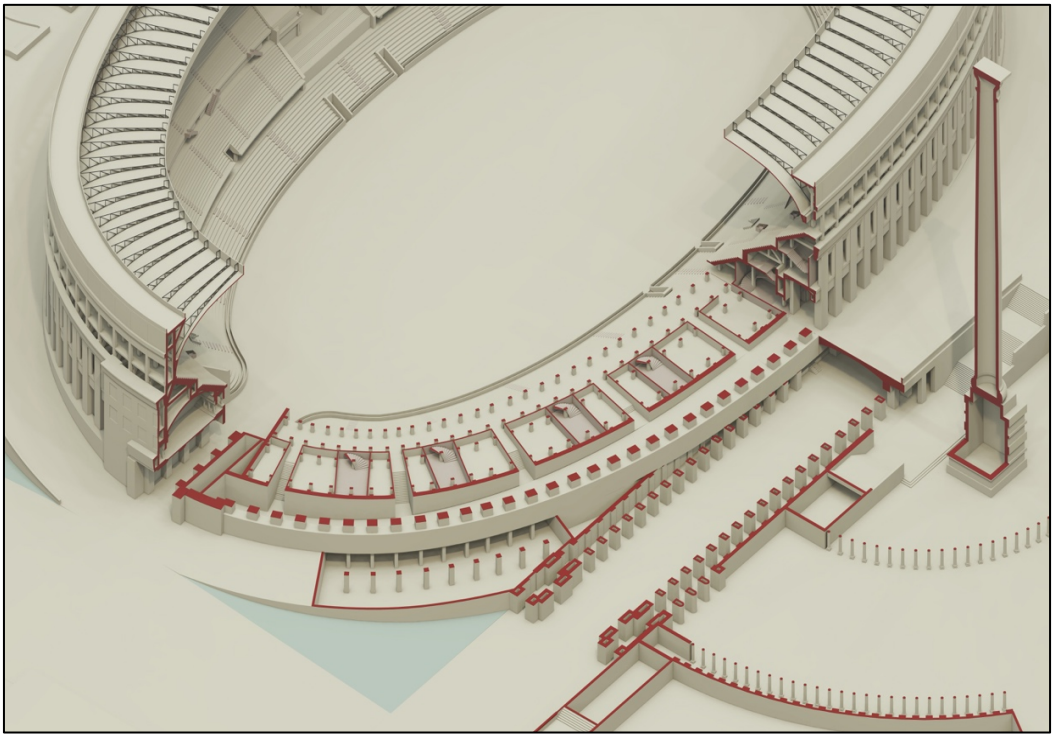
architecture. Organizing cities along major and minor axes offers a framework for urban planning, prefiguring public spaces that, as Aldo Rossi later observed, become a fixed backdrop for human life. De Finetti consistently emphasizes an architectural definition of public spaces, presenting a clear vision for the city rooted in 19th-century urban planning theories and specifically in Milan's 1807 master plan by the Commissione d'Ornato. In this plan, the urban axes traverse the consolidated city rather than circumventing it along its perimeter. In de Finetti's works, urban themes such as the "street," "square," and "urban block" holds the same relevance as in 19th-century urban theories: what distinguishes de Finetti's approch to these concepts, though, is that the architect adapts them to meet the infrastructure needs of a modern city through architectural design.

Such approach can be inferred through the analysis of numerous of his unrealized projects. For instance, in several of them the architect places train lines, metro stations, parking facilities, and various public services beneath public spaces. This approach reflects an urban mobility system that traverses the city, penetrating and intersecting its urban and built core. For this vision, the architect presumably draws inspiration from Milan's Classical heritage, including the city's Roman urban structure, as well as from the unrealized 1807 master plan. Additionally, he was most likely influenced by Leonardo da Vinci, another important figure for Milan during the 15th and 16th centuries. In fact, as Leonardo's interest in mobility led him to conceive multiple layers of transit at different elevations, de Finetti's vision of such concept influenced several of his proposals, such as his possible expansion plan for northwest Milan conceived in the late 1940s. For instance, in a notable project called by the architect "autostrada in trincea" (trench highway) de Finetti envisioned a high-capacity road traversing the city to connect with other infrastructures. This multilayered design, featuring both above and below ground levels, was intended to incorporate public spaces, squares, and potential architectural elements along its route. In his various urban and unrealized projects for Milan, de Finetti also demonstrates a hybrid approach that bridges classicism and modernity. He is deeply rooted in the urban and architectural culture of the 19th century, yet he embraces technological innovations and is well-versed in the European architectural landscape of his time. Above all, he recovers from the Classic Era a logical approach to problems to resolve contemporary needs. This modern yet classic attitude defines de Finetti: he is directly connected to the past, attentive to the present, and aims at proposing practical solutions for the future. Raffaella Neri's concept of "modernista classico" can be used to better understand de Finetti's approach. Although not directly connected to the architect, the term can be applied to him: in fact,

his approach too goes beyond formalism and historicism as it aims at identifying a rational principle and a method for the project.[1]

De Finetti applies such an approach to the complex urban environment of Milan, envisioning the city's organization around primary, penetrating roads that extend in specific territorial directions: north-west (cardo) and north-east (decumano). This vision guides the composition of his urban projects: the great importance represented by a penetrating axis (as in the past) and by technological mobility infrastructures finds in de Finetti a way through the definition of public and architectural spaces. His city planning concept unifies urban themes, architectural expressions, infrastructural needs, and technology to respond to a possible construction of the city, or more precisely, to the transformation of one of its parts. Most, if not all, of de Finetti's projects underscore the importance of these questions which are conceived at an intermediate scale, between urban planning and architecture.

This approach also anticipates themes later explored by Carlo Aymonino, who says that urban changes are not absolute innovations but rather reinterpretations of the existing built environment, integrating the city's historic memory. [2]



Img. 2
"Un grande stadio per Milano". Axonometric section. Re-drawing of the project "Un grande stadio per Milano" of Giuseppe de Finetti. Copyright: Francesco Lucchi

De Finetti's various unrealized designs from the 1940s for Fontana and Beccaria squares near the Duomo suggest that his vision goes beyond a simple spatial reorganization. Beneath the ground

[1] Neri, R., & Vigano, P. (2000). *La modernità del classico*. Venezia: Marsilio editori, p.17

[2] Aymonino, C. (1977). *Lo studio dei fenomeni urbani*. Roma: Officina, p. 130

level, he incorporates public spaces and services, such as an underground square and parking facilities. This strategy is similarly applied in his project for "La Strada Lombarda", situated north of the Duomo. This project reconfigures an urban block, envisioning a potential train line beneath it that would connect east and west. Since elements of “La Strada Lombarda” evoke classical forms such as the Stoà of Attalus, the architectural vision at the core of this project attests too how de Finetti’s projects tend to suggest analogies to and draw from the Classical Era. In the mentioned proposals, de Finetti tries to define a possible built environment for some parts of Milan which, simultaneously, are subordinated to a specific idea: a city connected by main roads that pass through its urban core. In the Fontana and Beccaria square projects, for example, de Finetti diverges from the urban administration’s plan, which bended a main road around an existing building. Instead, he proposes to demolish part of the same building to restore the road’s linear alignment. This approach reappears in “La Strada Lombarda”, where he tries to directly connect Piazza San Babila with Galleria Vittorio Emanuele II and the oval Cordusio square. Beneath this implant, he puts a train line, while overground he designs multiple levels of public spaces dedicated to pedestrians and slow-flow mobility. This reconfiguration of existing urban blocks also envisages additional public courtyards and squares, all defined by a rational and sometimes classically inspired architectural language. De Finetti’s proposals are characterized as well by a rational and rhythmic articulation of facades and their compositional elements. Sometimes, precisely in specific parts representative of the collectivity, he even incorporates a more direct reference to Classical architecture such as classical orders with entablatures and giant columns with capitals and balustrades inspired by 15th-century Renaissance forms.

Reflecting on the city’s architecture, Aldo Rossi conceives the city’s image as a background for human life, a place that is not just a functional public space but rather an area with a sense of permanence and memory. According to Rossi, a space must be evocative, not merely functional and technically refined. In his projects, de Finetti achieves an analogous emotional and evocative quality by drawing on Classical architecture to create an image that communicates the civic character of public spaces: this perspective enables to seize a critical reason at the core of de Finetti’s use of a rational composition interspersed with elements inspired by the Classica Era in several of his projects. Another example that illustrates this approach is the architect’s proposal to transform the existing Arena Civica into a modern stadium. The Arena was designed by architect Canonica in the 19th century and is still located in Parco Sempione between the Castello Sforzesco and the Arco della Pace. The Arena has an oval plant with an athletic track 600 meters long and can accommodate approximately twenty thousand spectators. Entirely built overground, its stands are located on a stone terrace. Its principal axes are characterized by four architectural elements: the Pulvinare (and its honor tribune) which constitutes the entrance building; the Porta Libitinaria, a small access to the playing field for the athletes; the Porta Trionfale, which is parallel to Corso

Sempione; and Le Carceri, a building constructed by architect Tazzini, who terminated the project of architect Canonica. This project represents for de Finetti a potential opportunity to reform some parts of this area of the city that he perceived as unresolved: indeed, he emphasizes the necessity for Milan to have a larger stadium capable of accommodating one hundred thousand spectators. For its renovation, he proposes to maintain only the existing stands and the playing field, while he plans to demolish all the other structures to build three overlapping tiers of stands, topped by a marathon track and covered with an iron roof supported by truss beams and to construct the remaining structural elements using reinforced concrete. If considered as a whole, it is possible to seize how the transformation of the Arena was likely a pretext de Finetti used for reimagining and reorganizing this entire part of the city with numerous public spaces. For Parco Sempione, the architect designs an elevated square connected to the Arena by gently curved ramps and staircases. Below the square a new road called Corso Bonaparte passes through it along with a metro line and a station, as well as parking facilities. In the opposite direction of the Arena, de Finetti envisions a grand semicircular forum bordered by three buildings and centered on a monumental obelisk designed as a tall classical column on a plinth. The forum, like the square in front of the park, has multiple levels: a road level at -5.00 meters and a higher level at +5.35 meters. Behind the columns of the forum, at ground level, de Finetti plans additional public services and parking facilities. To maintain symmetry, he proposes to open a new road parallel to Corso Bonaparte, also incorporating a metro line. Along the major axis of the Arena, he defines additional public spaces, including two squares located in front of the new symmetrical triumphal entrances. To design this stadium and its internal routes, de Finetti draws inspiration from classical Roman amphitheaters, but mainly from contemporary examples such as the stadiums in Berlin, Vienna, Turin, Los Angeles, and others. Through the squares and the Foro, de Finetti introduces multiple access points at different levels and aims to design a large-scale urban and architectural infrastructure based on a specific vision of the city that takes into consideration both mobility and the definition of public architectural spaces.

Today, the triangular open space formed by Piazzale Biancamano and Piazza della Lega Lombarda still highlights relevant urban planning issues of this area. Borgo degli Ortolani and Rione Garibaldi, two neighborhoods located in front of the Arena, have indeed never been properly connected, resulting in a formless urban space. In his project, de Finetti reimagines the area by proposing a multi-layered road system to facilitate movement to and from this part of Milan. These systems are known respectively as the Sistema di Smistamento (from the city to the stadium) and the Maglia di Arroccamento all'Arena (connecting this area to other parts of the city). The project integrates hybrid public and infrastructural spaces, and through this architecture, seeks to reclaim the urban legacy of this part of Milan. In the same area, specifically in Parco Sempione, the architect Antolini proposed, at the beginning of the 19th century, an unrealized vision for a grand urban Foro, known

as the Foro Antolini. At the time, Parco Sempione was a vast open space on the outskirts of Milan, and the Foro Antolini was intended to define a center for human activity around this part of the city. De Finetti, in a similar way, seeks to achieve the same vision, but with a response to the modern needs of the city. His multi-layered road system reflects the area's potential to attract people while facilitating movement to and from the site. In his proposal, such goal is achieved by blending public, architectural, and infrastructural spaces into a unified concept. The squares and roads transcend their basic functions, revealing an integrated approach to architecture and infrastructure that recovers the city's legacy while addressing current needs and future possibilities.

Img. 3
"La strada Lombarda". Public spaces. Image realized by Francesco Lucchi, obtained by re-drawing of the projects "La strada Lombarda" of Giuseppe de Finetti. Copyright: Francesco Lucchi

3. The legacy of de Finetti

In conclusion, the works of de Finetti, as demonstrated by the projects discussed and others not mentioned here, represent a concrete approach to reflecting on the tangible and intangible nature of urban space. For de Finetti, the relationship with the built environment is connected with a deliberate and clear intention: the construction of the city. This principle underscores a methodology that addresses the needs of the present while remaining rooted in an urban ideology connected to the past and grounded in logic. De Finetti's vision does not claim to represent an absolute truth but is rather an attempt to offer numerous concrete possibilities for the city through the practices of urban transformation and renovation. His projects often propose transformation to already built and consolidated parts of Milan, reflecting an active dialogue with the existing urban fabric. These unrealized proposals reveal their potential in presenting alternative visions of the built environment and show critical urban interpretations which ultimately are expressed through precise, concrete, and clearly articulated architectural projects.

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Imagination: public good is uberarchitecture

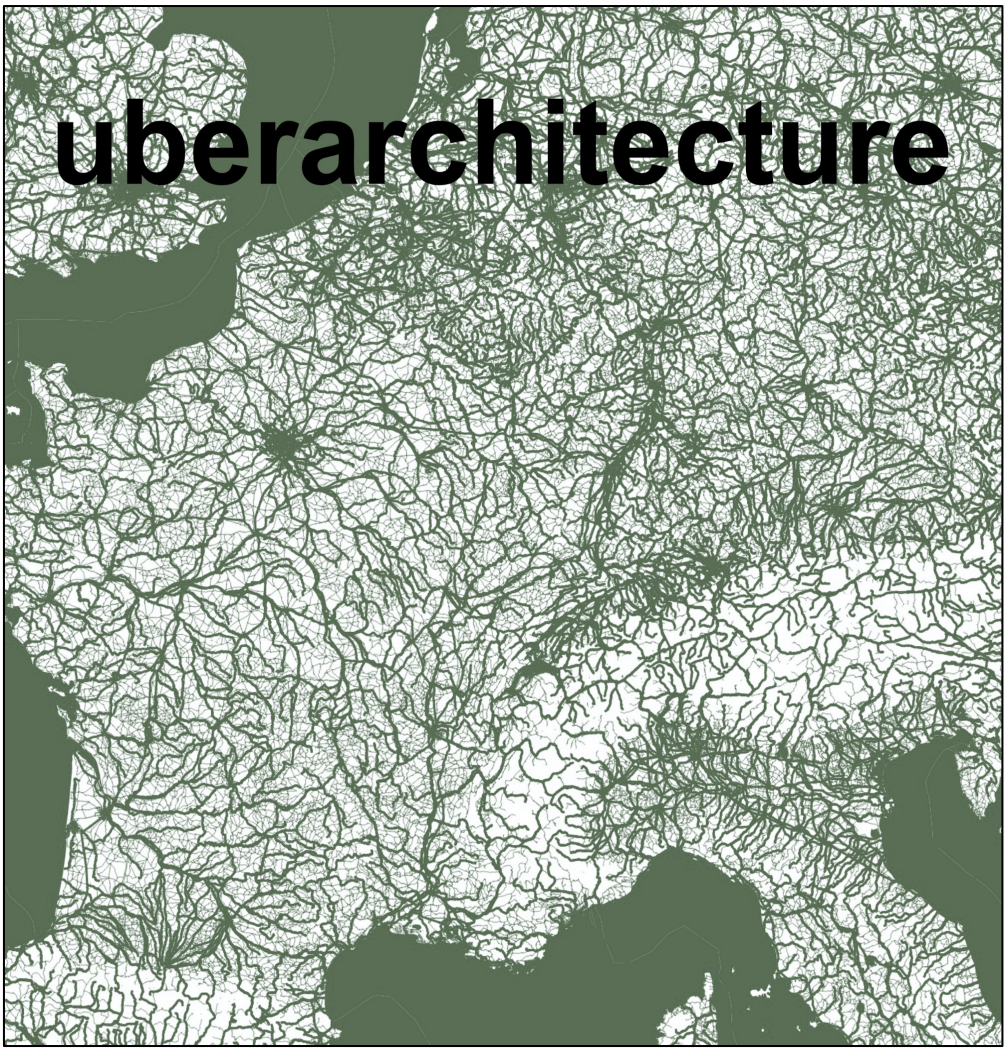
URŠKA KRISTINA ŠKERL

ABSTRACT

The paper introduces the concept of 'uberarchitecture', a malleable term that on one hand describes the top-down positions historically enforced and reproduced to the present state, such as politics, law and land registers—shaping the ground realities resulting in claimed delineations between private and public properties influencing social relationships, and shaping architecture as such. On the other hand, the term uberarchitecture holds a charge towards examining what these imposed civilizations' entanglements embed. The paper takes a methodological approach of speculative design and case studies, while it bases it on theoretical and practical research of the existing legislative instrument— 'public good'. Using the same 'uberarchitecture tool' that casted forces over ground, it overhauls its position and becomes self-surpassing by establishing a dynamic hierarchy more attuned to 21st-century discourse. Based on cadastral data and land use, a speculative international Public Good State is proposed. The paper uses correlating speculative projects, such as Constant's *New Babylon*, Doxiadis' *Ecumenopolis*, and Friedman's *Continent-City Europe*, which don't find their place beyond utopia, to justify and gain a base for enquiry and reopen the discourse to further it in the uberarchitecture reality.

UBERARCHITECTURE | PUBLIC GOOD | CRITICAL GEOGRAPHY | MEGALOPOLIS

1. Introduction



Img. 1
Public Good is Uberachitectur: Public good is invisible until made so. Map of public good based on European cadaster and land use. 2024, Urška K. Škerl

This paper invents the multifaceted term ‘uberarchitecture’, introduced to describe the top-down forces, civilization conventions, that shape realities, experiences, and materializations through their imposition on the ground—and uses them to invent *a better* uberarchitecture. It interrogates how these forces might be disentangled or transcended using a legislative frame. The prefix *uber-* relates to Nietzsche’s concept of the Übermensch (Nietzsche Friedrich 1961), signifying self-surpassing qualities. Despite acknowledging the superficial appropriation of Nietzsche’s term, its connotations of emancipation and agency align with the paper's inquiry into architecture's role in facilitating human existential engagement. As Markus Breitschmid (2007) notes, for Nietzsche, architecture as an art form, is tasked with crafting a veil over the metaphysical abyss—a notion that engages this paper to play with and look beyond, what uberarchitecture could be.

Uberarchitecture, in this context, questions the legitimacies embedded within the built environment, shaped by investment, law, and political power, and critiques the top-down imposition of architecture as a mode of control. Uberarchitecture engages critically with mechanisms rooted in

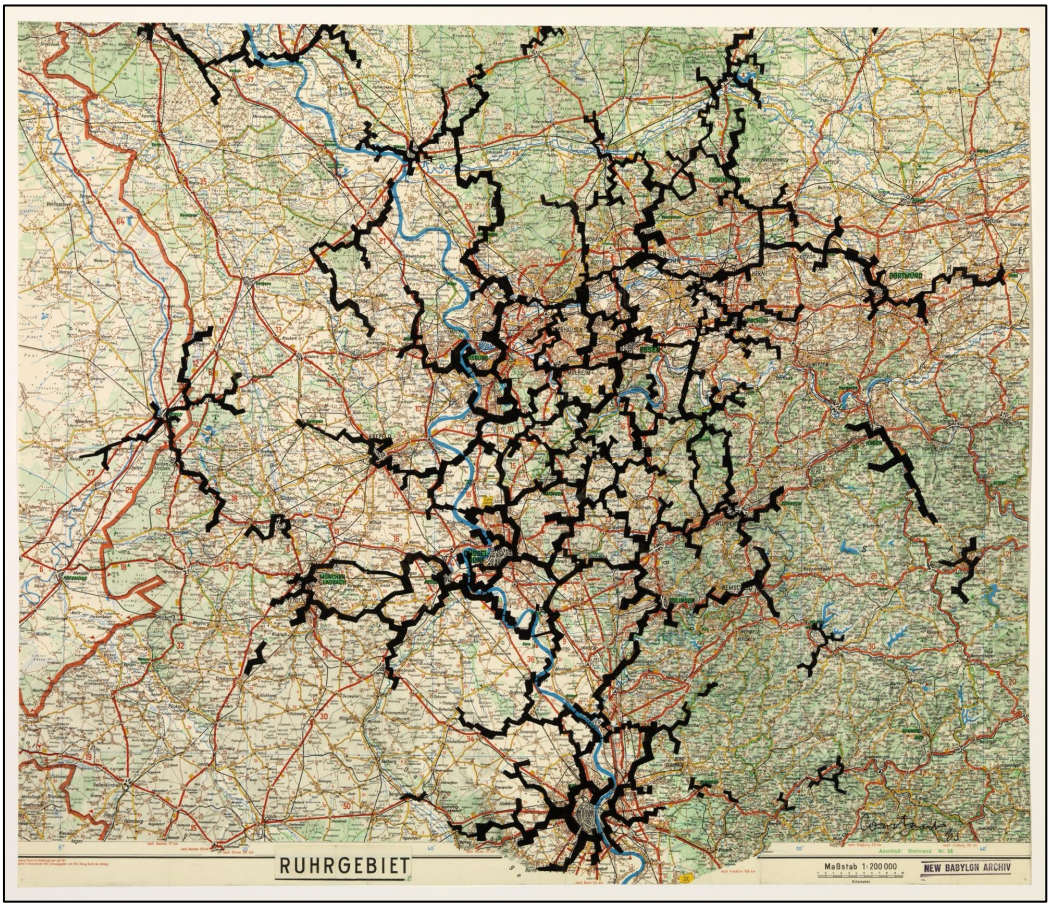
land and capital accumulation. These systems, historically predicated on dispossession and privatization, underpin the inequities of property rights and economic power. In this light, the study aligns with speculative architectural projects that advocate for collective ownership or the abolition of land commodification, put forth in speculative architecture projects from the 20th century, New Babylon, Ecumenopolis and Continent-City Europe. Yet what these projects lack is engagement with the real conditions obstructing their visions from overreaching utopian realms.

Thus, this paper singles out public good, an existing legislative concept and imports cadaster, land register and tools of critical geography to open the field for utopia positioning. The legal instrument of public good, assigned to public space, water beds and mobility infrastructures, is acknowledged in most European legislation systems based on Roman Law, as the actual and legitimate, yet invisible ground. Public good is the ultimate uberarchitecture, as it holds values attuned to future scenarios, the paper wishes to promote. It orders accessibility to *all* under *the same* circumstances, meaning the anonymous use of space and possibly its goods provisions. By using cadastral information to draw out the Public Good State, uberarchitecture becomes 'uber', meaning it uses its own tools to surpass itself. Public Good State is akin to and holds ground for the speculative projects visited below.

2. New Babylon

Constant Nieuwenhuys' *New Babylon* (1956–1974) is a series of artworks proposing what can become a future city of ephemeral, habitable structures perched above the ground. These structures are interconnected by aerial routes and 'socializing traffic lines', forming clusters of situations akin to the *dérive*, where play and creativity dominate the masses' everyday activities. New Babylon is governed by Unitary urbanism, "a very complex, very changeable, constant activity, a deliberate intervention … aimed at bringing our lives into lasting harmony with our real needs" (Wigley Mark 1988, p. 132).

In this idea, aligned with the Situationists' 'desire', the social space is the city's main character that supports psychological fulfilment. The future city, as Constant described, will likely "cover the entire surface of the earth" (Wigley 1988, p. 133) as humans acquire ultimate power over natural resources and exploitation of nature by unlimited development, resulting in technology replacing nature. Human life becomes an art form itself as automation allows for free time at one's disposal. Based on the society of freedom, Constant's New Babylon omits the given socio-economic conditions and land subdivision. As a prerequisite, the project "has been based on collective ownership of land" (Wigley 1988, p. 234).

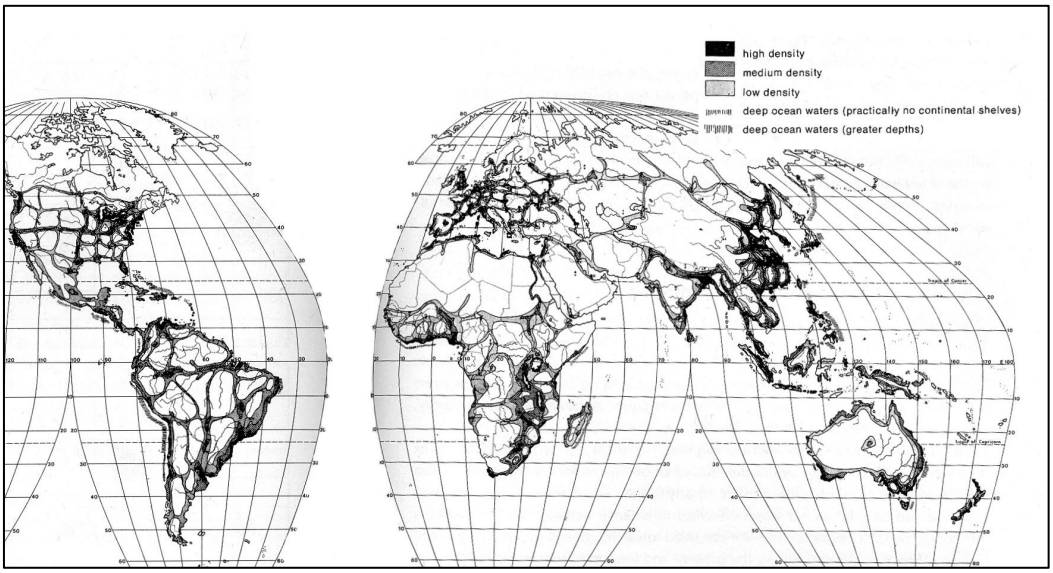


Img. 2
New Babylon over Ruhr Region (1963) by Constant Nieuwenhuys. Kunstmuseum Den Haag © Photo: Tom Haartsen. Image courtesy Fondation Constant

3. Ecumenopolis

Constantinos A. Doxiadis termed Ekistics as a new scientific field dedicated to the study of human settlements (Doxiadis Constantinos A. 1968). Exactly 30 years after the Athens Charter by CIAM, Doxiadis and Jaqueline Tyrwhitt gathered a group of acknowledged scientists from diverse fields, including Marshall McLuhan, Margaret Mead, Jean Gottmann—known for coining *megalopolis*—and Richard Buckminster Fuller among others, to participate in the Delos Symposium that continued annually for a decade (1963–1975).

What was needed in Doxiadis' view was a controlled urbanization of the inevitable urban growth resulting in Ecumenopolis, the worldwide city, a continuous city structure governed by all inhabitants via their 'television-telephones' (Perović Miloš R. 1978). Although the heterogeneous group had different views on some Ecumenopolis features such as the importance of planning the static versus dynamic electronic networks aligning to evolving technological means (Wigley 2001), they agreed on "general assumptions which might be summed up as: freedom of movement, absence of barriers, and a world that behaves in a rational manner" (Perović 1978, p. 30). Being aware that realities of politics and cultural patterns challenge Ecumenopolis, Doxiadis believed rational decisions to build common infrastructures by human interest might overcome tensions of national and territorial localities.



Img. 3
Ecumenopolis: 2060. Megalopolis as predicted by Doxiadis (1972). © Constantinos and Emma Doxiadis Foundation.

4. Métropole Europe

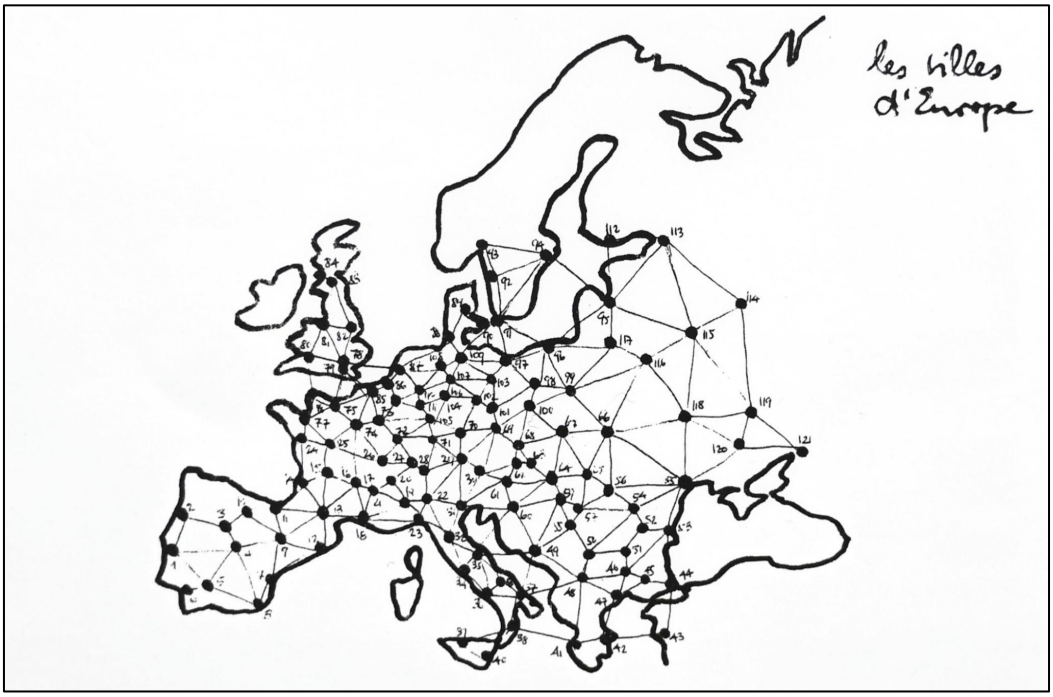
Yona Friedman's work is rooted in the principle of individual freedom, emphasizing the capacity of citizens to adapt and utilize urban environments according to their needs. Known for adaptable megastructures cast over cities in a manner of self-regulating systems as mobile architectures and spatial cities, Friedman searches for a 'feasible utopia', where city dwellers are authors and creators, acknowledged individuals.

One of his projects, the Métropole Europe (1960) or refined Continent-City Europe (1994), is described as "the biggest non-city in the world" (Friedman Yona 2011, p. 21). The Continent City uses the existing European train lines, which connect distant economies and emerge as "a network of existing large cities" (Friedman 2011, p. 34). Further, Friedman states that the Megastructure of the 21st century is continent-wide employed by remote work and hence without the need for the proximity of city centers, which "could lead to a new concept of living in nature" (Friedman 2011, p. 35). While not obvious that the idea could be built upon the legal concept of 'public or common good', which encompasses the railway system, Friedman is aware that this kind of solution is only realized by the will of politicians and economists as opposed to architects or urban planners.

Another curious example of Friedman's work in direct line with the presented article is Unicornia, a "proposal for turning certain territories in huge open-air museums" (Memorial da Resistência de São Paulo 2021). The Unicorn and Balkis dog are motifs in Friedman's work that take the form of large-scale drawings cast upon 'undetermined land', creating a boundary-that-is-not, to what seems a new, free territory and imaginative *cadaster art*.

No Man's Land is a Foundation in Pescara, Italy, to which Friedman was an honorary president. They aim to export the model of non-property and social and ethical change. During the 2017 workshop held there, Friedman stated that what he was trying to propose was "an operation of

democratising the imagination" and that the No Man's Land "belongs to everybody" (No Man's Land Foundation 2016).



Img. 4
Continent-City Europe by Yona Friedman (1994). © Fond Denise et Yona Friedman.]

5. Public Good as a Tool for Megalopolis

While speculative future-city projects prerequisite the abolition of territorial boundaries, their structural focus lacks practical tools for implementation. As uberarchitecture encompasses everything in the fictitious realm that influences the ground, built reality, including abstract ideas, it takes presented case studies as possible uberarchitecture scenarios, and provides them a legal link to the ground, based on public land ownership. The case studies, in turn, help by sharing a worldview in common.

Joanna Kusiak (2021) advocates for 'critical legal engineering', urging legal geographers to repurpose law as a means for progressive social transformation. David Harvey (2012) describes land not as a mere commodity but as fictitious capital shaped by market speculation and deregulation. This 'fiction' extends to the design of private property, historically devised to facilitate taxation and control. On the opposite end sits public property. To imagine the process of recalibrating, the proposal works by pushing legislative frameworks into speculative futures.

The cadastral framework and encompassing legal instruments, while ostensibly invisible, exert a profound influence over how space is conceptualized and utilized, functioning as a top-down apparatus that defines land through the mechanisms of legal ownership. Such frameworks, with their attached data attributes—land use, easements, and infrastructural provisions—serve as instruments that delineate rights and obligations within specific national jurisdictions. Cadaster,

therefore, can be understood as an unbuilt but pervasive condition that governs the land and, by extension, the built environment above it. This raises the provocative claim that 'cadaster, in its own right, constitutes a form of uberarchitecture—a spatial infrastructure of governance and control'.

One peculiar instrument in the European legislative system is 'public good', appointed to a particular cadastral lot and marked in the land register. Not to be mistaken for 'public goods' in terms of public services, public good[1] is a distinctive legal category crucial for the expression of individual liberties and includes properties such as roads, streets, train lines, parks, squares, seas and waterways, which are classified as 'non-rivalrous' and 'non-excludable' in contrast to more localized commons traditionally led by communities. By their designation, public good is accessible to 'everyone under the same conditions'[2]. Drawing from Roman legal traditions, public good is anchored in the concept of *res publicae* or *publica utilitas*, 'public things' and 'public use' (Menatti 2017). These properties were historically categorized as *extra commercium*, meaning that they could not be subjected to private proprietary rights. Roman Law thus established a clear delineation between properties governed by civil law and those under public law, foreshadowing modern interpretations of shared spatial resources. Each legislative system based on Roman law has its type of public good, *domaine public* in France, *Sachen im Gemeingebrauch* in Germany, *il demanio publico* in Italy, for example (Virant, 1990). What if all those public good properties connect into one, indivisible international 'public-good-land'?

Building on this foundational legislative understanding, the article posits a reimagining: an international 'Public Good State', conceived as one expansive territory where bodies of water, roads, streets and pathways coalesce into one seamless continuous corridor of green, blue, and brown infrastructure, 'available to all under the same conditions', engulfing private properties amidst. Public good sorts supremacy "of the public interest over the private one" (Menatti 2017), which is pivotal in the Italian documents from the Middle Ages, such as city planning.

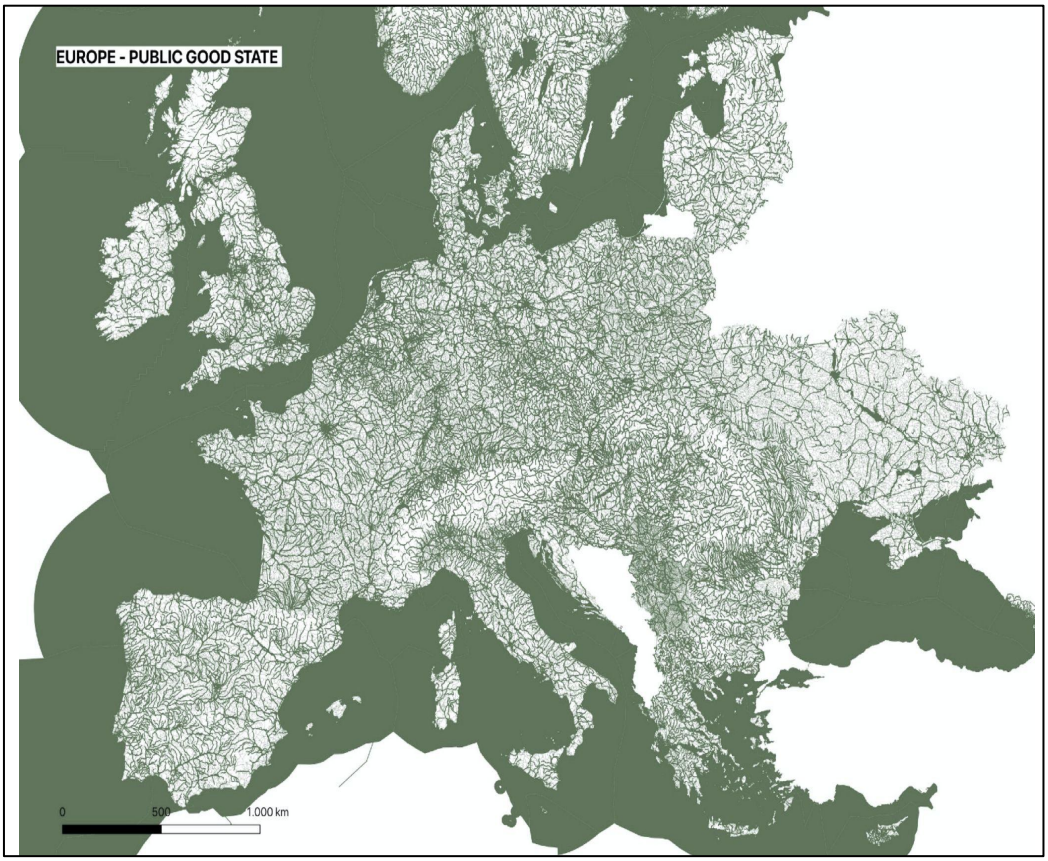
Public Good State is envisioned as universally accessible without the need to identify and legitimize its users, stretching internationally, challenging the spatial logic of enclosure and privatization. To this backbone of Public Good State, governed and managed internationally, clusters of local commons and public property attach. Public Good State provides accessibility to public goods such as food, water, transport, energy, education, and social services and also becomes a tool to exercise rights to a clean environment, multispecies justice and migration. As such, public good is the most advanced altruistic (not moral) legal concept Western society devised and should be

[1] Public good is not necessarily equivalent to public property, which can be excludeable. Yet, in my opinion, public good should capture most, if not all of public property and further, all of the public space.

[2] Direct translation from Slovenian legislation in depth researched by Gregor Virant who compared public good in legislation of Germany, France and Italy when Slovenia was gaining independence after Yugoslavia.

exercised as a wholesome body instead of being limited to nationalities and localities. While programatically similar to Continuous Productive Urban Landscapes, Public Good State is nevertheless a political project. Global reach, as in Ecumenopolis, is at odds, as the limit of the Public Good State is legislation and its border's reach. National security, too, falls under public good provision and is in contrast to the undeniable accessibility unless converted to the border-corridor. Public good must readdress *what* is good for *all*, and assert itself as a spatial, economic and social construct.

Yet, public good remains an abstract, intangible reality until rendered visible. Thus, mapping the layered uberarchitecture of public good becomes a critical tool for decolonizing within the colonial frameworks of land demarcation.



Img. 5
Public Good State: layered publicly available data of European seas, rivers, streets, train lines and city fabric, which become green, blue and brown corridors. This backbone of the international public good can be expanded by public property and local commons. Data source: https://www.copernicus.eu/en. 2024, Urška K. Škerl

The speculative projects from the past century in which authors refuse to position their visions among utopian scenarios in a strong belief that such changes are possible, even inevitable, without addressing the practical means for such conduct, to a certain degree, share the vision of the Public Good State.

In the recent movie *Megalopolis* (2024), directed by Francis Ford Coppola, the closing frame declares: "I pledge allegiance to our human family, and to all the species that we protect. One Earth, indivisible, with long life, education and justice for all". As critically bad as the idea of a megalopolis is used in the film, it nevertheless holds a shift towards the awareness that most of the one-world-city ideas from the past century did not encapsulate. While the above-presented worldwide cities

do not acknowledge the notions of climate change and the role of natural environments, resources and forces at large, they, however, hold a connotation of social justice and global governance, qualities nested in public good. In this repositioning, the ultimate uberarchitecture is Nature, and the megalopolis of the 21st century is the Public Good State.

6. Conclusion

The study takes a conceptual idea of a continuous accessible space and finds its relatives in architectural speculative case studies, while it tries to bridge the gap between the idea and spatial reality via a legislative framework of public good. In this way, it does not build or imagine an architecture, but draws out the invisible yet existing land in a form of *legal architecture,* resulting in the Public Good State. It offers a step forward from unachievable utopias, in denial that, at the same time, it renders an unattainable future, believing in its plausibility. The paper introduces the term 'uberarchitecture', which calls upon the invisible top-down forces and uses them to envision novel spatial arrangements. The paper addresses ideas as residing in the position 'beyond', releasing to the ground tangible imaginations, connecting the conceptual imaginative space inflicting its power over ground realities. Since imaginative ideas can become a reality, uberarchitecture urges us to envision better fiction.

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Exploring the Seasteading Hypothesis: A Floating Utopia for the Techno-Solutionist age?

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ABSTRACT

The paper focuses on the Seasteading movement's quest to build floating libertarian micro-nations in the High Seas, heralded by its proponents as a bold, 'offshore' solution to society's most pressing challenges. The article situates Seasteading within a broader reflection on the evolution of the floating city paradigm over the past century. It unpacks how Seasteading draws from some of its most relevant predecessors, re-signifying and incorporating elements of their technological, spatial, and rhetorical frameworks to construct a compelling market identity and legitimise its anarcho-capitalist agenda. This framing sheds light on the implications of the techno-solutionist form of territorialisation advocated by Seasteading, and the underlying planetary vision it implies.

FLOATING URBANISM | SEASTEADING | MARITIME URBANISATION | TECHNO-SOLUTIONISM

1. Introduction

In light of the growing interest in floating cities as a potential response to some of the most pressing effects of the current polycrisis, the article explores one of the most recent (and controversial) iterations of this seemingly alternative form of urbanisation: Seasteading. Framed within a broader exploration of society's evolving relationship with the urbanisation of maritime space over the past century, the article critically unpacks how some of the most relevant socio-spatial models have informed the Seasteading vision. These models offer a privileged viewpoint onto the specific challenges of their respective historical contexts and the mindsets that shaped their socio-political aspirations. This framing contributes to develop a critical reflection on the broader implications of Seasteading's conceptualisation of an inhabited maritime planet.

2. The Seasteading hypothesis

The Seasteading movement can be broadly described as the convergence of marine anarcho-secessionist ideals and the 'resortification' of floating urbanism, heralded by its proponents as a bold, 'offshore' solution to society's most pressing challenges. The term itself – a *portmanteau* word of 'sea' and 'homesteading' – was coined by Wayne Gramlich to describe an affordable path for individuals to colonise the High Seas, in analogy with the colonisation of the American West. Gramlich – together with Patri Friedman, grandson of leading libertarian economist Milton Friedman – founded The Seasteading Institute (TSI) in 2008, thanks notably to substantial funding from Silicon Valley magnate Peter Thiel. TSI's stated mission is of "building startup communities that float on the ocean with any measure of political autonomy" (TSI n.d., *About;* Steinberg *et al.*, 2012).

Seasteading's socio-political vision[1] combines libertarian anarcho-capitalist ideals with techno-solutionism. Seasteading originates from a deep dissatisfaction with democracy, believed to be an inefficient and costly "geographically segmented monopoly" (Friedman & Gramlich 2009, p. 21). Conversely, it presents the High Seas as the natural frontier to escape land-bound juridico-political systems, to reappropriate the political agency granted by freedom of movement and to unleash hyper-capitalism. It envisages a post-democratic 'seavilization' based on a constellation of self-ruled libertarian micronations. Navigable housing units would enable each individual to easily move from one micronation to another: you vote by moving your house. By detaching citizenship from fixed territoriality and framing it as a free market value, Seasteading aims to concretise what is presented as a Copernican revolution of the Nation-State paradigm. In this worldview, marine micronations would compete to attract inhabitants, the possibility to choose juridical system would minimising conflict, and deregulation would foster entrepreneurial innovation and prosperity.

[1] While the Seasteading movement groups a range of different spatio-political visions, the current analysis is based on the materials produced by The Seasteading Institute.

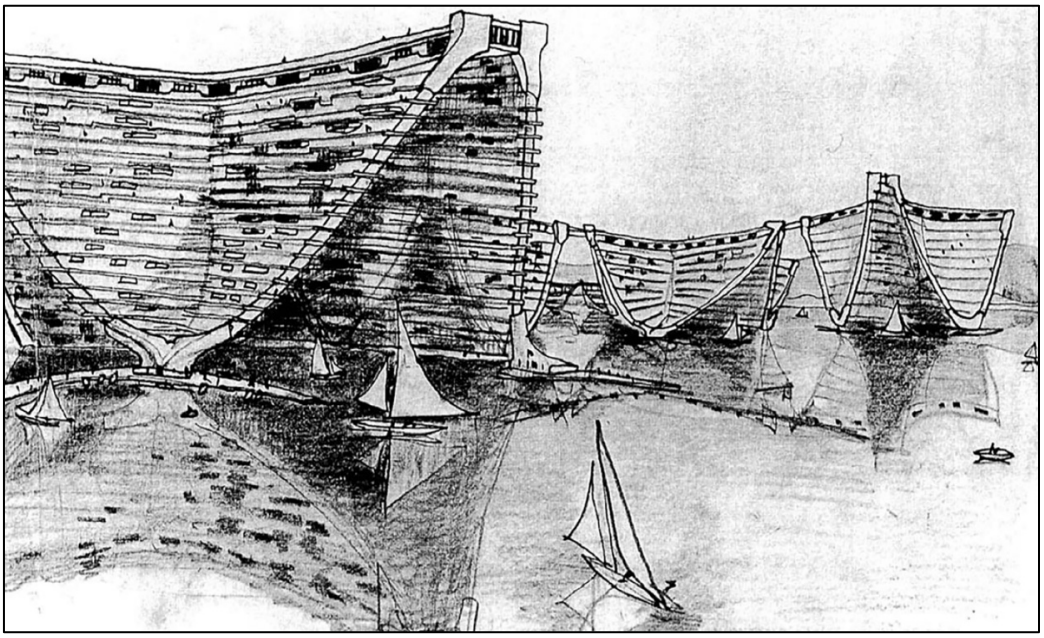
Heralding a privatisation of space-making on a territorial scale, Seasteading emerges as the marine "extrastatecraft" (Easterling 2014) by excellence, combining the appeal of the luxury resort and of the offshore financial centre (Quirk & Friedman 2017; Steinberg *et al.* 2012).

Seasteading inscribes itself within a long lineage of radical socio-political endeavours which have turned to the sea to concretise their vision. Driven by distinct visions and stakeholders' interests, each experiment engages with the revolutionary implications of inhabiting the sea from a different perspective, translating into distinct forms of socio-spatial organisation. The article explores how Seasteading draws inspiration from various maritime experiments conducted over the past century, re-signifying and incorporating some of their characteristics within its proposed production of space.

3. Metabolism – the megastructure as 'machine sociale'

Arguably, one of the major catalysts and testing fields for the floating city typology was the wave of proposals to urbanise the Bay of Tokyo (1957-1961), as Japan navigated the tension between post-catastrophe reconstruction and rapid economic expansion. This endeavour occupied a central place in the international architecture discourse, yet its main resonance was at the national level. It contributed to shape and crystalise the ideology of the Metabolists – a Japanese avant-garde movement created in 1960 by architects and intellectuals part of Kenzo Tange's *entourage* (Kikutake, Kawazoe, Otaka, Maki & Kurokawa 1960).

As architectural historian Maurizio Vitta observes, Metabolism "wasn't an architectural theory, but a critical theory of society seen from an architectural perspective" (Kikutake & Vitta, 1997, p. 17). At its core is a conceptualisation – drawn from ecological metaphors – of spatial models not as fixed forms, but as 'regenerative' frameworks able to adapt organically to their inhabitants' evolving demands, granting a plurality of possibilities. Inspired notably by Buddhist philosophy and Marxist ideals, the production of space is envisioned as an act of symbiosis which transcends dualisms (such as technology vs. tradition; nature vs. man etc.), enabling a more egalitarian, ordered and harmonious *Urbs* and *Civitas*. This strive for symbiosis is well illustrated by Kurokawa's renders for his *Floating City Kasumigaura* (1965) project. *[Img. 1]*



Img. 1
Noriaki Kurokawa, Floating City Kasumigaura project render, 1965 (Japan).

The central spatial expression of the Metabolist approach is *artificial ground*, primarily megastructures (a term coined by the Metabolist Fumihiko Maki), which serve as infrastructural and service backbone for modular 'capsules'. Collectively owned artificial ground is proposed as a solution to bypass the liabilities which were heavily hindering Japan's reconstruction, including lack of buildable space, land ownership fragmentation and vulnerability to natural disasters (Kikutake, Kawazoe, Otaka, Maki & Kurokawa 1960; Kikutake & Vitta, 1997; Lin 2010; Koolhaas & Obrist 2011). The sea, a fundamental element in Japanese imaginary and culture, is portrayed as a natural frontier to unfold the Metabolist' spatial and societal agenda (Lin 2010, pp. 109-111). This line of thought is particularly embodied by Kiyonori Kikutake, widely recognised as the godfather of marine architecture. In his presentation of the *Ocean City* in the Metabolist manifesto (1960, pp. 20-21), he thus argues that "the civilization of continents was an accumulation of bloody struggles of human relations established on limited land, so it was a history of endless wars"; while "the sea is awaiting a new discovery which will promise true happiness for human beings. It is just a matter of time that the civilization of continents hands over its part to the prospective civilisation of the sea commenced by Marine City".

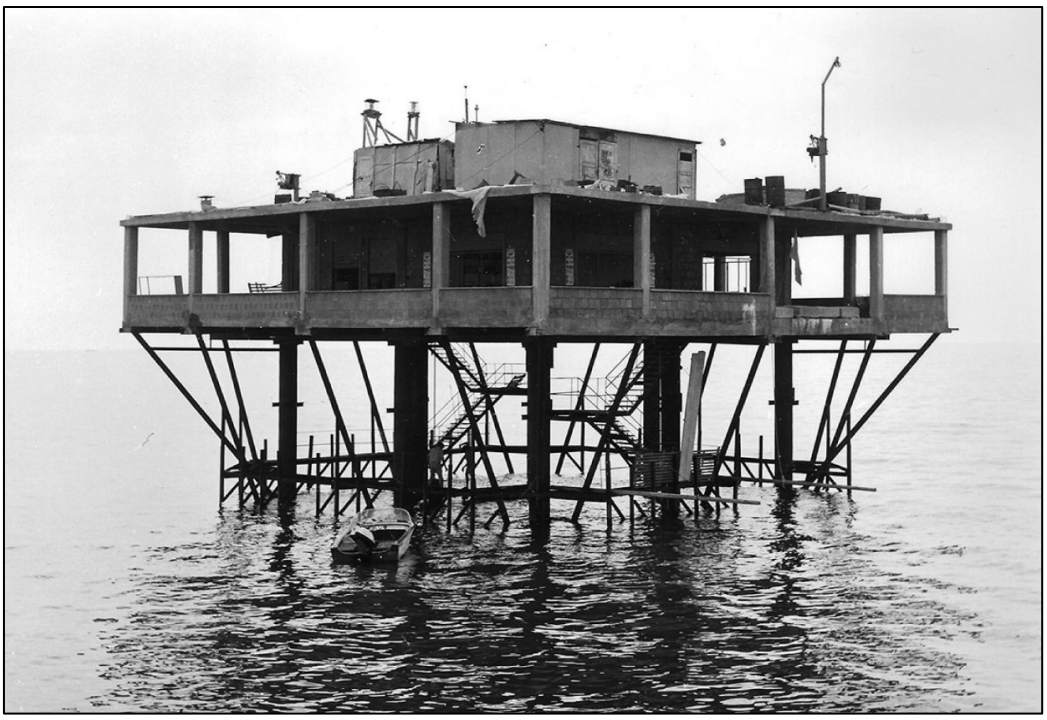
The typology of floating urbanism envisaged by the Metabolists can be broadly divided into two main categories. The first one can be described as a *hybrid* model, which extends land-based infrastructure (notably transport) onto the sea, combining it with technology and modularity specific to floating urbanism. It thus seeks to transcend the functional limits between land and sea, centre and periphery, envisioning a theoretically ever-expandable model. In addition to Otaka, Kurokawa and Kikutake's proposals for the Tokyo Bay masterplan, some examples include Kikutake's Disaster Prevention City (1961) and Shallow Sea-type community (1963). The second category centres on a territorial-scaled, self-contained *floating archipelago* model. It envisages a form of

territorialisation entirely independent from the land, spatially governed by its own metabolic cycle. This category includes most of Kikutake's Marine and Ocean City projects (Lin 2010; Koolhaas & Obrist 2011 pp. 354-59; Nyilas 2016). While none of the Metabolists' floating projects saw the light of the day (exception made of Kikutake's Aquapolis, 1975), they spurred considerable technological innovation, largely thanks to Japanese and American government funding.

Examining the relationship between Seasteading and Metabolism reveals a significant conceptual shift. Rather than evolving from Metabolist ideology, Seasteading merely appropriates some of its visual language as a reassuring aesthetic, suggesting that a self-sustaining, adaptable urban system at sea is viable. While Seasteading, similarly to Metabolism, envisages a systemic and dynamic infrastructuralisation of maritime space – one that notably aims to foster individual mobility and empowerment, framed as key preconditions for socio-economic progress – pertinent similarities largely end there. While current prototypes of 'seasteads' function as floating *habitats*, their classification as constitutive element of a floating *city* remains, at present, tenuous.

4. Maritime anarcho-secessionism - the self-made platform and ship

In the same period as Metabolism burgeoned, an entirely different form of marine cities attracted significant investments and public attention. Namely, the short-lived wave of anarcho-secessionist maritime micronations in the 1960s and 70s. These experiments are widely disparate, as their socio-political agenda and spatial embodiments are moulded by the vision of the charismatic leaders promoting them. What they share is a desire to capitalise on the deregulation of the High Seas to enact Libertarian ideals; and a rather picturesque drive to affirm their institutionality through the creation of flags, currencies and post stamps. It is hard not to feel the anticipatory echoes of the interest in Bitcoin and metaverses that would appear only decades later. These experiences can be classified in more 'piratesque' endeavours – led by a small group of people with minimum funding – and more structured ones. The first category groups for example *L'Isola delle Rose* (1968) – a DIY platform near Italy which takes its name from its founder, Giorgio Rosa, and operated mainly as a touristic attraction *[Img. 2]*; and *Sealand* (1967 – today) – an ex-military platform near the UK governed by the pirate radio broadcaster Roy Bates and his descendants (though it wasn't used for this purpose). The latter was even the unlikely object of a daring *coup d'état,* which included kidnapping and a government in exile. The second category groups more ambitious endeavours, backed by solid funding, for example *Operation Atlantis* in its various tentative incarnations as a custom-built ferro-cement boat, reclaimed island and oil rig (1968-73), brainchild of millionaire and Ayn Rand enthusiast Werner Stiefel. In a contemporary reinterpretation of Plato's *Atlantis*, all these micro-nations (except Sealand) either sank or were dismantled militarily by nearby states after only a few months of existence (Graziani 2015, pp. 32-52; Kaji-O'Grady & Raisbeck 2005, pp. 470-74).



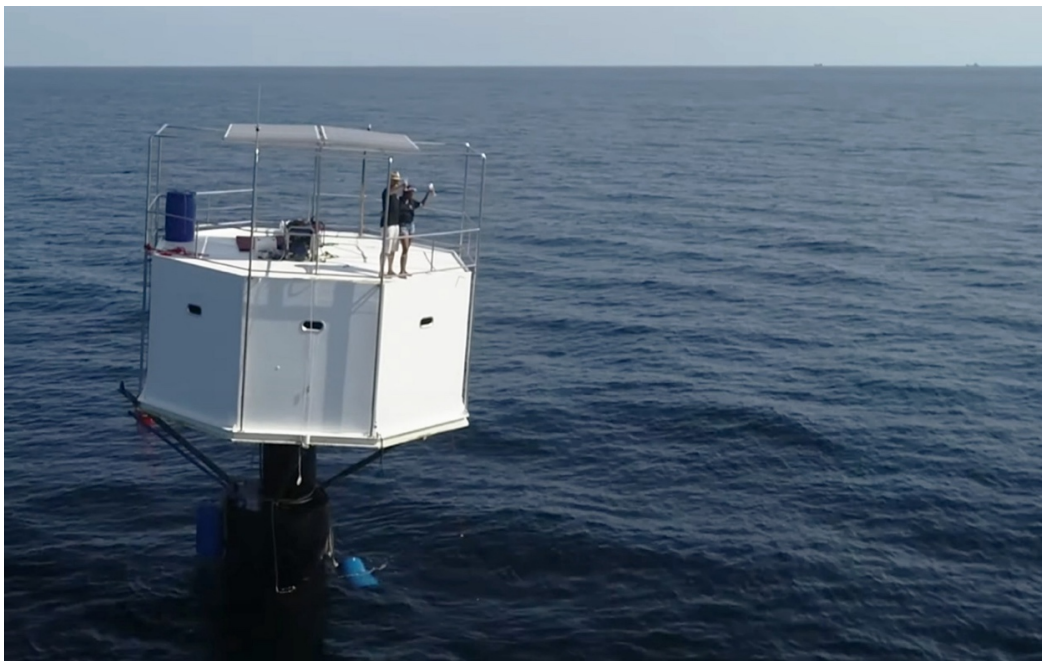
Img. 2
L'Isola delle Rose micro-nation in 1969 (offshore, near Rimini, Italy).

Though not constituting floating cities from a strictly typological perspective, these experiments constitute a non-negligible part of its imaginary, inspiring various books and films and successive secessionist endeavours. While successive endeavours, for example the *Freedom Ship*, never saw the light of the day due to unsustainable costs and timelines, Seasteading emerges as the most tangible and ambitious successor, aiming to systematise this model. All the aforementioned micronations are explored in dedicated sub-chapters of Friedman and Garmlich's 2009 book "Seasteading: A Practical Guide To Homesteading The High Seas". It is, then, perhaps not a coincidence that early attempts at Seasteading associated with The Seasteading Institute (TSI) used the same spatial expedients, namely self-made platforms and repurposed boats.

The first (and at the time of writing only) inhabited Seastead to be stably deployed in international waters was a DIY platform off the coast of Thailand in 2019 [img03]. It had to be precipitously abandoned by its two inhabitants after only two months when Thailand intervened militarily declaring it a threat to its sovereignty. The episode is recounted in epic tones in a Youtube series titled *The First Seasteaders*[2], directed by the TSI's current president. The same firm, Ocean Builders, relocated to Panama. In 2020-21, on the wake of the pandemic, its three founders saw the opportunity to repurpose a cruise ship, the MS Satoshi, into the heart of a Bitcoin-shaped "coastead", a Seastead located in Panamanian territorial waters. Despite garnering a non-negligeable interest from prospective inhabitants, it had to be sold before it came into use because of prohibitive insurance costs. Ocean Builders, which have now distanced themselves from TSI, are

[2] https://www.seasteading.org/facing-the-storm/

developing various models of a luxurious brand, the SeaPod, whose *Alpha Deep* version is deployable in deep water [Img. 4] (Elmhirst 2021; Simpson, 2021; Yarm, 2025; Ocean Builders, n.d.). The SeaPod – similarly to TSI-related designs conceived for shallow waters, such as Arktide's *Coquina* (n.d.) and CSTM's *Arkhaus* (n.d.) – seems to evoke an elite getaway for high-net-worth individuals rather than any sense of urbanity. These navigable pods emerge as the first steps towards the 'you vote by moving your house' ideal: the spatial manifestation of an atomised and individualistic society brought together by temporary interest. As argued by Simpson (2021, p.72), the seastead is as much an infrastructural device as a rhetoric one: "the [performative] construction of the seastead as a space of freedom, and of freedom as a product that could then be marketed and sold.



Img. 3
Ocean Builders, the First Seastead in 2019 (offshore, near Phuket, Thailand).

5. Design Science set sails – neo-liberal speculative coastal experiments

In more recent years, as the implications of climate change – notably in terms of vulnerability to sea level rise, natural disasters and resource scarcity – have taken centre stage in the urban planning and political discourses, amphibious and floating urbanism are increasingly emerging as the 'go-to' solution (Steinberg 2011). Ongoing experiments and visions align with a supposedly post-ideological interpretation of Design Science, tracing back to Buckminster Fuller's legacy. This approach frames spatial design as a neutral, problem-solving endeavour, sidestepping deeper political and economic considerations.

On the one hand, the most prominent contemporary projects draw heavily on the spatial (modularity, scalability and adaptability) and technological (complex buoyancy, metabolic self-sufficiency) concepts underpinning the 1960s and 70s marine megastructures. On the other, as

climate adaptation intersects with real estate dynamics, the typology and its strongly evocative imaginary become convenient vehicles to unfold oversimplistic and marketable narratives of sustainable development, romanticised through the 'living in harmony with the sea' trope. This novel capitalist-driven version of floating urbanism tends to blur the line between sensationalist 'resortification' and testing ground for alternative resilient urban models.

Img. 4
Ocean Builders, Alpha Deep SeaPod prototype in 2024 (offshore, near Linton Bay, Panama).

Two examples of modular coastal extension projects well illustrate this trajectory: *Oceanix City* and *Oxagon*. They share a similar spatial model – based on modular floating units that maximise valuable waterfront real estate – and narrative, using compelling videos and renders promising a "trail-blazing" sustainable urban model and vibrant lifestyle (NEOM n.d.; Oceanix n.d.;). *Oceanix City*, designed by the blue tech company OCEANIX and Bjarke Ingels Group, is the perfect embodiment of the typology's institutionalisation. It has been heralded as "the definitive blueprint for a sustainable marine metropolis" in the framework of the UN-Habitat Roundtables on Sustainable Floating Cities. A prototype meant to house 12,000 people is currently being developed in Busan (South Korea) with the support of UN-Habitat [img05] (idem; UN Habitat 2022). *Oxagon,* on the other hand, is the octagonal-shaped port and '4.0' industrial city proposed as part of Saudi Arabia's NEOM megaproject. In its promotional video[3], it is presented as a "the largest floating structure in the world, creating a new paradigm for living and working on water", notably thanks to automation, AI and Internet of Things.

[3] https://www.youtube.com/watch?v=V_p3kl6FHDY&t=4s

Img. 5
OCEANIX and BIG, Oceanix City Busan, expected completion in 2030 (Busan, South Korea).

These projects aren't entirely dissimilar from a full-fledged Seasteading real estate development for shallow waters ('Coastead'). As both models evolve and become more normalised, the boundary separating them is likely to become increasingly blurred. Both present themselves as environmentally friendly (e.g. net-zero energy, zero waste) and eco-restorative (e.g. biorock as building material, algae farming) solutions to often oversimplified discourses on 'environmental refugees' and climate change (see notably Hodson & Marvin 2010). The TSI narrative, outlined in its 'Eight Great Moral Imperatives' (n.d.; Quirk & Friedman 2017), goes one step further, decisively embracing techno-solutionist rhetoric. Both, however, manifest as globalised sea-oriented enclaves, loosely connected to their territorial hinterland, intended communities, or marine surroundings – treated as interchangeable. As such, they can be read as the latest development in juridic-spatial forms of extraterritoriality which blur the distinction between logistic, productive and leisure spaces. Variously combining a strategic position in global flows, fiscal and legislative exemptions, and an appealing coastal leisure environment, these forms of infrastructuralised territorialisation systematise corporate-run space-making which dilutes socio-environmental accountability and reinforces existing power structures (notably Easterling 2014, Farinella 2024 and Abrahamian 2024).

6. Conclusion

Seasteading emerges as the extreme manifestation of Western extractivist and functionalist conceptualisation of the sea as a blank canvas onto which to project yearnings for territorial expansion, affirmation of individual freedom and deregulation. By framing Seasteading within a trajectory of radical floating socio-spatial models, the article highlights how Seasteading

incorporates elements of their technological, spatial, and rhetorical frameworks to construct a compelling market identity and legitimise its anarcho-capitalist agenda.

In a historical moment where *extrastatecraft* has become a key driver of territorialisation within and beyond our planetary confines, enjoying a pervasive level of connivance with governmental institutions (notably Eastering, 2014), the Seasteading hypothesis warrants closer examination. It reveals the underlying implications of many "techno-solutionist" visions that have emerged over the last decade catalysing substantial funding, centered on the conquest of 'otherworldly' environments, whether distant celestial bodies or extreme terrestrial environments (Abrahamian, 2024). These visions offer a common response to the epochal polycrisis, namely a form of land-based escapism where proposed self-sufficient 'islands of security' carve out new geographies of in/exclusion on an unprecedented scale. Taken to their ultimate conclusion, these visions draw legitimation from postulating a future state of permanent catastrophe, "the Future" being reserved for those few that will be in a position to afford it.

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An interdisciplinary model for the next nature-based city

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ABSTRACT
Climate change and the increase in frequency and intensity of catastrophic environmental phenomena closely related to it are problems we must begin to deal with. The design of the city represents a field where it is essential to intervene. However, the starting point for a successful action can only be a utopian project.
Considering the relevance of the current emergency, this contribution investigates the possibility of outlining a theoretical and practical intervention model. This will be developed from Pierre Donadieu's utopian proposal for the urban countryside and designed by drawing on knowledge from different disciplinary fields to respond to the urgent requirements of today's city.
Certainly, the city is now at the centre of all social, environmental, architectural, and economic considerations, but it is essential to revise its conventional paradigm by recognising the urban organism within the natural environment along with everything else connected to it.
Through the critical analysis of some integrative theoretical, methodological, and design components of the French architect's utopia, this paper aims to enhance the dialogue on potential future urban scenarios.

CLIMATE CHANGE | URBAN COUNTRYSIDE | AGROECOLOGY | INTERDISCIPLINARY MODEL

1. Introduction

It is undeniable that the unsustainable and uncontrolled development of cities is one of the main causes of the worsening environmental disasters, most notably climate change and all its consequences. In this regard, numerous experts from international observation programs, such as the European Copernicus project[1], are publishing worrying scientific data.

Therefore, the authorities seem to be mobilising, urged by the worrying future scenarios and the escalating frequency and intensity of disastrous events, often related to hydrogeological and meteorological issues or, more generally, to water management.

It is pertinent to mention - by way of example but not exhaustively - the recent flooding phenomena and landslide movements that strained Emilia-Romagna in May 2023,[2] as well as the destructive flood that affected Spain and caused irreversible harm to part of the Valencian Community's land in October 2024[3].

This contribution aims to overcome the division between theoretical frameworks and practical applications in urban development by synthesising insights from various disciplines such as urban planning, architecture, sociology, economics, and environmental studies. By integrating diverse perspectives and methodologies, we can develop a comprehensive intervention model that not only addresses the immediate challenges posed by unsustainable urbanization but also promotes sustainable growth for future generations. Although acknowledging that this concerning climate situation is a global phenomenon, we have decided to focus on the geographical area of Europe to define a scope of application with at least comparable economic, social, and cultural characteristics.

Additionally, according to Lewis Mumford[4], the urban organism is the space in which the greatest social, economic and territorial problems emerge. However, as several current urban planners suggest, this necessary transition must be approached optimistically and constructively, trying not to be enchanted by the mirage of an absolute good, but pursuing a relative one (Granata 2019, p. 116).

To achieve this, while an admirable, visionary and creative utopia like Pierre Donadieu's does not claim to be accomplished, but it is useful as a driving force to start foreshadowing a better future scenario.

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[1] Official website: https://www.copernicus.eu/en

[2] A divulgative but complete reportage in terms of data and photographic documentation can be found in the book: Raggini, A. (2023) *Il tesoro sommerso: storie tra fango e speranza nell'alluvione del 16-17 maggio 2023 in Emilia-Romagna*. Modena: Artestampa.

[3] At the time of writing this text, the damage has not yet been quantified, but several local Spanish newspapers have published videos and articles presenting the gravity of the situation. To mention one: Levante El Mercantil Valenciano, official website: https://www.levante-emv.com/

[4] Mumford, L. (1985) *The City in History*, Vol. 3 *From the Court to the City invisible*. Milan: Bompiani.

2. Materials and Methods

Reflecting on Donadieu's well-known utopian and desirable urban countryside model as a starting point, the topic of discussion is how to enforce it for research and practical purposes in the current situation.

With an innovative stance on city planning, this architect offers a unique solution that combines social and environmental factors. He presents a vision where urban development is not hindered by green belts but is instead rooted in agricultural spaces, considering peri-urban landscape as an urbanisation tool capable of sustainably organising the city.

An important initial consideration should be that a single-discipline solution is no longer feasible. The complexity of the treatment and the need to necessarily consider the individual connections between the various parts of the overall system do not allow it (Secchi 2015).

To make this model more tangible, three different components will be explained below. It would at least be desirable to develop these in greater depth to comprehensively define the founding characteristics of a prototype intervention project. These are:

1. The theoretical component for supporting the base knowledge required to outline the model.
2. The methodological component to understand the best ways of investigating the territory, defining a site-specific model.
3. The project-comparative component, presenting one or more cases of application of similar territorial interventions.

2.1 Theoretical component

Although Pierre Donadieu's thoughts are extensively treated both by other intellectuals and reviewed by himself several times[5], additional points can be highlighted.

Firstly, the necessary rebalancing of the natural and anthropic landscape demands a new mindset focused on designs that acknowledge the site's malleability. The imposition of a technocratic power is not a solution that seems to be able to respond to the complexity of the situation by itself: this issue is so relevant that even a public figure like Pope Francis spoke clearly about this in 2015[6]. He highlighted the need to resort to a model of social ecology, attentive to the whole ecosystem as a system of relations between the different living and non-living elements.

A similar concept is expressed in both the writings and projects of Gilles Clément and especially in the emblematic case of the "Jardin en mouvement" (Clément 1990).

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[5] To explore this issue further, see for example: Donadieu, P. (2012). *Paesaggio agriurbano un'utopia realista?* Modena: Consorzio per il festivalfilosofia; Benyoucef, A. et al. (2009). Paysage et projet de territoire: théories, méthodes, exemples. Des bilans français aux projets maghrébins. *Projets de paysage*. https://doi.org/10.4000/paysage.28450

[6] Papa Francesco (2015). *Laudato Sì*. Milano: Edizioni Paoline.

Clément's work represents, by way of simplification, a re-evaluation of the 'friche' and its ecological-landscape potential. From this premise, he explains the metamorphosis of the project as a certain number of human-controlled actions - just to ensure safety, in cases such as the Parc André Citroën in Paris - and heavily related to the natural course of events.

We cannot think of applying such a paradigm to a mobile infrastructure or architecture. However, by incorporating this principle into future planning, we can consider again natural and man-made landscapes as interconnected and interdependent as they existed in the past.

This approach should always be supported by specific knowledge of natural laws so that they become tools for ecological design. In case of a huge emergency, such as in water management, being able to propose solutions that retain it within a given environment seems to be more significant than ever.

Delving into these issues, it emerged that several recent studies have identified permeable soil as one of the most important resources for climate change mitigation (Pileri 2022, p. 30). This topic is extensively dealt with by Professor Paolo Pileri[7], whose education has consisted of "soil protection engineering and land use planning". It corresponds to current environmental engineering. In particular, he studies the conformation of the soil, the causes and consequences of its uncontrolled use. In a sometimes-emphatic form, he gives us an undeniable truth: the less you work, move, and change the soil, the better it is for the ecosystem.

If construction is indeed necessary, it must be done by seriously assessing its environmental impact and resorting to preventive ecological compensation measures[8], which establish a new balance in the environment that has been affected.

It is well known that caring for the soil was one of man's priorities in ancient times before he found other forms of livelihood. However, the intensive forms of agriculture developed following the Industrial Revolution have changed the organisation of the land and impoverished the lands. This is why there has recently been talk of the so-called circular agroecology[9]. It is a transdisciplinary and complex concept that intends to deal with the issues of food security, biodiversity reduction and the establishment of sustainable food systems. The idea of circular agroecology surfaced due to this newfound awareness, promoting a range of practices aimed at minimising permeable soil consumption and fostering diverse polycultures to enhance biodiversity.

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[7] Another remarkable work of Paolo Pileri are the volumes: Pileri, P. (2024). *Dalla parte del suolo. L'ecosistema invisibile*. Milano: Laterza; Granata, E., Pileri, P. (2012). *Amor Loci. Suolo, ambiente, cultura civile*. Milano: Raffaello Cortina Editore.

[8] On this topic, consult the book: Pileri, P. (2007) *Compensazione ecologica preventiva. Metodi, strumenti e casi*. Roma: Carrocci

[9] Gentili A., Zampetti G. (ed.) (2021). *Agroecologia circolare. Dal campo alla tavola. Coltivare biodiversità e innovazione.* Milano: Legambiente; Ambiente.

The emergence of organisations - especially at the European level - for the protection of food and agriculture, such as the FAO (Food and Agriculture Organization of the United Nations),[10] certainly demonstrates a growing awareness of the importance of this issue. Indeed, even in recent academic literature[11], the difficulty and necessity of integrating the agricultural system with the actual urban organism are underlined.

As the well-known Professor Sébastien Marot reminds us in his work and reiterates in his latest book published in 2024[12], reviewing the relationship between architecture and agriculture seems to be a necessary condition to establish the next scenarios of the future city.

Human responsibility in overcoming global phenomena defined in the scientific world as 'planetary limits' is undeniable. However, even if it may seem impossible to completely reverse the planetary damage, it is still possible to mitigate the issue in the long run for future generations.

2.2 Methodological component

Concerning the explanatory potency of Donadieu's utopian vision and the theories that have been advanced to complement it, it is equally crucial to delve into a significant methodological aspect.

To obtain a credible interdisciplinary model for the future city, it is also necessary to define a schematic protocol of investigation. In summary, it is a matter of identifying several survey practices - or favourable combinations of them - that will make the subsequent planning and design phase easier. It is also imperative to understand the real problems and potentialities of the local context.

A similar approach to the project had already been envisaged in Italy by the IBC (Institute for Artistic, Cultural and Natural Heritage) in Emilia-Romagna. The method they proposed involved the critical analysis of cartography, supported by dedicated photographic campaigns and on-site experiences to verify the real status of places.

This idea was pursued by the Italian geographer Lucio Gambi - a staunch supporter and member of the IBC group - whose considerable contribution, also social and political, to the picture of Italy's transformation is well known.

A work of systematic explanation and definition of correct methods of investigation, followed by subsequent application to a practical case, was also done by geographer Eugenio Turri. He is an important scholar of anthropological changes in the territory and their effects on the landscape over a long period. The basis of his didactic intention towards individuals responsible for overseeing, constructing, or dwelling in a certain territory lies in his background. (Turri 2002, pp. 7-9).

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[10] Established in 1945 and whose role is becoming increasingly significant within the most important global discussions, official website: https://www.fao.org/home/en/

[11] Zaffi, L., & D'Ostuni, M. (2020). Città metaboliche del futuro. Fra agricoltura e architettura. *AGATHÓN –International Journal of Architecture*, Art and Design, 08, 82–93.

[12] Marot, S. (2024) *Prendre la clef des champs. Agriculture et architecture*. Marseille: Wildproject.

Furthermore, Turri underlines the importance of a survey that is supported by historical and recent photographic documentation and their comparison. This is a practice shared by both the Italian and French schools of landscape architects and architects, which have initiated several collaborative projects, including public ones[13].

The last element to be included in this research approach is the anticipation of potential future scenarios. This brings us back to the central core of this paper, which is that a utopian representation is one of the fundamental steps towards achieving certain urban, socio-economic and cultural objectives. A design exercise widely employed by the famous Secchi-Viganò research and design group is trying to understand the reactions in the macrosystem of certain proposed choices.

It is not guaranteed that forecasting a scenario will generate complete endorsement for a specific current. This is demonstrated by Arturo Lanzani examining seven different scenarios for the Italian landscape (Lanzani 2003). He theorises that pursuing purely ideal plots is impractical, advocating instead for hybridized solutions to overcome inherent weaknesses.

2.3 Project-comparative component

A final detail to note about the methodological component is the importance of acquiring one or more project-comparative case studies. This separation allows for a more in-depth analysis of the specific case study, providing a detailed examination of the factors at play and the outcomes observed. Additionally, by explicitly stating the reasons for including a comparative case study, we can justify our methodology and demonstrate the value of this approach in enhancing the overall research findings.

Considering similar practical cases is necessary at some point in the project development process. It can become a reference from which to understand the results to be achieved and those to be avoided.

A model of considerable relevance, as it is aligned with the features enumerated above, is the blueprint for the "Continuous Productive Urban Landscape", developed by the English architectural firm Bohn & Viljoen[14].

Originally proposed as a theory, it was subsequently used to handle specific spatial scenarios within the Greater London Area (GLA), including the famous Thames Gateway, in which some feasibility studies were made for the future expansion of the area in question.

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[13] For example, the photographic and artistic mission carried out between 1984-1988 by the Délégation à l'aménagement du territoire et à l'action régionale (DATAR) to represent the state of French territory is well known.

[14] For further information on their work, see the official website: https://bohnandviljoen.co.uk/

There are many points in common between Donadieu's utopia and this case. The English architects group proposes a continuous system of permeable areas to produce food for the local community. This new urban design closely aligns with the system, positioning it as the primary organizer of both natural and man-made surroundings.

Their aim is achieved by particularly insisting on two fundamental aspects that are only marginally covered by the French architect. The first is the impossibility to remove the existing urban fabric, but it is necessary to carve out space for such interventions in the interstitial landscape voids, or in certain areas to be re-planned anyway. The second practical aspect concerns the importance of providing for the reclamation of the land where intervention is to take place, whose magnitude is certainly underestimated.

In addition to this, the founding themes of the project that are identified are food security, the benefits of social growth associated with it, and the use of nature-based methods such as permaculture to achieve ecosystem-friendly results.

It seems appropriate to point out that this continuous urban farming system must be supported and monitored by local authorities.

The benefits of this case study lie in the fact that it presents several adaptive solutions that can be easily extrapolated and reported elsewhere.

3. Discussion and conclusions

The utopian blueprint outlined throughout the aforementioned different components is certainly complex, but not unrealizable.

Its interdisciplinary approach - appropriately premised at the beginning of the contribution - has also been proved in the essay. The explored model is composed of parts defined by architects such as Pierre Donadieu, landscape-biologists such as Gilles Clement, but also geographers such as Lucio Gambi or Eugenio Turri. It is also proposed to employ cartographic, bibliographic and photographic sources on the same level of relevance, and in this aim can be found one of the innovative concepts of the model presented. A properly researched photograph of the territory can tell the micro-history of a transformation better than any other source.

Only through the use of multiple methods it is possible to fully understand the current European agro-urban context and intervene appropriately. After this first phase, the idea emerged to reorganise the landscape starting from the natural-agricultural part and assuring the increase of permeable parts and the use of nature-based systems - both for water management and for other natural resources - reviewing the present natural-anthropic balance. To this purpose, soil has

appeared as an endangered tangible/intangible resource on which to operate. As early as 1986[15], Bernardo Secchi warned of the risk of not giving the soil project sufficient importance.

The serious planetary problem we deal with is proving difficult to solve. However, there is a twofold way forward: on one hand, working with municipalities to integrate methods of studying and designing the land as presented more in management plans than in urban planning. On the other hand, we can make the population more aware of what is happening, including intangible issues, in their local area and in the city.

Going back to the theme of the congress, the positive side of the utopia is that it imposes a propulsive critical confrontation with the present and its history (Secchi 2005, p. 65).

It seems, therefore, even more fundamental for the present moment of environmental and social difficulty, to begin from a critical analysis of the current environment, through utopia, identifying what the priority problems are and optimistically trying to solve them.

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[In]tangible connections

[In]tangible connections

Public spaces have always played a key role in urban and territorial development: from an informed reading of the built environment to historical and aesthetic perspectives and planning experiences, the role of these areas emerges as fundamental and contributes to the development of cities in their most tangible aspects. At the same time, these spaces and related policies are closely linked to intangible aspects such as identity building, social inequalities and expressions of difference, which can influence the physical, emotional, economic and psychological well-being of inhabitants and affect the quality and development of urban life. It follows that the quality of public space is not only determined by morphological or performance characteristics, but also by its ability to support practices of use, relationships and forms of mutual recognition. Even minimal interventions can have significant effects when they affect the concrete conditions of coexistence and equity in access to urban opportunities. Public spaces are therefore contested and debated places, where the differences and conflicts that animate cities are not only revealed but also meet and clash around their uses, meanings and projects, embodying different ways of living in and thinking about the city. Collective spaces, and more generally the built heritage, represent the place where the immaterial networks of socio-economic interactions manifest themselves by becoming space, and occupy a central role in public life due to their ability to shape relations between citizens and help guide urban lifestyles. The dispute concerns not only physical presence in the space, but also the legitimacy of the practices that take place there, the dominant representations and the rules – explicit or implicit – that select who can stay and who, on the other hand, is discouraged or excluded. For this very reason, public space is often the point where policies of security, decorum and enhancement come into conflict with the needs of accessibility, spontaneity and everyday use. Even in marginal areas – urban suburbs, small towns or rural areas – public space becomes a decisive vehicle in the relationship between material and immaterial dimensions; today, it requires regeneration processes capable of preserving existing cultural realities, bringing out the polyphony of urban life and activating targeted development policies. Questioning the prospects of such actions, which involve both human and non-human actors, and critically reflecting on the interventions and processes related to the design of public space remains a non-negotiable issue. In low-density areas or suburban neighbourhoods, the presence and possibility of using collective spaces have a direct impact on social cohesion, the stability of local networks and the very possibility of building shared services and initiatives. Furthermore, the issue of regeneration cannot be separated from climate issues such as shading, water management and microclimate regulation, which affect conditions of use and health, introducing new constraints and new opportunities for design action in public space.

This track has been created to include Italian and international reflections, research and case studies that recognise the value of the relationship between tangible and intangible aspects of public space, highlighting the quality of social relations and creating opportunities for encounter and inclusion, but also for conflict and contention.

Awareness and reflection on this dualism become fundamental in fostering the creation and transformation of social bonds and promoting participation in urban life. Through heritage enhancement activities, urban policies and projects involving local communities, the aim is to show how public spaces can be transformed into drivers of sustainable development, transformation and invention. These actions could respond to the needs and aspirations of those who live in these places, overcome inequalities and social exclusion, and enhance the quality of urban life and the expression of differences. Critically questioning public space means reflecting on the responsibilities of urban design and policies in making plural forms of coexistence in urban and territorial space visible, practicable and lasting.

A first thematic area that emerged from the selected contributions addresses public space as a place for the construction of collective identity and as a field of tension between community practices and dominant institutional models. In this case, public space is not considered as a simple container of functions, but rather as an active device, loaded with political, symbolic and relational meanings, in which power relations, forms of belonging and conflicts (latent or manifest). The three articles question this dimension by highlighting how the materiality of public space is deeply intertwined with immaterial processes of identity, recognition, narration and collective appropriation.
This approach reveals an interpretation of public space as a relational environment in constant transformation, in which practices of use, urban policies and design devices intertwine, producing often provisional and negotiated arrangements. The focus is therefore less on the formal outcomes of interventions and more on the processes that generate and traverse them, highlighting the role of local actors and modes of everyday appropriation in constructing the meaning of collective space. Public space is configured as a place where the project is not exhausted in the act of design, but is continually confronted with social practices, conflicts and adaptations that redefine its uses and values over time.
Cannata's contribution analyses the phenomenon of unfinished public works as a tangible expression of an institutional and democratic crisis, reading these suspended spaces as the outcome of interrupted political and administrative processes and, at the same time, as potential places for civic reactivation. Through a critical reinterpretation of the concept of public space in the light of theories on power and the commons, the author shows how bottom-up spatial approaches and practices can transform these artefacts from symbols of failure into material infrastructures for a deeper and more participatory democracy. The temporary, performative and collective actions described highlight the role of space as a threshold, capable of reconnecting communities and institutions and reorienting the public meaning of the unfinished towards new forms of shared use and future planning.
A second interpretation emerges in the article by Amatori and Varini, which addresses public space in historic villages as a fundamental habitat for the construction of a sense of belonging and as a terrain of conflict between local identities and processes of consumption and touristification. Through the example of Borgo San Giuliano in Rimini, the article highlights how the progressive transformation of collective space into consumer space leads to a loss of social relations, a weakening of shared memory and the marginalisation of long-standing residents. Co-design and community design practices are interpreted as tools capable of re-semantising places, restoring centrality to inhabitants and reactivating the link between

the material dimension of space and the immaterial dimension of identity. Public space can thus become a field of mediation, a place where the project acts as an open and inclusive process, aimed at countering dynamics of exclusion and standardisation.
In the third contribution, Saladino shifts the focus to marginal, hybrid and peri-urban contexts, investigating local development tools and practices, such as maps and community cooperatives. In this case, public space and territory are read as complex systems of material and immaterial stratifications, in which the community itself operates as an intangible infrastructure that can activate processes of enhancement, narration and shared management of resources. The experiences analysed show how the production of participatory maps and cooperative action contribute to strengthening local identity and social cohesion, making visible values and meanings that are often absent in institutional representations. Nevertheless, the contribution also highlights the limitations of such practices in the absence of integrated territorial policies, emphasising the need for a more structured dialogue between grassroots initiatives and planning and programming tools.

These first three contributions offer a detailed and complementary reading of public space as a place of intersection between tangible and intangible dimensions, highlighting the role of participatory practices and community enhancement processes in redefining the uses and meanings of collective space. Although operating on different scales and in different contexts, the contributions converge in recognising the central role of public space in the construction of identities, the management of conflicts and the promotion of more equitable and inclusive models of development, opening up critical perspectives on the relationship between design, urban policies and community life.

The second thematic area consists of three contributions that investigate the design of public space as a practice capable of promoting forms of inclusion and integrating social, environmental and cultural dimensions. These contributions also lead to an important reflection and critical analysis of the role and methods of intervention of architects and designers in relation to the urban community within complex projects for the revitalisation of public and collective spaces.
Yu Chen's article, integrating theories and methods of urban design and social sciences, analyses the contribution of Nature-based Solutions (NbS) to sustainable urban development, highlighting how urban public spaces can become strategic locations for green actions and solutions aimed not only at environmental outcomes but also at social inclusiveness. The study shows that NbS foster relationships between people by creating opportunities for social inclusion and community involvement. While most NbS projects focus primarily on environmental outcomes, Yu Chen's research investigates the intangible dimensions of urban space by analysing, through the collection and analysis of good practices, how different NbS contribute to social inclusiveness and can be useful in the creation and transformation of inclusive public spaces.
The work of Manfroni and Priola, on the other hand, explores the importance of community-based design practices as a response to contemporary socio-environmental issues (global uncertainties, pollution, climate change and biodiversity loss), highlighting the great potential of collaborative and “symbiotic” design approaches in encouraging and promoting the spread of a “collective ecological consciousness”. The research therefore

investigates the contribution of design in creating networks of collective knowledge through the adoption of “rhizomatic” processes, communicative approaches and local ecological practices. This leads to the emergence of new forms of civic action that are useful for promoting a sense of ecological citizenship and community.
Through the analysis of case studies and the use of the *Circular Value Framework*, design is studied as a force capable of triggering positive changes that can transform everyday practices and individual and collective behaviours into concrete actions oriented towards “*co-futuring*”. The adoption of different collaborative and relational approaches encourages the identification of appropriate responses to environmental challenges to bring benefits on different scales, from that of communities of citizens to that of ecological environments and society.
Some of the case studies examined, relating to formally structured communities, highlighted the potential offered by contributions arising from dialogue between designers and communities of citizens, who were able to tackle and overcome challenges in a dynamic and cooperative manner.
Finally, Montanaro's contribution offers an interpretation, based on ethnographic research, of the process of constructing the Community Centre in the village of Zhaoshan, in Hubei province, China. The author critically analyses top-down narratives of the transformation of public spaces, specifically investigating the interaction between material and design choices, the relationships between stakeholders and the socio-economic consequences of the construction phase of the Community Centre. The architectural realisation process is read and analysed as a “cosmogram” based on the close intertwining of design, local economies, bureaucratic and legislative frameworks, and the distribution of benefits. The study of the interaction between different construction systems has, for example, highlighted how technologies influence the relationships between the parties involved, local economies, and the impact on the community. The contribution also highlights how the constraints imposed by institutional frameworks and procurement standards have favoured replicability over the satisfaction of local needs and the achievement of community objectives within rural regeneration practices. The research reveals an expanded role for the architect as a mediator between political mandates and community objectives, in order to enhance socio-economic dimensions that are often neglected. In the context of investment in public spaces, the contribution seeks a response to the need to bridge the gap between the construction market and the public interest of the community.
Compared to previous contributions, the research by authors Fangyu Chen, Erdmann-Goldoni and Zhengzheng stands out for its highly methodological and operational approach, aimed not only at understanding urban phenomena, but above all at constructing analytical tools, decision-making models and conceptual platforms capable of providing concrete support for public space planning processes. In these works, public space is interpreted as a complex system, where physical and measurable dimensions are constantly intertwined with intangible components, such as social practices, cultural values, community relations and the temporal dynamics of urban use.
Fangyu Chen's research specifically addresses the issue of health equity and accessibility to services for the elderly population in the Chinese urban context, taking the Wenjiang district in Chengdu as a case study. Through the integrated use of GIS analysis, accessibility, and location gravity models, the research highlights how the spatial distribution of elderly care facilities produces significant inequalities in

access to care services. The adoption of an improved analysis model overcomes the limitations of traditional measures based exclusively on proximity, integrating factors such as service capacity, elderly population density, and walkable distance thresholds. In this way, accessibility is interpreted not only as a technical variable, but as a key indicator of social equity and urban quality of life, demonstrating how location and infrastructure choices directly affect social relations and well-being opportunities for the most vulnerable groups.
Erdmann-Goldoni's article takes a broader, more theoretical approach, proposing *Public Scape* as a data-driven platform for the regeneration and revitalisation of public spaces. The contribution responds critically to the limitations of traditional approaches to urban planning, which are often based on fragmented data and focus primarily on the tangible aspects of space, such as infrastructure and environmental parameters. *Public Scape*, on the other hand, is an integrated environment that combines spatial data, socio-economic information, environmental indicators and community feedback, promoting more inclusive, transparent and participatory decision-making processes. The use of advanced GIS tools, predictive analytics and post-intervention monitoring systems allows top-down and bottom-up perspectives to be combined, enhancing the role of users and local communities in defining the meaning and functions of public space. In this sense, the platform explicitly recognises the value of intangible dimensions, such as cultural identity, collective memoryand social involvement, considering them essential elements for the long-term sustainability of urban regeneration processes.
Zhengzheng's work completes the picture by proposing a *task list* of space-time components as an operational tool for optimising public open spaces. The research starts from the recognition of the dynamic nature of urban space, whose use varies throughout the day, the seasons and over the long term of urban transformation. Through the integration of spatial and temporal dimensions, this innovative task list provides a structured guide for systematically addressing issues related to accessibility, safety, environmental comfort, social interaction, cultural dimension and urban aesthetics. The proposed model stands out for its ability to translate abstract objectives – such as urban identity, social cohesion and environmental sustainability – into operational indicators and design strategies that can be adapted to different types of public spaces, from historical contexts to contemporary commercial areas.

Taken together, these contributions demonstrate how advanced analytical tools, spatial models and integrated digital platforms can become fundamental levers for effectively addressing the challenges of equity, sustainability and urban quality of life, offering concrete support for decision-making processes in the field of planning. At the same time, the authors emphasise the need not to reduce public space to a mere sum of technical or performance parameters, but to recognise and value its social, cultural and symbolic complexity. From this perspective, the integration of quantitative data and intangible dimensions emerges as an essential condition for developing fairer and more inclusive urban policies, capable not only of improving the efficiency and performance of spaces, but also of responding flexibly and sensitively to contemporary urban transformations and the diverse needs of the communities that inhabit them.

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From public space to consumer space, or vice versa? Re-semanticizing places through design

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ABSTRACT
This paper analyses methodologies and approaches of transdisciplinary design and identifies co-design practices and processes of re-establishing communities' sense of belonging to representative places for public life, encounters, collective experiences, debates, and protests within villages. Historic villages are currently facing significant depopulation phenomena which, in rural and inland areas, can be attributed to the lack of job, relationship opportunities, essential services, and tiring or often unremunerative agricultural or craft activities. But in urbanized villages, what could be the cause of the abandonment of residents? The Borgo San Giuliano in Rimini exemplifies some of the dynamics that underlie it: once a vibrant fishing-artisan community, it has transformed into a space dominated by tourism, eroding local identity. This shift highlights public spaces no longer as resources of the local community, but as consumer goods, increasing gentrification and loss of social ties. Strategic and community design plays a critical role in re-establishing a balance between inhabitants and place, enabling participatory processes that make residents protagonists in the shaping of their environment.

CO-DESIGN | SYSTEMIC DESIGN | HISTORIC VILLAGES | LOCAL IDENTITY

1. Habitat and sense of belonging

Public space is crucial habitat for the educational, evolutionary, and social life of communities, whether within large or medium-sized urban centers or in more circumscribed contexts such as historic villages[1]. In the latter, even if the number of inhabitants and places of aggregation is reduced, a cohesive community is more likely to be found, which identifies itself in collective spaces –natural and artificial– of daily attendance. This community is deeply rooted in the immaterial dimension of the relationship between the human being and the place and expresses itself in social moments –for instance pagan or religious rituals– in which essential, voluntary and social activities combine to give a soul to the village (Gehl 2012; Sennet 2020). Often deprived of some important primary facilities and socio-economic opportunities, the Italian 'borghi' have arisen public interest and posed complex challenges for researchers, attracting more and more funds for the reactivation of local micro-economies and to stop depopulation phenomena, which impact on both isolated villages and those incorporated into cities: historically defined as autonomous organisms, with unique landscape, environmental, structural, social and cultural characteristics, they are now experiencing a loss of community identity, often due to tourism-led gentrification (Cristiano & Gonella 2020).

Emblematic in this sense is the Borgo San Giuliano in Rimini, built as a village of fishermen and artisans 'extra moenia' (Ghirardelli, Pasquinelli, & Spadoni 2008). From being a neighborhood of popular extraction with a strong community vocation based on skilled trades and age-old traditions especially linked to the sea, in the last fifteen years, it has become a place of a frenetic and monocultural consumption aimed at the exclusive needs of the tourist, rather than those of the community-inhabitant who feels slowly rejected by the place having lost its landmarks. This functional shift is the involuntary consequence of an initial positive phase of redevelopment and regeneration of the area, followed by a deleterious phase of widespread and undifferentiated aggression and replacement by the feverish offer of new commercial activities or events with an impersonal and globalized aspect, often patronized by the Municipality (De Vita 2021).

Since the social space represents essentially that characteristic and emblematic place of the community that inhabits it, perceiving it as its own authentic common good, what occurs when the threshold space, between the public and private realms transforms into a commodity and a possession of a few, homologated and exclusively functional to the tourist economy? If the tourist-led gentrification uproots residents from their places of living, erasing intrinsic affective ties and social values, how can design contribute to restructure a sense of community and belonging, preventing the loss of identity? Can design work transversally by re-conceptualizing the

[1] The term "village" refers to those urban organisms that in Italy are also known as "borghi".

environmental, social, and economic dimensions of public space in an inclusive manner among all user categories?

On one hand, the importance of methodologies for the enhancement and revitalization of villages in rural areas through cultural and design projects has been highlighted, with public space serving as the focal point for reactivation efforts (Brignoni, Gasparotto, Dall'Osso & Varini 2023). On the other hand, while the depopulation of urban villages and the loss of their identity are often analyzed in relation to the impacts of tourism, less attention has been given to the resistance practices that emerge in response to the rising tourism-driven gentrification (Iovino 2016; Cristiano & Gonella 2020; Basso, Fava & Fregolent 2023). Even more complex is finding examples of how design can return public space to its community, avoiding identity loss and preventing the phenomenon of tourism-led gentrification.

Hence, the present research aims to move in this direction establishing the Borgo San Giuliano as the crossroad for interdisciplinary experimentation and contributing to a broader body of work conducted by the Community Design Research Unit of San Marino University.

In particular, in the following pages, some worthy case studies will be listed, in order to represent and certify an intangible heritage to be preserved and protected.

2. Methodology

The contribution constitutes the starting point of a two-year-long search, aiming to be accomplished in September 2026 during the 'Festa De' Borg', the biennial neighbourhood event that preserves the traditions and history of this area. In this initial phase, outlined within a roadmap [Fig. 1], the study has primarily been conducted through a desk research, on-site visits, and informal interviews with some key stakeholders.

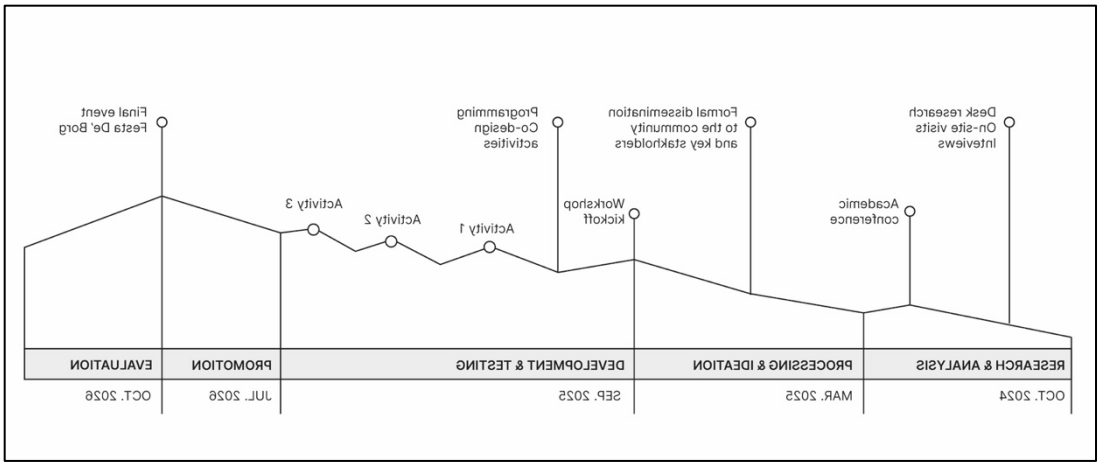

Fig. 1
Roadmap of key activities planned for the research project (credit: C. Amatori, 2024).

In order to define the project framework, it was examined the scientific literature on the enhancement of community identity and sense of belonging within historic villages mainly through

co-design practices. Based on approximately 100 case studies[2], two relevant projects were identified. These were selected according to the project promoter, differentiation and number of stakeholders involved, the level of the community engagement, the use of collaborative processes, main activities, design disciplines involved, as well as the project's duration, outcomes, and impact. For this purpose, the focus was projected on two Italian realities located in places - Calabria and Sardinia - that even if differ to the Borgo San Giuliano in Rimini, proved to be functional to better investigate the correct indicators to correlate with the contingent situation in Romagna. 'BelMondo' project guided by the association 'La Rivoluzione delle Seppie', aimed to re-imagine and revitalize the historic center of Belmonte Calabro, and give the community the opportunity to appropriate the public space basing on collective and emerging social needs. Born from a research group of the London Metropolitan University in 2016, still active, the project aims to gather national and international professionals, academics, local institutions, and inhabitants in order to experiment urban and social reactivation through participatory workshops, informal meetings and cultural exchanges, focusing on the local human and entrepreneurial capital [Fig. 2] (Adamo 2022; La Rivoluzione delle Seppie n.d.).

Born in 2016, 'Restart. Innesti Urbani' is part of an ongoing research project taking place in the historic Oliena city center, in Sardinia Region. Through the definition of a shared language and practices between locals and professionals, the implementation of a series of events, such us workshops, exhibitions, round tables, the project aims to generate an experience which would allow local inhabitants to recognize the value of their tangible and intangible cultural heritage, building meaningful scenarios in the contemporary and future culture and uses, and encouraging the formation of a sense of belonging to the community [Fig. 3] (Boi, Camocini, Daglio, Mazzarello & Podda 2018).

Alongside the methodological framework, an historiographical investigation was undertaken using bibliographic sources, cartographic materials, and photographs related to the Borgo San Giuliano. The documentation was primarily gathered from the archives of the Gambalunga Library in Rimini, which holds the largest collection of documents related to the city. Moreover, an informal interview was conducted with Tommaso Panozzo editor, collecting texts on the history and culture of Rimini since 1981. In addition, various documents and digital platforms were examined, including the Open Geo Data and the Interactive Maps Portal of the Municipality of Rimini, the general urban planning regulations, and the Airbnb platform. Through this documentation and many on-site explorations, a mapping of local services has been designed, covering commercial enterprises, hospitality

[2] It was mainly used the database of the research project 'Stretch the Edge: Design Driven Processes for Reactivating Small Walled Towns and Inland Areas', conducted by the Design Research Department of the University of San Marino and Bologna that define an operational taxonomy of best design practices (UNIRSM 2023).

services –e.g., restaurants, accommodation–, cultural centers, social spaces, educational and healthcare institutions, and sports facilities. This effort led to the creation of a territorial map through Google My Maps, used to analyze how the area has been developing during the last decades, and facilitated the identification of key stakeholders and the assessment of their prospective involvement in the project.

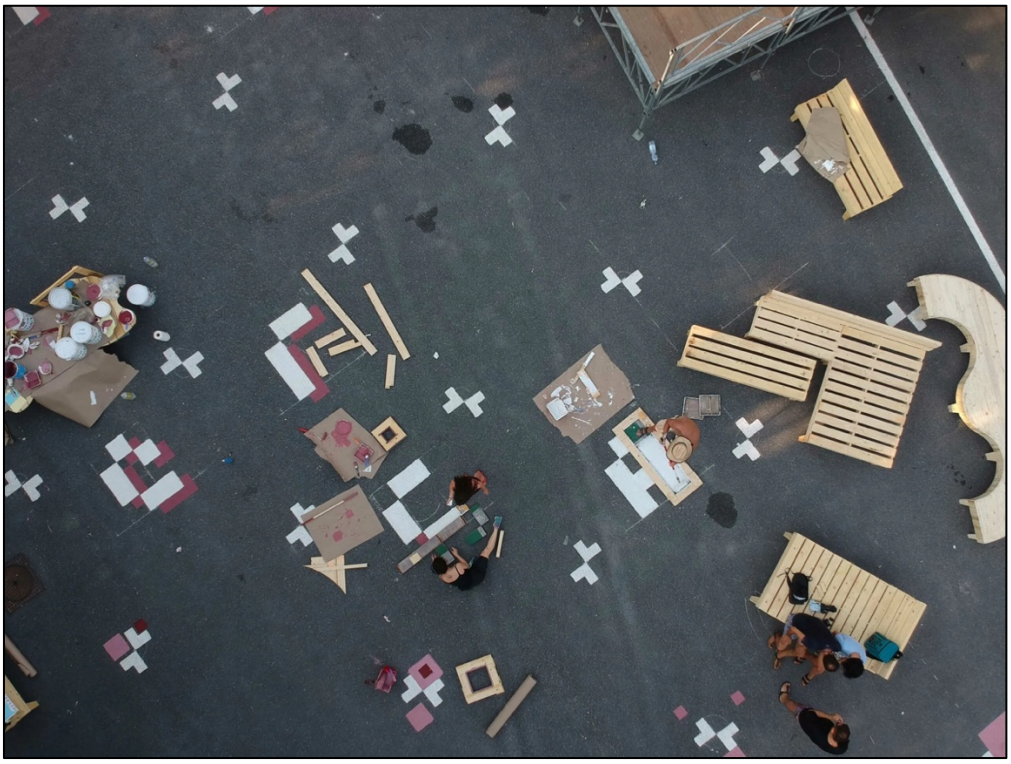

Fig. 2
Crossing 2022 workshop organised in Mercato Marina, located in Belmonte Calabro (credit: La Rivoluzione delle Seppie, 2022, https://larivoluzionedelleseppie.org/galleria/).

Fig. 3
Visit to the site-specific installation in Oliena in 2018 (credit: Daglio et al. 2020)

3. From depopulation to tourism-led gentrification

The Borgo San Giuliano, established during the Middle Ages as village outside the city walls of Rimini by the Marecchia River, was predominantly inhabited by fishermen and sailors (Conti & Pasini 1982). Over the past century, it has experienced cycles of depopulation and repopulation, leading local politicians, and administrators to recognize its potential. Ghirardelli & Pasquinelli (2013)

describe how the collective awareness of community life in the post-war period was evident in the active participation of residents in the Communist Party and the founding of the 'Primo Maggio' Circle. "Mainly composed by sailors, factory workers, carters, coachmen, manual laborers, railway workers, and some shopkeeper" (p.6), the community underwent a transformation during the economic boom and the rise of a tourism-based economy. Many residents moved to residential neighborhoods and public housing, and local businesses and craft shops ceased to exist, while commercial activities along Viale Tiberio, the main thoroughfare, became more dominant. This initial depopulation was interrupted by the first 'Festa De' Borg' in 1979, which marked the regeneration of the Borgo values and identity [Fig. 4] (Ghirardelli et al. 2008). Between 2011 and 2021, the municipal administration promoted a further transformation in the Borgo, with new commercial and social entities and residents establishing themselves.

Fig. 4
Procession organised during the 4th Festa De' Borg in 1984. People occupy the public space with tables and chairs. (Credits: Archivio fotografico-Biblioteca civica Gambalunga, Rimini)

Fig. 5
On the left, some children play in Gabena Square in 1974. On the right, the same square enclosed by stalls and occupied by cars nowadays. (Credit: Archivio fotografico-Biblioteca civica Gambalunga, Rimini)

Through the new urban planning regulations and the management of European Union funding, Rimini initiated a long-term urban redevelopment project, making the Borgo increasingly attractive (Giuzio 2024).

It has been observed that Airbnb activities have tripled over the past ten years, as have the prices of real estate and hospitality services. The public space, which 30 years ago was a meeting and discussion area for the residents, has progressively lost its social function and transformed into a parking lot for cars and a space for outdoor dining activities [Fig. 05]. The historic village bakery, a traditional habitat for the cultivation of fruitful transgenerational neighborhood relationships, has been replaced by the aseptic and impersonal business of a multinational fast-food chain. The change, progressed after the Covid pandemic, also involved the removal of some stalls and benches created by the Ci.vi.vo group[3], which had been used as social spaces. The growing tourist interest, the abandonment and disappearance of residents from their activities, and the privatization of public spaces for the benefit of a few led to the formation of a Committee of Borgo residents in 2016, who felt the urgency to oppose the massive transformation the area wasundergoing.[4]

4. Design practices for re-establishing community identity

Based on the analysis, the inhabitants are losing their sense of belonging as expressed by Granata (2024), the place begins to lose its intrinsic value, "authenticity and uniqueness, quality and distinction, in favor of conforming to a single model of easy and ready-to-use tourism, identical in every location" (p. 7).

Both case studies –BelMonte and Restart. Innesti Urbani– offered valuable insights into how strategic design and co-design practices can help address this phenomenon. Their analysis was guided by a framework that synthesizes key factors relevant to the research [Fig. 6]. Both initiatives, originated within university research groups, have been affected by design in managing different approaches provided by the interdisciplinary leader group, engaging local citizens in co-design activities, fostering the knowledge exchange through workshops that resulted in tangible results and different outputs, such as setting design and exhibition, re-discovering the design potential of shared immersive experience and narrative tools, helping to interpret the local historical heritage with a new perspective that includes new behaviors and innovative uses. Through a program of interventions and initiatives alongside the local community, villages progressively rebuilt their unique identities. The local community reclaimed public space, new social dynamics emerged between old and new residents, and a network of relationships with stakeholders at various levels

[3] The City Council of Rimini approved, with resolution no. 282 of 2011, the 'Regulations for the conduct of civic volunteering activities', to enhance a new civic engagement through the direct involvement of citizens in solving problems and fostering the awareness that public spaces belong, above all, to citizens (https://www.civivo.it).
4

was established. Social, cultural, and economic impacts are visible thanks to projects' longevity that also allowed to build credibility among stakeholders and a high degree of territorial and extra-territorial dissemination (Boi et al. 2018; Adamo 2022).

5. Re-composition

Depopulation phenomena in villages within rural territory has been analyzed along the last decades. Many academics, practitioners and public administrators studied and designed methodologies, tools, and laws to enhance and reactivate public places. Less effort has been spent for resolution of depopulation phenomena within urban villages, largely driven by tourism-led gentrification, which have prompted local populations to migrate towards more livable environments.

	BELMONDO	RESTART. INNESTI URBANI
LOCATION	Belmonte Calabro (Calabria)	Oliena (Sardinia)
INHABITANTS	> 2000	> 2000
ACTIVATOR	La Rivoluzione delle Seppie London Metropolitan University	Design Department (PoliMi) ABC Department
TIMEFRAME	2016-ongoing	2016-2019
TARGET	Children, asylum seeker, students, academics, professionals in the creative fields, elders	Local citizens and associations
KEY STAKEHOLDER	Orizzontale, Comune di Belmonte, Arts of the Working Class, Cheap, Ex Convento, London Metropolitan University	Fondazione Sardegna, Tianjin University (China), Sassari University, Cagliari University, GAL Barbagia, Oliena Municipality, Oliena Centro Association, OICE, Presting S.r.l.
FUNDING AGENTS	Regional and private contributions, E.U. funding	Regional and local funding
MAIN ACTIVITIES	Co-planning, remote working, widespread hospitality, regeneration of underused and abandoned spaces, creation and development of businesses and innovative start-ups, creative workshops, round tables	Round tables, students' projects exhibition, setting design event, interdisciplinary group workshops
DESIGN DISCIPLINES INVOLVED	Exhibit Design, Interaction design, Design strategy, Design for social Innovation, Critical Design, Co-Design, Design thinking	Exhibit Design, Interaction design, Design strategy, Design for social Innovation, Participatory Design, Co-design
MAIN RESULTS AND IMPACT	1) More appreciation of the territorial potential and creating new points of view within the local community in their hometown; 2) Research and feeding of the culture of own community, with shared goals; 3) Cultural occupation generates attraction to the territory for a possible repopulation, even if temporary but constant; 4) Collaboration between the global and local reality to configure a powerful agent for affirming the empowerment of local actors and maintaining culture, even in areas lacking the offer; 5) Creating a new international community capable of collaborating to conserve and develop culture can bring economic well-being and society to marginal realities like urban areas.	1) Increased the sense of awareness about the relevance of local historical heritage and of ownership of the place, witnessed by the creation of the Oliena Centro association; 2) Reaction to cultural and territorial isolation, tracing meaningful connections with other homogeneous realities; 3) Deep involvement of local community, stakeholders and visitors.

Fig. 6 The framework synthetizes the main indicators of the case studies of BelMonte and Restart.Innesti Urbani (credit: C. Amatori, 2024).

Cases such as San Gimignano in Tuscany or the Cinque Terre in Liguria illustrate how tourism has never been properly regulated, and how political agendas have often promoted a growth-oriented vision without adequately considering the potential harms to local communities and the environment (Mura 2024; Allegri 2020). As noted by Cristiano & Gonella (2020), "when the side effects of over tourism become mainstream, it is often too late to intervene, and emergency policies are therefore implemented, for example through special or urgent laws, which are scarcely democratic by definition" (p.2).

After experiencing periods of depopulation and repopulation, the Borgo San Giuliano is still under the spotlight of public administration, which continues to promote actions and interventions aimed at its redevelopment, but homologation and gentrification impoverish and aggravate the marginalization of its residents. It thus seems worthwhile to explore design practices to halt this process and recreate a sense of belonging for the local community to the place.

Many are the experiences where design functions as a mediating tool that bridges the intangible dimension of community memory with the recontextualization of the tangible culture. It serves as a

facilitator of processes, reinterpreting contextual and situated elements to cultivate a renewed identity within spaces. This approach engenders new functions conceptualized by the residents themselves, fostering relational dynamics among individuals and between individuals and the environments they inhabit. Playing a supportive role in the construction of a balanced ecosystem of relationships between the local and the global, it generates processes of sharing visions for the reactivation of the common good, rediscovering, or recreating systems of proximate relations, while expanding and strengthening networks of stakeholders who reclaim local microeconomies (Manzini 2015).

If a community survives over time only if it is intrinsically determined to regenerate, coexist, merge, and interact with its internal and external differences, then there is reason to hope that this moment of self-critical transition for the Borgo will lead to the birth of new and unexpected opportunities for immaterial re-composition between place and inhabitants, perhaps starting from the reopening of a neighbourhood bakery.

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The Unfinished as Commons: material conditions for a deeper democracy

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ABSTRACT
Within the framework of the relations between public space and the various powers that shape it, this article begins with unfinished systems of traces left behind when political and administrative processes abruptly halt. Since the 1950s, Italian governments have invested public funds in the construction of transport infrastructure, hospitals, schools. Far from being a contingent approach, the following decades revealed it as a constant 'deviation' – especially in the Mezzogiorno – where hundreds, if not thousands of these works have been left unfinished. The scale and spread of the phenomenon of unfinished public works in Italy display the failure of these policies, emerging as a tangible form of a broader crisis that involves public institutions. New spatial and curatorial practices brought life into unfinished spaces, activating them for the first time through performance and civic participation. We discuss these practices – and their spatial and material characteristics – marking the passage from a state of suspension to long-term transformations. Finally, these practices are seen through the lens of the Commons to bridge them with each other and highlight their emancipatory and deeply democratic nature.

POWER | UNFINISHED PUBLIC WORKS | COMMONS | CONSTRUCTION SITE

1. Power and public space: unfinished visions

Since the 1980s, influenced by Henri Lefebvre's concept of 'Droit à la ville' and Michel Foucault's intuitions on the intersection between space, knowledge and power, the importance of public space as a political arena has been explored. Specifically, research has delved into the spatialization of forms of power (Raffestin 2022), along with the understanding of the urban process as a complex social interaction, where different spatial agencies collide (Harvey 1989).

Territory and community are now seen as engaged in a close socio-spatial dialectic (Soja 1989), and space is understood as a repository of traces left by different and often conflicting powers – officially recognized, subversive, or criminal – that have shaped it (Weizman 2010, Tesoriere 2023a). When the ongoing urban processes, along with the forces that set them in motion, suddenly halt, what remains is a system of signs that displays the interruption of complex processes – political, economic, technical, bureaucratic and social – through a tangible form. As 'ruins in reverse' (Smithson 1967), unfinished public works promoted by institutional powers testify to interrupted ideas of progress and visions of the future, standing as failed embodied politics.

This is most evident in the utopian-totalitarian 20th-century regimes (Troiani & Dawson 2020), where the suppression of individual initiative was replaced by pervasive and violent state intervention. The unfinished projects of countries such as the former Yugoslavia, Romania, and Cuba, or the incomplete projects as the Deutsches Stadion in Nuremberg, the Palace of the Soviets in Moscow, or the Fascist EUR in Rome[1], clearly embody the ideology of these regimes and their downfall.

These material legacies are closely tied to the myth of the 'strongman' and served as a propaganda tool: space, form, and language were devices through which the authoritarian and anti-democratic powers controlled, surveilled and represented themselves. In contemporary democracies, the phenomenon of unfinished public works persists, though it has altered in form and scale, shifted in meaning, reshaped in language, and reoriented in its aims, reflecting the different types of power that molded it [Fig. 1]. In recent years, growing interest in Italy's unfinished public works across institutions, academia, art, and pop culture have highlighted their unique characteristics, unlike those of other European countries. Emerging within a broader European institutional and democratic framework, Italian unfinished public works mirror the complexity and multifaceted nature of its current economic, social, and political context. But how do unfinished public works appear in a democratic landscape?

[1] Albert Speer's Deutsches Stadion, designed for 400,000 spectators, was abandoned at the foundation phase, now hidden by trees. The Palace of Soviets project halted during WWII; the Cathedral of Christ the Savior was rebuilt on its site. The E42 district, renamed EUR, was completed and repurposed for post-war use.

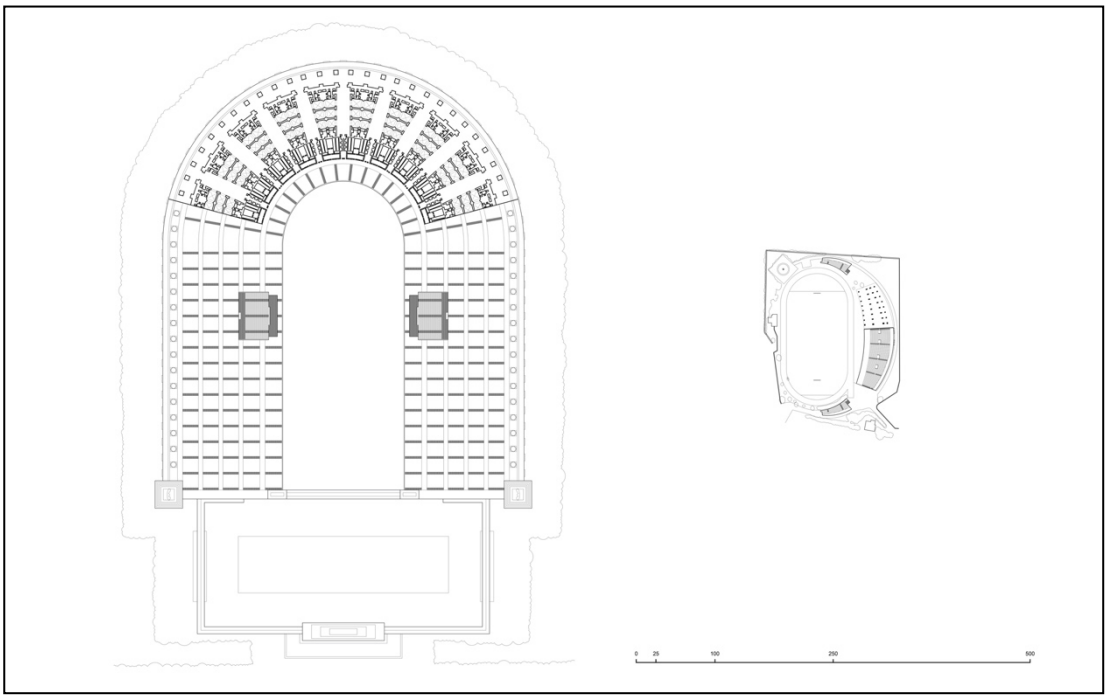

Fig. 1
Albert Speer's Deutsches Stadion vs Unfinished Polo Stadium in Giarre (CT). [credits: Image elaborated by the author].

2. An unfinished form of democracy

In Italy, the phenomenon of unfinished public works has developed unique traits, both because of the political context where it occurs and its widespread distribution across the whole country. Since the 1950s, successive governments of the Italian Republic have invested public funds in modernizing the country through the construction of transport infrastructure, hospitals, schools, etc. Despite these initial intentions, in the following decades this approach, far from being an exception, unfolded as a praxis, and the 'irresistible infrastructural deviation' became, on the contrary, a 'prerogative of underdevelopment' (Becchi 1990). This trend exacerbated the gap between the South and the rest of the country, resulting in oversized works, barely useful, or completely useless projects, hundreds (possibly a thousand) of which have been left unfinished.

In 2011, the Italian government established the Elenco-anagrafe nazionale delle opere incompiute (National Registry of Unfinished Public Works) and, in 2013, the Sistema Informatico Monitoraggio Opere Incompiute (SIMOI, Information System for Monitoring Unfinished Public Works) under the Ministry of Infrastructure and Transport (MIT). These tools were thought to facilitate the monitoring, collection, processing, and coordination of data on unfinished public works at national, regional, and local levels, ensuring a uniform presentation of the results in table-based formats.

In parallel – since 2007 – the artist collective Alterazioni Video (AV)[2] has explored this phenomenon through a visual investigation.[3] Its work consists of photographic reportages, maps and a catalogue, summarizing the phenomenon's main features in their 10-bullet-point Incompiuto Manifesto (Alterazioni Video & Fosbury Architecture 2018). According to ministerial data published in 2023 (MIT 2023), Italy has 373 unfinished public works, with 70% located in the southern regions and, particularly, in Sicily, which accounts for 37% of the total. Nevertheless, this figure is likely underestimated: ongoing research based on a spatialized approach (Cannata 2023), indicates that the actual number of unfinished public works only in Sicily is at least 259[4] [Fig. 2], revealing discrepancies between the existing records and highlighting their incomplete and fragmented nature [Fig. 3].

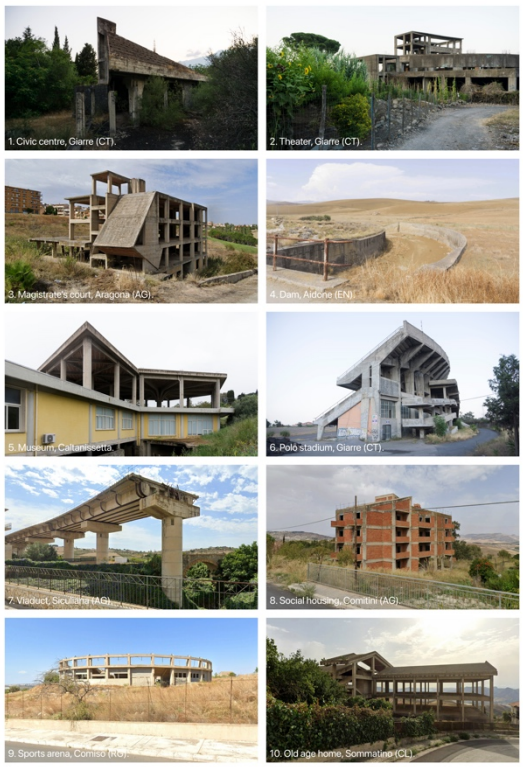

Fig. 2
Selected views of unfinished public works in Sicily. [credits: Photographs 1–6 by the author; images 7–10 sourced from Google Street View.]

The justification for these projects lies in their supposed *publica utilitas*, a goal that, due to their incompleteness, has never been achieved. As Ada Becchi sharply pointed out in 1990 already, the

[2] AV is an art collective founded in 2004 by Paololuca Barbieri Marchi, Alberto Caffarelli, Matteo Erenbourg, Andrea Masu, and Giacomo Porfiri.
[3] Under a Critical Heritage Studies' perspective (Arboleda 2017), AV attitude tends to 'historicize' the phenomenon, that they call "the leading architectural style in Italy since World War II" (Alterazioni Video & Fosbury Architecture 2018, p. 15), questioning its heritage nature and promoting its resignification through performative and artistic actions.
[4] The category of unfinished public works is vast and heterogeneous: although transport infrastructure is the most prevalent category in Sicily (23%), public buildings are also numerous, including sports facilities such as arenas, stadiums, and swimming pools (20%), as well as service structures like elderly homes, markets, and cemeteries (14%).

presence of such works is not a random fact but an endemic issue, driven by political interests, profit-oriented motives, and even criminal activities, rather than addressing the real needs of the community. Thus, unfinished public works demonstrate not only a prematurely halted construction but also incomplete administrative and political processes, a tangible form of a broader crisis within public institutions and democracy. In this framework, they remain incapable of embodying the values of the public and display the failure of the institutions to govern political and spatial transformations (Tesoriere 2023b). Consequently, communities lose both the physical spaces needed for public life and the opportunity to engage in democratic practices: the civic role of these communities is weakened, leading them to a distorted performance of democracy.
Building on Bruno Latour's 'Dingpolitik' (2005, pp. 14-43), what material and spatial conditions enable democracy, and how can they be fostered? How can we subvert negative values associated with unfinished public works? How can we reorient their meaning, imagining alternative futures?

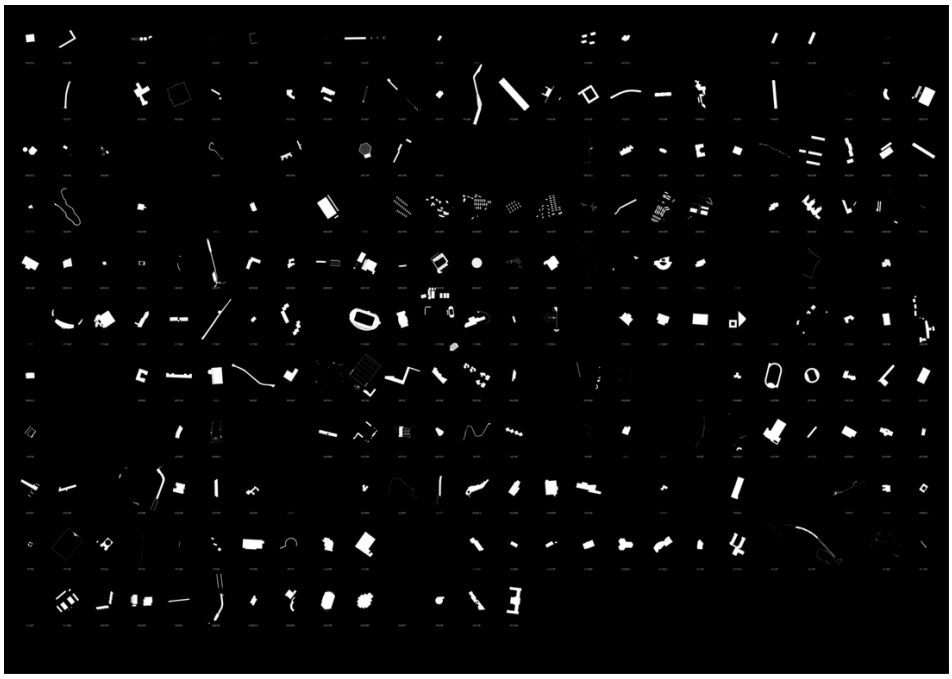

Fig. 3
Redrawing of the plans of unfinished public works in Sicily, 2024. [credits: Image elaborated by the author.]

3. Setting up the construction site

In recent decades in Italy, several bottom-up and participative initiatives have emerged in different cities, demonstrating that civic engagement with unfinished public spaces can bring new life and meaning to them. Spatial and curatorial practices, led by artists and designers, acted as a tool for the co-construction of public spaces, reclaiming public spaces that have been inaccessible for decades. Among the numerous actions, notable examples include the Festival dell'Incompiuto Siciliano in Giarre (Catania) in 2010, curated by AV with StudioNOWA; the Leggermente Party! in Matera in 2019, curated by AV and Fosbury Architecture, in collaboration with Architecture of Shame; Uccellaccio in Ripa Teatina (Chieti) in 2023, curated by HPO and Claudia Durastanti and

presented at the 18th Venice Architecture Biennale; and, in the same year, Grande Teatro in Gibellina Nuova (Trapani), curated by Progetto Materia [Fig. 4].

The incompleteness of these projects leads to recurring conditions, such as site inaccessibility, presence of debris, and the need for authorizations, along with the desire to make them accessible and usable.[5]

Facing recurring conditions, these actions 'carved a trench' activating unfinished spaces by designing spatiotemporal events that serve as models for a systemic approach. The step-by-step design and low budget interventions aim to make unfinished spaces habitable for the first time, ensuring their safe usability and leading to some constants in design and material solutions.

The reclamation of these spaces begins with the removal of access barriers, followed by mowing, brush clearing, and cleaning operations to free the site, sometimes employing rented machinery for earthmoving and debris removal.

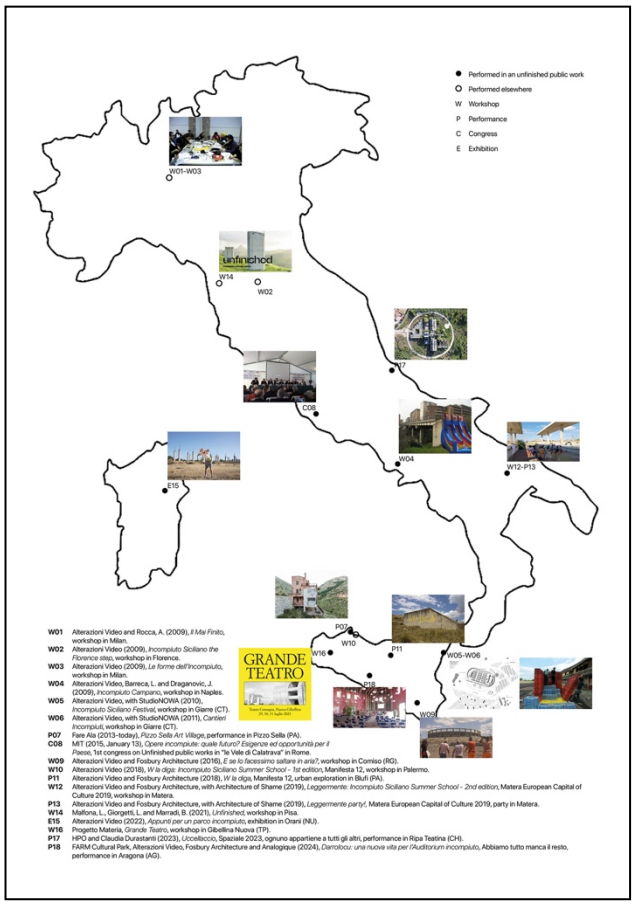

Fig. 4
Activating Unfinished: map of spatial and curatorial practices in Italy, 2024. [credits: Image elaborated by the author.]

Next comes securing the site – treating it as a construction site – by installing wooden railings, nets (anti-fall, dust-proof, fiberglass), and protective caps for exposed rebar.

[5] Demolishing all unfinished works isn't viable, nor is it possible to activate and transform them all. Building on the concept of 'curated decay' (Desilvey 2017, Arboleda 2017), Alterazioni Video suggested other forms of (non)intervention, considering entropy and 'active' arrested decay as possible operations.

Demolition work is reduced to the bare minimum to ensure safety and lower the costs, and limited paintings mark the intervention. If the building's utilities are unusable, portable generators are used to provide electricity, and portable toilets are rented and installed.

The new setups reinvent common objects, used as furniture or supports: barricades or stretched plastic films reorganize the internal space, redefining pathways; lightweight concrete blocks or fruit crates become modular, composable furniture; wooden, aluminum, or steel tubular uprights serve as supports for exhibition installations. Finally, potted plants, screens, musical instruments, and ribbons are arranged for the inauguration event.

The use of raw construction materials, reinterpreted to meet new needs, explicitly evokes the construction site landscape – ephemeral, transitional, and necessary – here reorganized a posteriori: a transient architecture, contaminated by Land Art, Ready-made, and Arte Povera techniques, that displays the everyday life of a construction site.

As the most recent of these interventions, the activation of the unfinished Municipal Auditorium of Aragona in Agrigento serves as a pilot project, defining a protocol applicable to various contexts and scales. The project started with an agreement between the municipality and four agencies[6] that allowed reappropriation of the unfinished space, initiating the cleanup and safety efforts. At its inauguration on June 21, 2024, a cultural program featuring debates, installations, and performances attracted significant public participation. The next phase will involve designing a transformation project with minimal interventions and a radical reconsideration of the use of space [Fig. 5]

[6] Farm Cultural Park, Alterazioni Video, Fosbury Architecture, and Analogique.

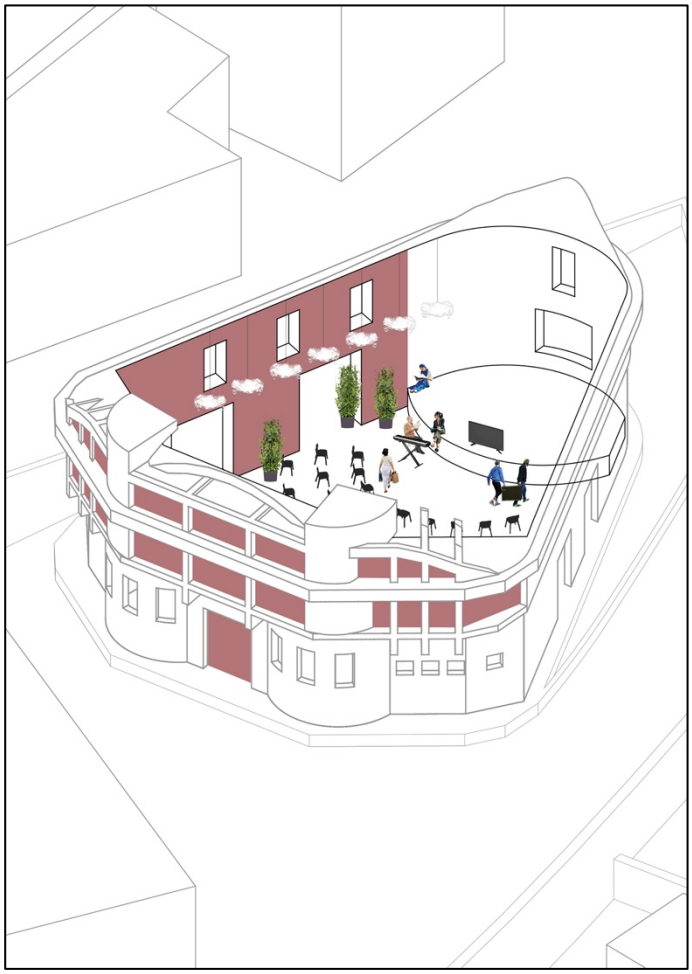

Fig. 5
Axonometric view of the inauguration of the unfinished Municipal Auditorium of Aragona (AG) on June 21, 2024

4. Unfinished as Commons: a bridged archipelago

According to Massimo De Angelis' definition (2021, p. 643), Commons are social systems constituted of three strictly related elements: a commonwealth (as a material or immaterial set of resources), a community of commoners (to hold, manage and govern them) and the praxis of commoning (namely, the act of producing and reproducing forms of social labour and cooperation). In Italy, the concept of *beni comuni* (common goods), revitalized by the Rodotà Commission (2007–2008),[7] is rooted in Roman law through the notion of *res communes omnium*.[8] This concept is strictly related to *actio popularis*, a Roman legal notion that (as an ancestor of contemporary commoning

[7] The Rodotà Commission, established at the Ministry of Justice from 2007 to 2008, proposed a redefinition of the taxonomy of public goods, dividing them into 'sovereign goods of necessary public ownership' (beaches, road networks, airports), 'social public goods' (hospitals, schools, universities), and 'productive public goods' (a residual category that can be sold or managed by public entities using private law instruments).
[8] Literally 'things common to all', in Roman law they were understood as natural resources, such as air, the sea, and coastlines.

practices) allowed an individual citizen to act in defense of public rights on behalf of the people (Settis 2010, p. 118).

As a topical debate in Critical Spatial Practices (Jaque 2024, pp. vii-ix), the theme has been explored through the lens of commoning practices in relation to social housing complexes, contested streets, and occupied squares. These spaces, both spontaneous and envisaged as commons, underscore the emancipatory potential of Commons (Stavrides 2016) and highlight the possibilities of architecture in transition towards a non-destructive, non-extractive form of planetary life (López-Dinardi 2024), as an alternative to contemporary capitalism based on mutual aid, solidarity and cooperation. [9]

Following Giorgio Agamben's theory of the 'State of exception', Stavros Stavrides describes the contemporary city as an archipelago of enclaves, where enclosed urban islands adhere to internal laws, protocols and behaviors imposed by the authority.

Commoning practices aim to 'perforate' the material and immaterial boundaries of enclaves, while common spaces act as spatial thresholds that separate yet simultaneously connect, shaping the transition from an inside to an outside (Stavrides 2016).

Similarly, unfinished works can be described as enclosed spaces where public authorities force a permanent state of suspension through control devices – fences, gates, locks, sealed openings, surveillance systems, but also prohibitions, service orders, the necessity of permits and inspections – that inhibits human presence.

As seen before, new spatial and curatorial practices, performative and participative, promoted the reappropriation of these spaces, prompting the re-signification of unfinished public works, subverting and reorienting their meaning towards renovated public values. They also tested participatory processes that address community needs, challenging traditional notions of ownership, maintenance, and care and addressing future long-term transformations. Additionally, they foster collaboration between designers, institutions, and communities, offering a new perspective on public assets that shifts the focus towards common goods and community-based management.

Unfinished spaces, understood as Commons, can connect separated parts of the contemporary city: spatial thresholds through which full citizenship rights to the city can be reclaimed. Commons act as bridges, connecting isolated unfinished enclaves, facilitating the transition from a suspended, enclosed and exclusive space to a vital, porous, and inclusive one: a bridged archipelago where a deeper and more participative form of democracy can take place [Fig.6].

[9] Within Political Theory, the concept of common goods has been developed in contrast to commodities. For a discussion on this opposition and the distinction between the user as a consumer or a commoner, see De Angelis 2021, pp. 647-648.

Following this bridge metaphor, commoning actions would serve as the centerings for constructing and shaping our bridge: transient uses – cultural, social, and ecological – are essential temporary structures to build long-term transformations and to address contemporary needs.

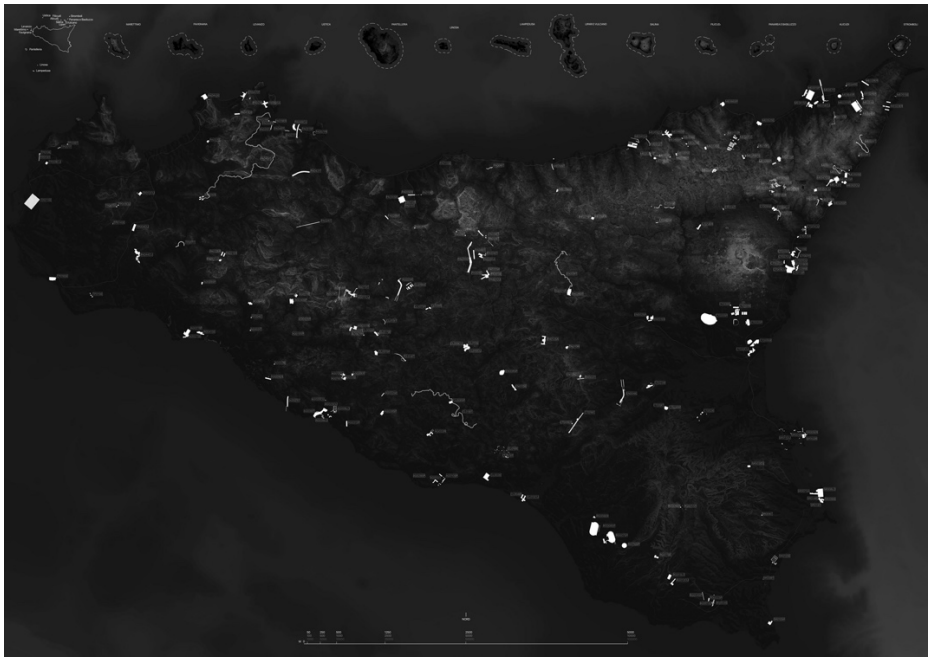

Fig. 6
Unfinished Archipelago: spatialized visualization of unfinished public works in Sicily, 2024. [credits: Image elaborated by the author.]

The metaphor unites unfinished public spaces with actions, emphasizing their emancipatory and transformative potential when seen collectively and in relation to each other. This allows us to view them from a transscalar perspective, unifying isolated interventions and addressing the phenomenon on both a national and local scale.

The recognition of unfinished public works as common goods certainly goes beyond the scope of this article and primarily belongs to the realms of Jurisprudence and Political Theory. Here, the focus has been limited to highlighting the existence of spatial practices that have been bringing new life to unfinished spaces across Italy, interpreting them through the 'Commons lens' for connecting them.

The possible contribution of architecture – understood, in its broadest sense, as a practice of spatial transformation where humans and non-humans coexist – lies in learning from these alternative ways of togetherness, re-interpreting and re-designing unfinished public works. As briefly shown, the recurring challenges can help to develop a model for reactivating unfinished works and addressing future transformations through a systemic approach. Hence the need for a transscalar, step-by-step, and commons-based approach that involves local communities, institutions, and designers, embracing planning based on publica utilitas and new priority criteria for transforming unfinished public works.

With the general aim of transforming them into significant public buildings shaped by renewed civic values, transient uses serve as rite of passage, achieving short and mid-term goals for activating, cleaning, taking care of, and inhabiting these spaces for the first time.

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Assessment and Optimization of the Layout of Community Elderly Care Facilities from the Perspective of Health Equity

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ABSTRACT
As China's population continues to age, the importance of senior care facilities for the elderly is becoming increasingly apparent. However, the elderly face spatial inequalities in accessing health and care services. This disparity not only reduces their quality of life but also underscores the intricate relationship between the physical layout of public spaces and the intangible fabric of social relations. Therefore, this study takes Wenjiang District in Chengdu, China as a case study, employing the ArcGIS geospatial analysis and the improved potential model to assess the walking accessibility of community facilities for the elderly. Furthermore, the spatial optimization of existing community facilities for the elderly is conducted using a location-allocation model. The objective of this study is to compare the current status of the accessibility of community facilities for the elderly with the changes in accessibility after adding new facilities. The results explore how the physical spatial layout shapes intangible social relationships and health equity by evaluating walking accessibility, providing new insights for the optimization of elderly care facility layouts.

HEALTH EQUITY | COMMUNITY ELDERLY CARE FACILITIES | ACCESSIBILITY | IMPROVED POTENTIAL MODEL

1. Introduction

According to the seventh national census, individuals aged 60 and older made up 18.7% of China's population, with projections reaching 35% by 2050 (United Nations, 2019). This demographic shift underscores the urgent need to improve elderly care services. In Chinese cities, these services primarily rely on family- and community-based models (Chen & Han, 2016). However, disparities in spatial accessibility to community elderly care facilities present significant challenges. Functional limitations and socioeconomic inequalities exacerbate disparities, affecting elderly quality of life and highlighting the connection between physical space layouts and social relationships. Therefore, achieving spatial equity in public facility distribution is crucial for promoting active aging (Hu et al., 2019). Extensive studies have examined the distribution and utilization of public facility resources, including supermarkets (Niedzielski & Kucharski, 2019), transportation infrastructure (Vecchio et al., 2024), and elderly care facilities (Sun et al., 2024).

Health equity, defined by World Health Organization, refers to eliminating unfair health differences, particularly for marginalized groups (World Health Organization, 2025). Health equity ensures everyone can achieve full health potential by eliminating unjust disparities rooted in structural inequalities, systemic discrimination, and unequal living conditions (Braveman, 2022). In this study, health equity refers to older adults' equitable access to community-based eldercare facilities. Therefore, accessibility is central to measuring health equity, achieved by ensuring equitable access to elderly care services across all populations. Research on accessibility originated in the 1950s (Hansen, 1959), describes the ease of reaching essential services. Traditional accessibility measures often focus on proximity but neglect factors like income, service capacity, and mobility (De Luca et al., 2024). The two-step floating catchment area (2SFCA) method is widely used to assess accessibility (Blumenberg et al., 2023), but it lacks consideration of distance decay. The potential model, which incorporates additional factors such as population and service capacity, has been used to better assess accessibility for medical facilities (Rong et al., 2020) and aged care institutions (Wang & Geng, 2024).

Nonetheless, research addressing community elderly care facilities remains insufficient. Therefore, this study uses an enhanced potential model to assess the accessibility of community elderly care facilities, incorporating factors such as population and service capacity. A location-allocation model is applied to optimize the spatial distribution of existing facilities, comparing current accessibility with potential changes following new facility additions. The study also explores how the physical layout of spaces influences social relationships and health equity through accessibility evaluations.

2. Data and Methodology

2.1. Data collection

Wenjiang District, located within the central urban area of Chengdu, China, covers a land area of 277 km2 (Fig. 1). Wenjiang has a permanent population of 967,868, with 146,096 individuals aged 60 and above (15.09%), and 107,624 individuals aged 65 or above (11.12%) (Wenjiang Municipal Government, 2021). As a designated demonstration area for smart healthy aging in China, Wenjiang serves as a significant research case. Data on 83 community elderly care facilities were collected, including information on location, building area, and other attributes.

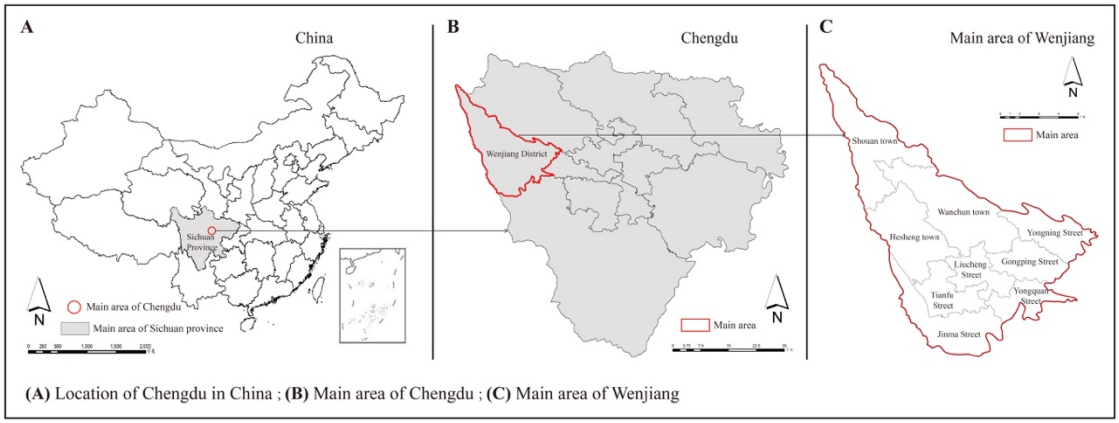


Fig. 1 Study area in Wenjiang District, Chengdu, China.

Additionally, data from 788 residential sites were gathered, covering location and the population of the elderly. Road network data were sourced from the 2020 traffic map. Administrative division data were derived from 2020 records. All data were standardized to the WGS84 coordinate system using ArcGIS.

2.2. Improved potential model

The improved potential model was derived from gravity model. Hansen proposed using the gravitational model to measure accessibility (Hansen, 1959), as shown in Eq. (1). Weibull added the population scale factor V_j to reflect the competition of the potential demand population around the supply point j for its resources (Weibull, 1976), as shown in Eq. (2):

$$A_i = \sum_{j=1}^{n} A_{ij} = \sum_{j=1}^{n} \frac{F_j}{D_{kj}^{\beta}} \quad (1)$$

$$A_i = \sum_{j=1}^{n} \frac{F_j}{D_{ij}^{\beta} V_j} : \quad V_j = \sum_{k=1}^{m} \frac{P_k}{D_{kj}^{\beta}} \quad (2)$$

where A_i denotes the accessibility of demand point *i*; F_j denotes the service capacity of supply point *j*; D_{ij}, is the cost of traffic distance between the suppliers and demanders; β is the impedance coefficient; P_k denotes the population of demand point *k*; and D_{kj}, denotes the cost of the traffic distance between point *k* and point *j*. The traditional gravity model does not set

the limit distance for residents to choose facilities. Thus, the improved formula introduces the comprehensive service capacity factor M_j, this factor adds the impact of socioeconomic factor to the accessibility calculation. And the scale grade coefficient R_{kj}, of limit travel distance is added (Tianyan et al., 2022), as shown in Eq. (3):

$$A_i = \sum_{j=1}^{n} \frac{R_{ij} M_j}{D_{ij}^{\beta} V_j} : \ M_j = f(w_t X_t), R_{ij} = 1 - (\frac{D_{ij}}{D_j})^{\beta}; \ V_j = \sum_{k=1}^{m} \frac{R_{kj} P_k}{D_{kj}^{\beta}} \quad (3)$$

where M_j, represents the comprehensive service capacity factor. In this study, M_j signifies the construction area of community pension facilities; R_{ij} denotes the scale grade coefficient of community elderly care facility *j*; and D_j, is the limit travel distance of facility *j*. If $D_{ij} \geq D_j$, let $R_{ij} = 0$, indicating that facility *j* is no longer attractive to demand point *i*. In addition, *b* is affected by factors like facility type and service population, often between 1 and 2. The *b* value in this study was 1, as reported in a previous study (Wang & Geng, 2024).

2.3. Location-allocation model

At this stage of the location-allocation model, the road network system of Wenjiang District must first be constructed in ArcGIS software, with existing community elderly care facilities and residential areas incorporated. The network analysis tool is employed to configure impedance weight attributes and values, facility quantity, impedance cutoff, and problem types for location-allocation models, encompassing seven distinct types (Karim & Awawdeh, 2020). This study adopts the minimum facility point model and the minimum impedance model, enabling the calculation of candidate locations for the minimal number of community elderly care facilities while meeting the needs of the maximum number of residential areas within the service coverage.

3. Results

3.1 The spatial distribution of community elderly care facilities

In this study, nine streets in Wenjiang District were coded as S1 to S9. Community elderly care facilities are primarily concentrated in S1 Street, which is situated in the central urban area. In contrast, facilities in the outer suburbs are dispersed across various communities. Using the kernel density analysis method in ArcGIS, we calculated the spatial distribution of community elderly care facilities. The analysis reveals a relatively even distribution, as shown in the spatial distribution map [Fig. 2A]. However, while S1 Street exhibits a high density of facilities, the overall pattern follows a

trend of “dense in the south, sparse in the north.” The building area of these facilities also varies significantly (Fig. 2B).

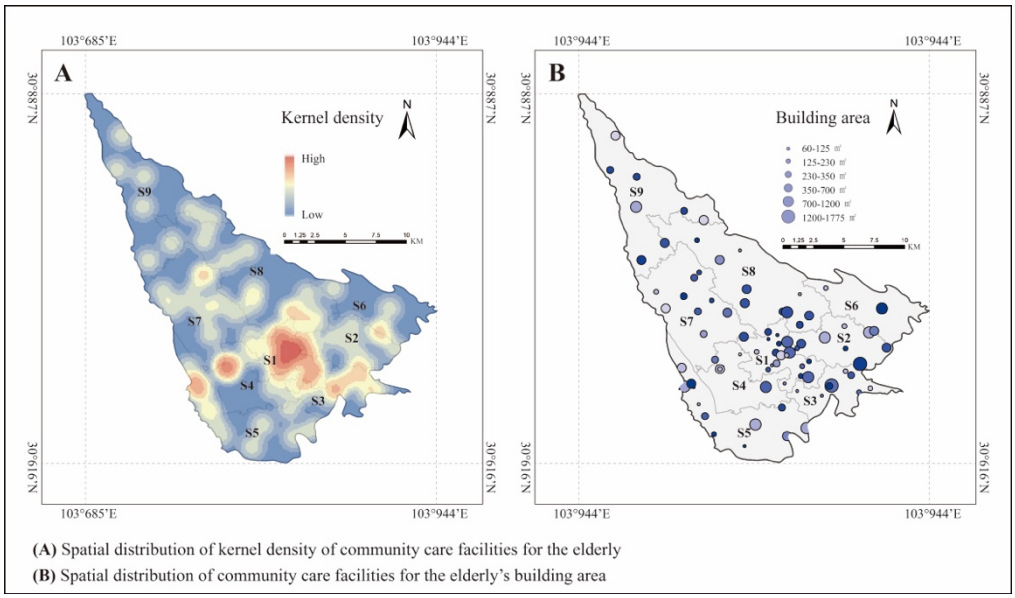


Fig. 2
Spatial distribution of community elderly care facilities.

a. Evaluation results of walking accessibility of community pension facilities

The accessibility of community elderly care facilities was determined using Eq. (3) and the Kriging interpolation method in ArcGIS, with walking accessibility illustrated in Fig. 3. The following results were observed:

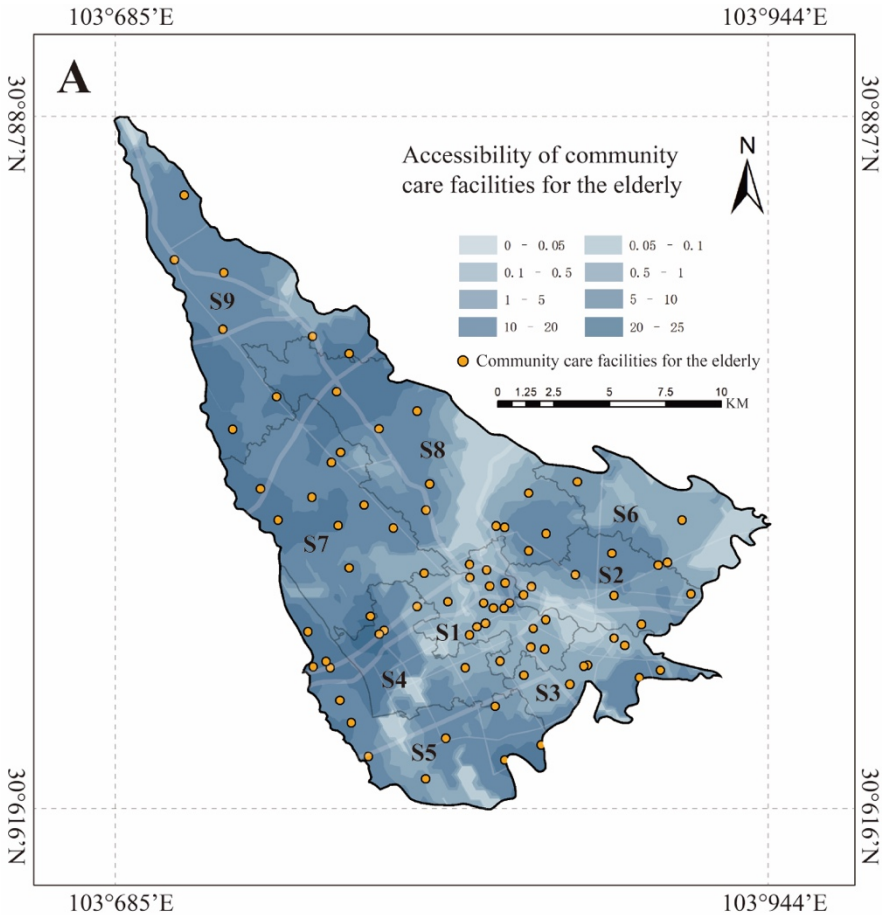


Fig. 3
Accessibility of community elderly care facilities.

1) Average accessibility values for each street were calculated by overlaying residential area accessibility (**Table 1**). Streets such as S1 (0.521) and S2 (0.520) showed moderate accessibility, whereas S5 (4.545) in the southern region had the highest average value.

2) Accessibility disparities were influenced by factors such as facility distribution, road network development, and other spatial variables. Facilities near S1 Street exhibited a trend of increasing accessibility towards neighboring areas.

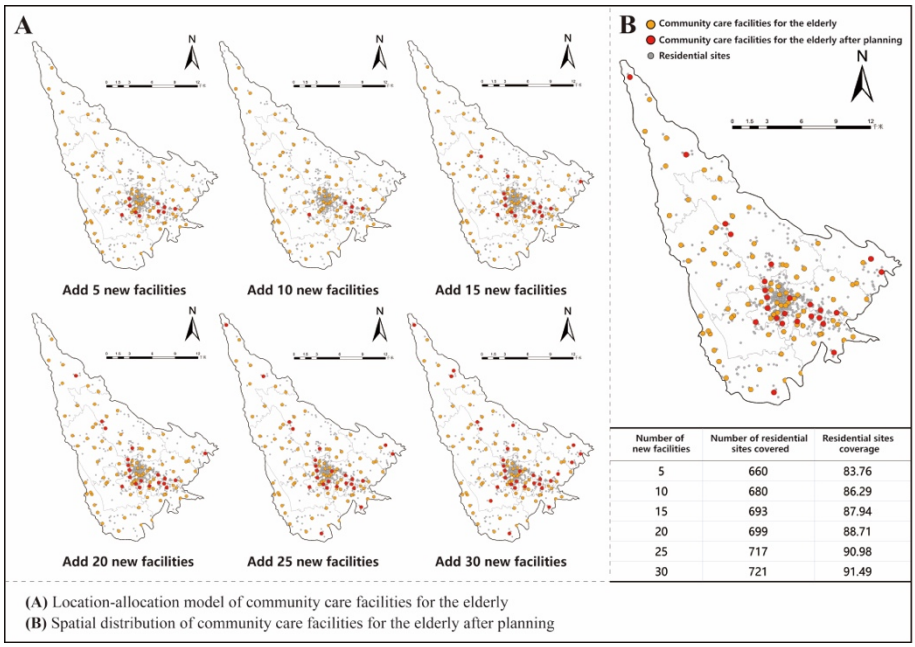
3) Streets with high accessibility were mainly located in peripheral regions. This phenomenon is attributed to the proximity of facilities to residential districts in the suburbs, where fewer residents reside. Conversely, the central urban area, despite having dense residential zones, demonstrated relatively lower accessibility due to insufficient facilities.

Table 1. Accessibility of community pension service facilities in each street.

Street name	**S1**	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**
No. of residential areas	432	88	50	23	35	33	34	74	19
Accessibility average	0.521	0.520	0.367	2.885	4.545	0.694	3.713	1.492	3.167
Accessibility minimum	0	0	0	0	0	0	0	0	0
Accessibility maximum	9.850	5.814	14.167	22.727	17.011	3.453	22.003	21.948	7.963

3.3 Evaluation results of walking accessibility of community pension facilities

Considering the current accessibility challenges in Wenjiang District, additional facilities were proposed to enhance spatial equity. The location-allocation model was applied to optimize the placement of new facilities. By incorporating 25 additional community elderly care facilities, over 90% of residential areas could be covered, as illustrated in Fig. 4A and Fig. 4B.



Number of new facilities	Number of residential sites covered	Residential sites coverage
5	660	83.76
10	680	86.29
15	693	87.94
20	699	88.71
25	717	90.98
30	721	91.49

Fig. 4
Location-allocation model of community elderly care facilities.

Using Eq. (3) and Kriging interpolation, accessibility was re-evaluated for 788 residential areas. The optimized plan achieved a 90.98% coverage rate of residential areas, indicating significant improvement in accessibility Fig. 5.

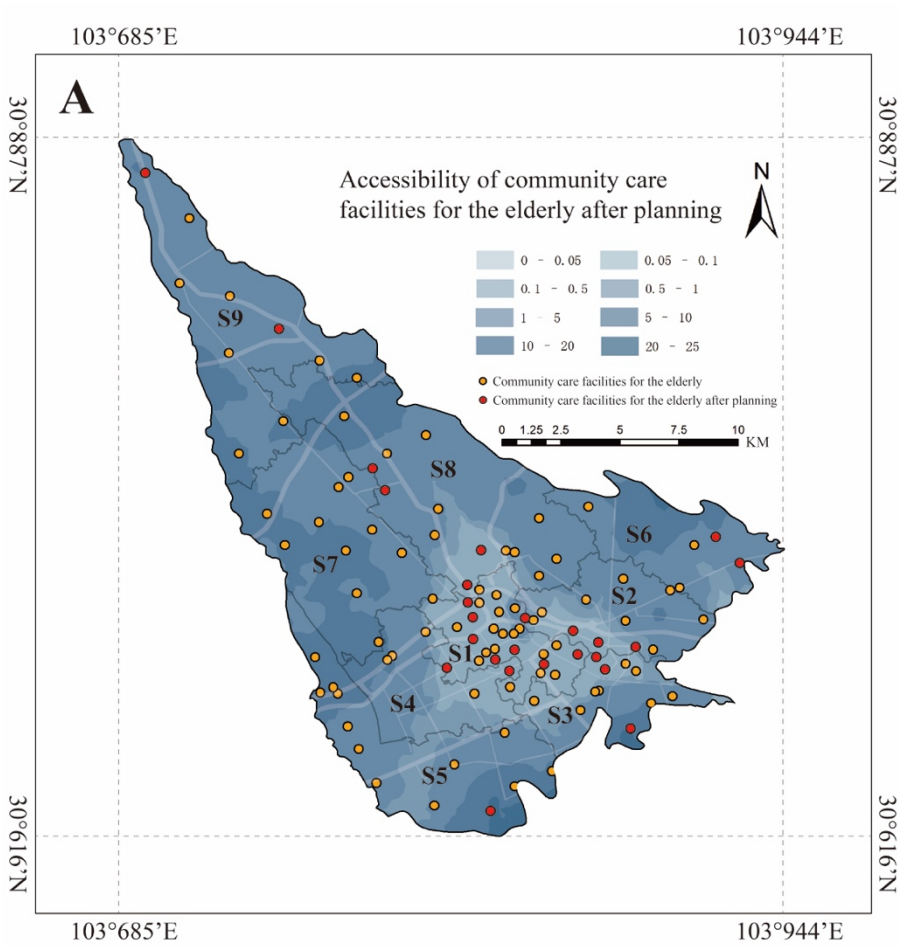


Fig. 5
Accessibility of community elderly care facilities after planning.

3.4. Spatial efficiency analysis of the community pension facilities after planning

This section analyzes the spatial efficiency of community pension facilities after planning through trends in accessibility, trends in the number of residential areas covered, and trends in the number of elderly people covered.

1) Trends in accessibility:

   Fig. 6A demonstrates substantial improvement in accessibility following the addition of facilities. The maximum accessibility reached 24.889, an increase of 2.162 from the current level. Although the accessibility of community elderly care facilities varied significantly, the uneven distribution improved compared with the current situation; however, the accessibility of Wenjiang district's central urban area remained somewhat lower than that of the outlying suburbs.

2) Trends in the number of residential areas covered:

   As shown in Fig. 6B, after the planning, the rate of residential areas covered by the community pension facilities ranged from 76.5% to 103.7%. Streets such as S1, S3, S6, and S9 achieved full coverage (100%), with most streets exceeding 80%. Overall, elderly individuals can easily enjoy pension services.

3) Trends in the number of elderly people covered:

   Fig. 6C highlights notable improvements in the coverage of the elderly population. The overall coverage rate increased from 92.0% to 101.0%, with significant enhancements observed in central urban and southern regions. The optimized distribution achieved better alignment between elderly population density and facility resources, particularly in S5 Street, where the coverage rate rose by 71.0%. The coverage rate in S1, S2, S3, and S6 was 100%.

4. Discussion and conclusion

This study emphasizes the critical role of public spaces in urban development, particularly in promoting health equity for the elderly. As a core component of the urban built environment, the planning and equitable accessibility of public spaces critically shape health equity among older populations—particularly when environmental sensitivity intersects with structural disparities in resource allocation (E et al., 2024). In addition to the regular life scenes of the elderly group, the pandemic significantly reduced medical visits among the elderly, vulnerable individuals, and high-risk groups. Numerous elderly care facilities temporarily ceased operations. This situation has raised concerns about the optimal placement of community facilities. The pandemic has highlighted the need to enhance the quality of life for elderly individuals at home through community services, which should be integrated into future facility planning (Li et al., 2024). This study uses the improved potential model to assess accessibility and guide layout planning for non-epidemic periods. By

optimizing the layout, we can reduce walking distances, lower infection risks, and integrate the concept of a “compact city” (Mouratidis, 2022) into retirement community planning.

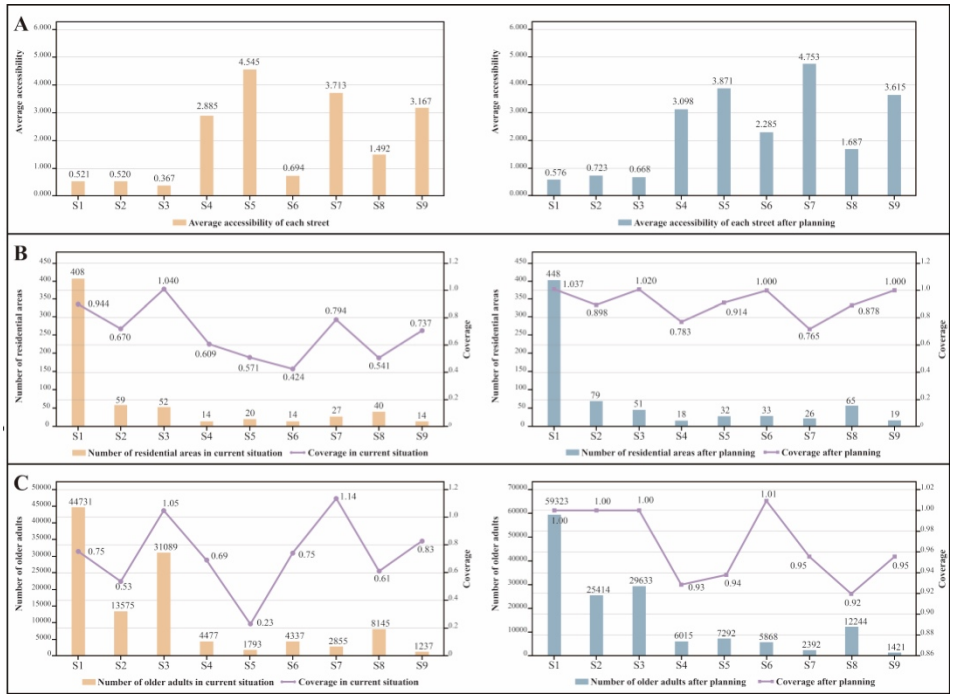


Fig. 6
Changes in spatial efficiency of the community elderly care facilities.

Focusing on community elderly care facilities in Wenjiang District, this study evaluates their walking accessibility and spatial distribution. It identifies issues like uneven facility distribution in certain regions. And a location-allocation model was developed to analyze current distributions and predict optimal facility placements. This model offers a dynamic plan for balancing facility layouts with the elderly population's density. Although the improved potential model provides valuable insights, it has limitations. It currently considers factors like distance, population, and service capacity but lacks intangible elements such as socioeconomic variables (e.g., income, health status, education). Future research can improve the model by incorporating these factors for a more comprehensive view. Despite these limitations, this study offers a realistic assessment of accessibility for elderly individuals and valuable insights for optimizing the spatial layout of multi-level elderly care facilities.

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Inclusive Urban Space Design through Nature-Based Solutions: Reflections and Insights

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ABSTRACT
Public spaces play a determining role in daily engagement and can be regarded as important criteria for measuring the quality of urban life. In recent years, cities have actively adopted promising approaches in pursuit of sustainable development. In this context, Nature-based Solutions (NbS) have emerged as a mainstream approach or concept in sustainable urban development, effectively and adaptively addressing societal challenges. Research has shown that public spaces are increasingly seen as significant sites for implementing these green strategies. However, there is currently a gap in research on the implementation of NbS. Most NbS projects focus primarily on environmental outcomes, with less attention paid to how these solutions can create socially inclusive spaces. This paper investigates the intangible aspects of urban space and analyzes how different NbS contribute to social inclusivity by collecting best practices of NbS. By integrating theories and methods from urban design and social sciences, this paper offers reflections and insights for urban planners and designers aiming to create or transform inclusive public spaces.

INCLUSIVE DESIGN | PUBLIC SPACE | NATURE-BASED SOLUTIONS | SOCIAL BENEFITS

1. Introduction

Traditional public spaces, such as squares, parks, and urban streets, have long been places where people engage in individual and collective public social activities (Han et al., 2022). However, with accelerated urbanization and the growing diversity of social needs, the definition and functions of public spaces are undergoing profound changes. These spaces are no longer viewed merely as physical locations; they are increasingly regarded as "third spaces" in addition to the home and office (Finlay et al., 2019). These spaces not only serve social and recreational purposes but have also become key venues for fostering community interaction, and cultural exchange, and enhancing the overall quality of life (Aelbrecht & Stevens, 2023). Therefore, public spaces play a determining role in daily engagement, and furthermore, they can be regarded as important criteria for measuring the quality of urban life (Bambó Naya et al., 2023). According to United Nations Sustainable Development Goal (SDG) 11, the quality of the built environment closely depends on urban green infrastructure (Goal 11 | Department of Economic and Social Affairs, 2015).

However, with the continuous expansion of urban development, the appropriation of large amounts of land has led to ongoing environmental degradation and exacerbated social inequalities. In response to these challenges, urban planners and policymakers are actively seeking solutions that balance economic growth with social equity and environmental protection (Garau & Pavan, 2018). In this context, Nature-based Solutions (NbS) have emerged as a mainstream approach or concept in sustainable urban development. NbS are defined as “actions address environmental, social and economic challenges simultaneously by maximizing the benefits provided by nature…inspired by, supported by, or copied from nature” (European Commission. Directorate General for Research and Innovation., 2015). These solutions provide not only environmental benefits but also intangible social value in public spaces through tangible interventions such as green corridors, rooftop gardens, and parks, which improve health and well-being (Kabisch et al., 2017). For example, many NbS projects involve local communities in the design process and the implementation of community gardens. This co-design method fosters a sense of belonging among diverse residents, promotes social cohesion, and simultaneously creates environmental benefits that enhance urban life quality. Inclusive public spaces are fundamental to participation and inclusion in society, as they provide shared environments where individuals from diverse backgrounds can equally utilize them, thus contributing to the strengthening of social ties. Research has shown that various factors can affect the sense of inclusivity, such as gender, age, ethnicity, religion, cultural background, and socioeconomic status (Simões Aelbrecht et al., 2022). Although these factors share common design criteria for inclusive public spaces, such as accessibility, safety, and the presence of a variety of activities, there is currently a gap in research on the implementation of NbS that considers these relevant design criteria (Qi et al., 2024). For example, in urban areas, safety concerns and the threat

of gender-based violence may discourage women and girls from using green spaces such as urban forests and parks for outdoor recreation, thereby limiting their access to the social and health benefits provided by these spaces (Integrating Gender and Social Inclusion in Nature-Based Solutions: Guidance Note | GFDRR, 2023). Furthermore, most NbS projects focus primarily on environmental outcomes, with less attention paid to how these solutions can create socially inclusive spaces (Lafortezza et al., 2018).

This paper seeks to address this gap by investigating the intangible aspects of urban space and analyzing how different NbS contribute to social inclusivity by collecting best practices from NbS implementations. By integrating theories and methods from urban design and social sciences, this paper offers reflections and insights for urban planners and designers aiming to create or transform inclusive public spaces.

2. Materials and Methods

The overall conceptual workflow of this study is shown in Fig. 1 and consists of three main phases. Phase 1 involves the collection of NbS projects implemented in public spaces, particularly those prioritizing inclusivity, using the “URBiNAT” (NBS Catalogue, 2018) and “Urban Nature Atlas” (Urban Nature Atlas, 2017) databases. “URBiNAT” is an open platform repository that shares NbS projects co-selected and co-created by citizens. “Urban Nature Atlas” serves as a knowledge base showcasing the diversity and value of NbS implemented in cities worldwide. Although other databases, such as Oppla (Case Studies, 2023), also exist, they were excluded from this study due to the lack of specific filters related to social challenges. In Oppla, relevant cases must be identified through manual keyword searches, which may compromise the precision and relevance of the results. In contrast, the selected databases offer targeted filtering options that address social dimensions, making them more suitable for the aims of this research. In addition to database searches, a manual review of existing literature was conducted using several academic research engines, including Science Direct, Scopus, and Web of Science. The selection of case studies was based on the following criteria: (1) explicit integration of public participation in the design and/or implementation processes; (2) inclusion of multiple spatial scales, ranging from the building scale and neighborhood scale to larger urban contexts; and (3) successful implementation with documented evidence of delivering social benefits, particularly in terms of enhancing social inclusivity. Phase 2 analyzes the outcomes from Phase 1, categorizes the different NbS options first, and describes their implementation activities and how NbS interventions contribute to social inclusivity in urban public spaces. Finally, Phase 3 provides reflections and insights based on the results of Phase 2, offering practical recommendations for urban planners and designers.

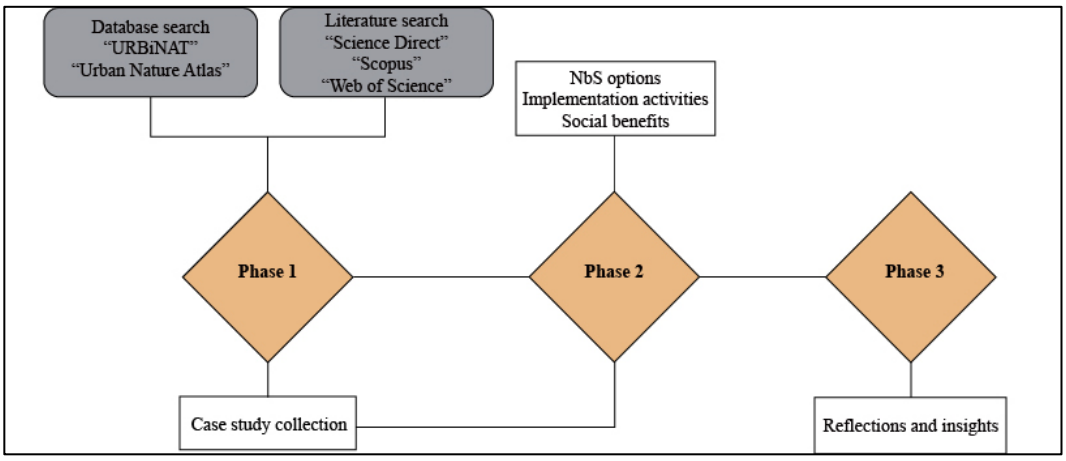

Fig. 1
The overall workflow of the study

3. Results and Discussions

This section explores the relationships between the intangible aspects of public space and social inclusivity through the analysis of several NbS projects. Tab. 1 provides an overview of the NbS identified through screening databases and research engines.

NbS options	Implementation activities	Social benefits	Case study
Community Garden	Implementation of the different garden elements is executed in communal work, supported by neighbors, youth, and volunteers.	① Increased visibility and opportunity for marginalized groups or indigenous people ② Improved mental and physical health ③ Increased sense of place identity, memory, and belonging	'Nature Island' Community Garden, Bonn, (DE), 2013 (*'Nature Island' Community Garden - Pennenfeld, Bonn* | *Urban Nature Atlas*, 2013)
	Local community launch and autonomous management by the gardeners.	① Improved health and well-being ② Increased sense of place identity and belonging ③ Increased opportunities for social interaction	Naomi Shimpo- Tokyo, (JP), 2024 (Shimpo, 2024)
Vegetable garden	Organize community horticulture workshops.	① Improved social cohesion ② Increased opportunities for social interaction	Asomadilla Park, Córdoba, (ES), 2004-2007 (*Asomadilla Park* |

NbS options	Implementation activities	Social benefits	Case study
		③ Increased support for education and scientific research	*Urban Nature Atlas*, 2004)
	Customized and assembled in several configurations according to user's preferences and space needs.	① Increased access to healthy/affordable food ② Increased opportunities for social interaction	Poble Nou district, Barcelona, (ES), 2015 (*Mobile Vegetable Garden*, 2015)
Rooftop garden	Workshops open to the public are held periodically to teach residents how to plant and maintain a small urban garden.	① Improved social cohesion ② Increased awareness of NbS and their benefits	Bilbao Roof Top Community Garden, Bilbao, (ES), 2011-2012 (*Bilbao Roof Top Community Garden* | *Urban Nature Atlas*, 2011)
	The decision to reshape the Hilldegarden bunker was made spontaneously by local residents and supported by architects.	① Increased involvement of locals in the management of green spaces ② Protection of historic and cultural landscape/infrastructure	Hilldegarden, Hamburg, (DE), 2019 (*Hilldegarden*, 2019)
Trees	Municipality organize workshops to help citizens assemble planters.	① Improved liveability ② Increased involvement of locals in the management of green spaces ③ Increased knowledge of locals about local nature	Operation Fil Vert to vegetate the streets, Rouen, (FR), 2014 (*Operation Fil Vert to vegetate the streets* | *Urban Nature Atlas*, 2014)
	-	① Improved health and well-being ② Increased social cohesion	Cruz-Sandoval et.al., Guadalajara, (MX), 2020 (Cruz-Sandoval et al., 2020)

NbS options	Implementation activities	Social benefits	Case study
Green corridor	Local government-led projects transforming abandoned areas into new green spaces.	① Increased perception of safety ② Improved access to urban green space ③ Protection of historic and cultural landscape/infrastructure	Green Corridor of the Guadalhorce Valley, Malaga, (ES), 2015 (*Green Corridor of the Guadalhorce Valley* | *Urban Nature Atlas*, 2015)

Tab.1 NbS projects derived from the search.

Community gardens are among the most commonly implemented NbS in neighborhood outdoor green spaces. Designed as meeting points for gardening activities, they strengthen connections between neighbors and foster social cohesion. Numerous studies confirm their positive impact on physical and mental health (De Bell et al., 2020). Unlike home gardens, where individuals often work independently, community gardens emphasize collaboration and encourage social interactions. The "Nature Island" Community Garden is a transformation project designed to enhance opportunities for elderly residents to engage with nature ('Nature Island' Community Garden - Pennenfeld, Bonn | Urban Nature Atlas, 2013). At the same time, it is a place of encounter that promotes social stability by encouraging all other residents to get engaged in the planning, implementation, and maintenance processes. This community garden effectively enhances the quality of life, increases local biodiversity, and also strengthens community building and mutual support in the neighborhood. Shimpo (Shimpo, 2024) investigated the role of community gardens in suburban Tokyo during the COVID-19 pandemic and demonstrated that they not only cultivate a sense of belonging but also promote active citizenship and enhance spiritual well-being, thus contributing to urban resilience.

Vegetable gardens, while focused on food production, are highly adaptable and can take various forms—such as in-ground plots, raised beds, and container systems—making them suitable for diverse urban spaces and resource constraints. A notable example is the Asomadilla Park project, which received a special Environmental Justice Award in 2010 from the Biodiversity Foundation (Asomadilla Park | Urban Nature Atlas, 2004). This recognition highlighted the project's contribution to environmental protection and social integration within the city. As part of the initiative, ecological vegetable gardens were established to host a variety of community activities. The city council also regularly organized horticultural workshops and environmental education seminars to enhance public awareness and understanding of NbS and their associated benefits. Another illustrative case is the implementation of mobile vegetable gardens in the Poble Nou district of Barcelona (Mobile

Vegetable Garden, 2015). This initiative enables users to assemble and move modular containers within public spaces according to their preferences, creating opportunities for social interaction. Furthermore, it supports local food markets and increases the availability and accessibility of healthy, locally grown food.

The shortage of land in urban areas has inspired innovative approaches to fostering horticulture. With limited open spaces for traditional gardening, urban residents and designers are turning to creative solutions, such as transforming rooftops into green spaces. These rooftop gardens not only enhance urban liveability but also provide inclusive spaces for community engagement. The Bilbao Rooftop Community Garden exemplifies this trend by combining environmental education with inclusive urban practices (Bilbao Roof Top Community Garden | Urban Nature Atlas, 2011). The project educates local residents on sustainable food cultivation and healthy eating habits, while also offering free access to gardening plots and practice hours for individuals interested in managing their own space. Community-led workshops further promote collaborative learning and environmental stewardship, enhancing residents' capacity to engage in small-scale urban agriculture. A further notable example is Hilldegarden, a rooftop "reshape" project that places particular emphasis on ecological performance and social value (Hilldegarden, 2019). Situated on an 800 sqm rooftop, the garden incorporates sustainable technologies such as renewable energy systems and greywater harvesting for irrigation. It provides a shared space for residents to participate in food production, fostering intercultural dialogue and community cohesion. Beyond its environmental merits, the project generates significant socio-cultural benefits—contributing to the preservation of cultural heritage, while strengthening local identity, memory, and a sense of belonging.

Trees play a vital role in supporting both people and the urban environment. They provide multiple social benefits, including promoting physical and mental health for urban residents, strengthening community ties, and reducing crime rates. These contributions align with the United Nations Sustainable Development Goals (SDGs) 3 (Good Health and Well-being), 11 (Sustainable Cities and Communities), and 16 (Peace, Justice, and Strong Institutions) (THE 17 GOALS | Sustainable Development, 2015). "Operation FIL VERT" is an urban greening initiative aimed at creating a continuous green network across streets by systematically planting trees (Operation Fil Vert to vegetate the streets | Urban Nature Atlas, 2014). Through these greening efforts, the project fosters social connections among residents, strengthens community bonds, and enhances the overall quality and liveability of urban streetscapes. However, as Cruz-Sandoval et al. (Cruz-Sandoval et al., 2020) point out, the distribution of urban trees is often influenced by underlying social and economic inequalities, leading to uneven access to the benefits of urban greenery. This disparity underscores the urgent need for inclusive policies and equitable greening strategies that ensure all communities can benefit from the social and ecological advantages of urban greening.

Green corridors connect fragmented natural areas to form a cohesive green network, integrating elements of nature into urban environments and positively stimulating the senses through sound, color, motion, and smell (Aman et al., 2022). They promote biodiversity, improve air quality, and provide accessible recreational spaces, encouraging physical activity and social interaction. The Green Corridor of the Guadalhorce Valley in Málaga exemplifies such an approach (Green Corridor of the Guadalhorce Valley | Urban Nature Atlas, 2015). This transformation project repurposed a previously neglected area into a multifunctional green space that is universally accessible, including dedicated pathways for people with reduced mobility. By ensuring equitable access to nature and public space, the intervention actively promotes social inclusion, cohesion, and environmental justice.

In general, these NbS contribute to healthier and more resilient urban environments. Reflecting on the examples discussed above, several key insights can be drawn to inform the design of inclusive urban spaces:

1. Community involvement and long-term management strategies: The creation of inclusive public spaces relies on active participatory approaches, such as co-selection, co-design, co-implementation, and co-monitoring.
2. Innovative solutions for urban constraints: Considering the limitation of urban land use, creative solutions like rooftop gardens and mobile installations show another possibility of making full use of space.
3. Maximizing synergies and ensuring inclusiveness: The selection of NbS should emphasize their capacity to generate environmental, social, and economic co-benefits, while also promoting equity and encouraging active public engagement across diverse social groups.
4. Equity in green space distribution: Addressing the unequal spatial distribution of green infrastructure is essential for ensuring that all urban residents, regardless of socioeconomic status or geographic location, have equitable access to the benefits of nature.

The successful implementation of NbS also depends on flexible participation formats that cater to diverse needs and facilitate the transfer of technical knowledge. By integrating the strategies mentioned above, cities can maximize the potential of NbS to create sustainable and inclusive environments.

4. Conclusion

NbS bring intangible social value through tangible interventions, transforming urban streets, squares, parks, and other public spaces into vibrant hubs of possibility. They foster connections among people, encourage interaction with natural elements, and create opportunities for social inclusion while cultivating a sense of belonging. NbS promote inclusivity by providing spaces where individuals from diverse backgrounds can equally participate and benefit. By integrating natural

elements into daily life and adopting participatory approaches—such as co-selection, co-design, co-implementation, and co-monitoring—NbS empower communities to take an active role in their development. Through community workshops and shared knowledge transfer, these solutions not only enhance environmental benefits but also strengthen community engagement and resilience.
The findings emphasize that the success of NbS relies not only on their environmental outcomes but also on their ability to address the intangible aspects of urban spaces, such as inclusivity and community engagement. Incorporating co-design processes and participatory governance into NbS projects ensures their long-term sustainability and equitable impact. Ultimately, this work serves as a foundation for urban planners, designers, and policymakers, offering actionable strategies to implement NbS that bridge environmental goals with the social and cultural needs of diverse urban populations, thereby promoting sustainable urban development.

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Conceptualizing a Data-Driven Platform for Public Space Revitalization: Integrating Tangible and Intangible Elements

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ABSTRACT
Revising public spaces in rapidly increasing cities is crucial for promoting social interaction, cultural expression, and communal well-being. Current urban planning methodologies frequently depend on disjointed data and predominantly emphasize concrete components, such as infrastructure and environmental conditions, while neglecting intangible aspects like cultural identity, social dynamics, and community needs. This paper presents Public Scape, a conceptual platform that amalgamates tangible and ethereal components into a cohesive whole. The platform facilitates urban planners, policymakers, and residents in formulating more inclusive, data-driven revitalization initiatives by integrating spatial analysis, environmental data, and community feedback. Public Scape utilizes collaborative participation and integrated analytical techniques to reconcile top-down planning with local viewpoints, guaranteeing that public spaces are both functional and socially, as well as culturally, pertinent.

PUBLIC SPACE REVITALIZATION | DATA INTEGRATION | TANGIBLE AND INTANGIBLE | URBAN PLANNING | COMMUNITY ENGAGEMENT

1. Introduction

Urban public spaces are critical to fostering social, cultural, and communal well-being within cities. However, rapid urbanization poses significant challenges, particularly in managing and renewing these spaces effectively. Existing planning approaches often rely on fragmented data, emphasizing tangible components such as infrastructure and environmental metrics, while underestimating the role of intangible dimensions like cultural identity, emotional attachment, and community participation (Gehl, 2011; Wang, Lu, & Fu, 2023; Hinrichs, 2009). Public Scape, a proposed conceptual platform, aims to address these challenges by seamlessly integrating diverse datasets to enhance urban planning strategies.

2. Contemporary Art ad a Catalyst for Public Space Revitalization

Contemporary art interventions can reframe the perception and function of public space, contributing to identity formation, memory preservation, and socio-political discourse (Lacy, 1995; Marchart, 2002; Hornig, 2009). Iconic projects like Wynwood Walls in Miami illustrate how art can revitalize underutilized industrial zones into thriving cultural hubs, attracting millions of visitors annually and driving local economic growth (Wynwood Arts District, 2021). Similarly, Superkilen Park in Copenhagen employs artistic interventions to celebrate the cultural diversity of its residents, promoting inclusivity and urban vibrancy (Superkilen Park Design Team, 2013). Public Scape acknowledges the potential of art-driven regeneration by incorporating mechanisms to evaluate artistic and cultural contributions, ensuring their integration into urban planning methodologies.

3. Evaluation Criteria for Case Studies

3.1. Framework

The evaluation of case studies in this research follows a comprehensive framework that considers both tangible and intangible criteria [Tab. 1]. This dual approach ensures a balanced assessment of public spaces, recognizing the importance of physical improvements alongside cultural and social factors. On the tangible side, the framework emphasizes enhancements to physical infrastructure, such as the addition of pathways, lighting, and planting. These elements are critical in transforming neglected spaces into accessible and visually appealing environments. For example, improved pathways not only enhance the functionality of a space but also encourage foot traffic and community interaction. Similarly, the strategic use of lighting improves safety and usability during evening hours, fostering a sense of security and inclusivity (UN-Habitat, 2013).

Environmental improvements are another key focus, with an emphasis on increasing biodiversity and improving air quality. Green spaces not only contribute to the ecological health of urban areas but also provide residents with a respite from the stresses of city life. Projects that incorporate sustainable landscaping techniques, such as the use of native plant species, create spaces that are both beautiful and environmentally beneficial (Parc de la Villette, 2020). For instance, these

initiatives often result in cooler microclimates, reduced noise pollution, and cleaner air, all of which enhance the quality of life for local communities.

TANGIBLE & INTANGIBLE CRITERIA									
Location	**Description**	**Tangible - Before**	**Tangible - After**	**Intangible - Before**	**Intangible - After**	**Annual Visitors (Before)**	**Annual Visitors (After)**	**Economic Impact (Before)**	**Economic Impact (After)**
High Line (New York)	An elevated rail line transformed into a public park with art, nature, and recreation.	Abandoned elevated railway line, inaccessible to the public.	An elevated park with pathways, seating areas, and over 500 plant species.	No cultural significance, largely ignored by the community.	A symbol of innovative urban development and a cultural hotspot.	None	8 million	Minimal economic activity in surrounding areas.	Surrounding property values increased significantly; major tourist spending.
Millennium Park (Chicago)	A central park featuring iconic art installations and hosting large public events.	Industrial wasteland, underutilized and poorly accessible.	A modern park equipped with iconic artworks and annual events.	Industrial area with no cultural or social value.	A cultural center featuring iconic artworks.	500,000	25 million	Limited economic activity, primarily industrial.	Boosted local economy with significant tourist revenue and events.
Federation Square (Melbourne)	A multifunctional square blending modern architecture and cultural activities.	Unattractive areas with minimal social use.	A multifunctional plaza with contemporary architecture and events.	Minimal identity or attraction.	A popular venue with strong identity and diverse uses.	200,000	10 million	Low-value commercial activity.	Dramatic increase in commercial activity and cultural tourism.
Superkilen Park (Copenhagen)	A park celebrating cultural diversity through artistic and urban design elements.	Unstructured urban space lacking identity.	A culturally diverse urban park with artistic elements.	No connection to cultural diversity.	Strengthened cultural diversity and community engagement.	100,000	2 million	Underdeveloped economic surroundings.	Enhanced local businesses due to increased foot traffic.
Parc de la Villette (Paris)	A cultural park combining green spaces with art and performance venues.	Former industrial site with no green spaces.	A cultural park with art installations and performance venues.	Lack of cultural integration.	Internationally known for its art and cultural events.	300,000	10 million	Neglected industrial zone with minimal economic output.	Revitalized area with increased property values and cultural tourism.
Olympic Sculpture Park (Seattle)	A waterfront park showcasing contemporary sculptures in an urban setting.	Industrial wasteland, no public use.	A public sculpture park integrated with nature.	Limited social or cultural relevance.	A hub for contemporary art and public interaction.	None	1 million	No significant economic presence.	Strengthened local economy with art-driven tourism.
Zaryadye Park (Moscow)	A modern park linking natural and urban elements in the heart of Moscow.	Vacant land, previously a hotel site.	An innovative park combining modern landscaping and historical elements.	No clear cultural or social identity.	Blends modern culture with historical relevance.	None	6 million	Vacant lot, no economic significance.	Boosted local economy with tourist and cultural engagement.
Gleisdreieck Park (Berlin)	A reclaimed railway area transformed into a green urban park with cultural venues.	Abandoned railway land with limited infrastructure.	A green urban park with sports and cultural activities.	Unattractive with no cultural integration.	A vibrant district with cultural and leisure offerings.	None	2 million	Neglected area with minimal economic use.	Property values increased; new cultural and commercial ventures.
Wynwood Walls (Miami)	An industrial district converted into an open-air gallery with large murals.	Old warehouse district with minimal artistic value.	An art district with large-scale murals attracting global attention.	Culturally insignificant and largely unknown.	An internationally recognized cultural destination.	50,000	3 million	Underdeveloped and largely ignored by investors.	Significant investment in art, tourism, and local businesses.
Plaza de las Tres Culturas (Mexico City)	A historic square revitalized with modern art and community spaces.	Historic site with a neglected environment.	A square featuring modern art and restored structures.	Little recognition as a culturally significant site.	A culturally enriched square with strong public perception.	10,000	500,000	Minimal local economic activity.	Revitalized local economy through cultural tourism and restoration projects.

Tab. 1 Tangible and Intangible Criteria. Source: Author's elaboration

Accessibility is also a fundamental criterion, addressing the need for inclusive public spaces that cater to diverse user groups. This includes the installation of ramps, clear signage, and transportation links that ensure people with disabilities, families with young children, and elderly individuals can fully utilize the space (Gehl, 2011). Accessibility improvements transform public areas into hubs of interaction, allowing more individuals to participate in community activities.

On the intangible side, the framework evaluates cultural significance by examining how spaces integrate local traditions, historical relevance, and symbolic value. Public spaces that honor a community's cultural heritage foster a sense of identity and pride among residents (Federation Square Management, 2019). For example, design elements that reflect local traditions or commemorate historical events help connect the community to the space in meaningful ways, strengthening the emotional ties between people and their environment.

Social engagement is another crucial intangible factor, focusing on the role of community involvement in the planning, design, and ongoing use of public spaces. Projects that encourage active participation, such as public workshops or collaborative design initiatives, ensure that the outcome aligns with the needs and desires of the community (Superkilen Park Design Team, 2013). This engagement not only increases the relevance of space but also promotes a sense of ownership and collective responsibility.

Finally, economic benefits serve as an essential indicator of the success of public space revitalization. Spaces that attract tourism, increase property values, or stimulate local businesses contributing to the overall economic vitality of the surrounding area. For instance, public spaces designed to host cultural events, markets, or exhibitions often generate revenue streams that benefit the entire community, creating a sustainable model for urban development (Chicago Planning Commission, 2018).

By applying these tangible and intangible criteria, the evaluation framework ensures a holistic understanding of the impact and potential of public spaces. This approach highlights the interconnectedness of physical, cultural, social, and economic factors, providing valuable insights for the development of Public Scape as a tool to guide future urban planning initiatives.

4. Public space: A Vision for Data-Driven and Inclusive Public Space Revitalization

Public Scape envisions a transformative platform that centralizes diverse datasets to enhance public space revitalization, balancing infrastructure with cultural and social needs [Fig. 1]. By integrating GIS layers, socio-economic metrics, and community feedback, it streamlines data collection, providing planners with intuitive tools for spatial analysis and informed decision-making. The platform features AI-driven feedback analysis to incorporate real-time community input, predictive modeling to simulate the impacts of interventions, and customizable design tools to address diverse user needs. GIS capabilities, including heatmaps and land suitability models, help optimize land use and assess environmental impacts, ensuring functionality and sustainability (GIS in Cultural Heritage, 2019).

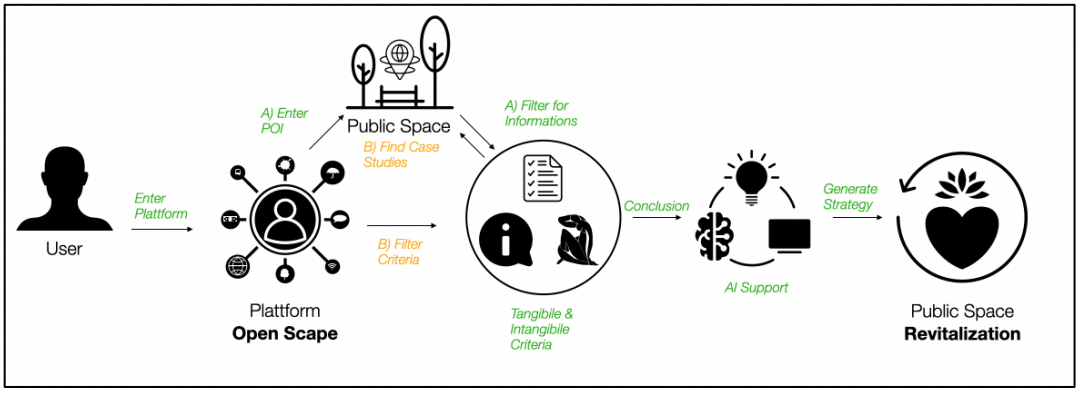

Fig. 1 Functional description Public Scape. Source: Author's elaboration

Public Scape also emphasizes post-revitalization monitoring via IoT sensors for real-time updates on visitor flow, environmental health, and maintenance needs. Visualization tools like augmented reality and interactive dashboards foster transparency and stakeholder engagement (ESRI, 2023).

By merging technology with participatory planning, Public Scape aspires to create inclusive, adaptive, and culturally resonant public spaces. Its innovative approach addresses urban planning challenges while prioritizing sustainability, equity, and local identity (GIS Cultural Resource Management, 2020).

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5. Case Study Insights

This research examines ten diverse case studies to explore innovative approaches to public space regeneration, providing valuable insights for the conceptualization of Public Scape. These examples were chosen for their ability to showcase adaptive reuse, geographic and cultural diversity, and measurable impacts on community engagement, cultural representation, and economic revitalization. Together, they form a comprehensive foundation for understanding how public spaces can be transformed into multifunctional and inclusive environments [Tab. 2].

Public Space Criteria Analysis

Criteria	High Line (New York)	Millennium Park (Chicago)	Federation Square (Melbourne)	Superkilen Park (Copenhagen)	Parc de la Villette (Paris)	Olympic Sculpture Park (Seattle)	Zaryadye Park (Moscow)	Gleisdreieck Park (Berlin)	Wynwood Walls (Miami)	Plaza de las Tres Culturas (Mexico City)
Multifunctionality	Strong - Combines art, nature, and recreation.	Strong - Art, events, and public spaces blend.	Strong - Combines architecture, events, and culture.	Strong - Celebrates diversity and urban design.	Strong - Combines green spaces and cultural venues.	Strong - Combines art and natural spaces.	Strong - Modern park blending history and urban design.	Strong - Combines sports, art, and leisure.	Strong - Focus on public art and community events.	Moderate - Focus on history and modern art.
Cultural Relevance	High - Became a cultural icon of NYC.	High - Iconic cultural landmark in Chicago.	Moderate - Significant but not globally iconic.	High - Represents cultural diversity in Copenhagen.	High - Known for its cultural contributions.	High - Promotes contemporary art in the city.	High - Represents Moscow's cultural transformation.	High - Symbol of urban renewal in Berlin.	High - Became a global cultural hotspot.	High - Celebrates Mexican cultural heritage.
Accessibility	Very High - Centrally located, easy to access.	Very High - Easily accessible, central location.	High - Central location supports foot traffic.	Moderate - Accessible but less centrally located.	Moderate - Reasonably accessible, outskirts of Paris.	High - Waterfront location enhances accessibility.	High - Centrally located, easy access.	High - Accessible via public transit.	High - Accessible, central location in Miami.	Moderate - Less central, but accessible.
Integration of Art	High - Art installations integrated into the landscape.	High - Iconic artworks like Cloud Gate.	Moderate - Less focus on art, more on design.	High - Artistic design reflects local cultures.	High - Contemporary art integrated into design.	High - Art and environment merge harmoniously.	High - Art and technology integrated.	Moderate - Less emphasis on contemporary art.	High - Street art integrated throughout the district.	High - Modern art integrated into historic context.
Community Engagement	High - Involves local artists and community.	High - Community and tourists heavily involved.	High - Engages diverse communities.	High - Strong community involvement.	Moderate - Limited community engagement.	High - Strong focus on public interaction.	Moderate - Community involvement limited.	High - Community engagement in design.	High - Strong local artist involvement.	Moderate - Limited public engagement.
Identity Building	Strong - Revitalized into a globally recognized space.	Strong - Became a symbol of cultural pride.	Moderate - Known locally but less internationally.	Moderate - Popular but less iconic globally.	Moderate - Recognized for its architecture.	Moderate - Local landmark but less global impact.	High - Symbol of modern Russian identity.	Moderate - Known locally, less internationally.	High - Recognized as a cultural destination.	Moderate - Known locally for cultural relevance.
Sustainability	Strong - Green spaces and eco-friendly designs.	Moderate - Focus on public use, less on eco-designs.	Moderate - Limited eco-design focus.	Moderate - Some eco-friendly features.	Moderate - Limited sustainability focus.	High - Focused on green spaces and nature.	High - Focus on eco-design and green spaces.	High - Emphasis on green spaces and ecology.	Moderate - Minimal focus on green spaces.	Moderate - Limited sustainability focus.
Aesthetic Enhancement	Very High - Significant improvement in aesthetics.	Very High - Dramatic aesthetic improvement.	High - Modern design enhances appeal.	High - Urban design significantly improved.	High - Improved aesthetics through design.	High - Improved urban aesthetic significantly.	High - Significant urban and cultural improvement.	High - Aesthetic appeal improved significantly.	High - Transformational aesthetic improvement.	High - Aesthetics improved through restoration.
Economic Impact	Very High - Property values and local spending increased.	Very High - Boosted local economy through tourism.	High - Cultural events boosted local spending.	High - Boosted foot traffic and local businesses.	High - Boosted tourism and cultural activity.	High - Strengthened local tourism economy.	High - Boosted tourism and cultural spending.	High - Increased local economic activity.	High - Boosted art tourism and local economy.	High - Boosted tourism and community pride.
Visitor Growth	Extreme - None to 8 million annually.	Extreme - From 500,000 to 25 million annually.	High - From 200,000 to 10 million annually.	High - From 100,000 to 2 million annually.	High - From 300,000 to 10 million annually.	Moderate - None to 1 million annually.	High - None to 6 million annually.	Moderate - None to 2 million annually.	High - From 50,000 to 3 million annually.	Moderate - From 10,000 to 500,000 annually.

Tab. 2 Public Space Criteria Analysis. Source: Author's elaboration

A recurring theme across the selected projects, such as the High Line in New York, Millennium Park in Chicago, and Superkilen Park in Copenhagen, is the principle of adaptive reuse. This approach involves repurposing underutilized or abandoned spaces into vibrant public areas, demonstrating the potential for such transformations to generate social, cultural, and economic benefits. For instance, the High Line was reimagined from an elevated railway into a linear park featuring pathways, seating areas, and diverse greenery (New York City Department of Parks and Recreation, 2020). This project exemplifies the integration of nature, art, and urban innovation, attracting millions of visitors annually and redefining the space as a global landmark.

Similarly, Gleisdreieck Park in Berlin converted a disused railway yard into a dynamic community hub that combines green spaces with cultural and sporting facilities (Berlin Urban Development Agency, 2019). Millennium Park in Chicago turned an industrial wasteland into a cultural epicenter, featuring iconic art installations like “Cloud Gate” and the Jay Pritzker Pavilion (Chicago Planning Commission, 2018). These design elements not only enhanced the park’s aesthetic appeal but also created a venue for large-scale events and everyday community use, underscoring the social and economic benefits of thoughtful urban design.

Superkilen Park in Copenhagen represents a compelling example of how public art and cultural symbolism can foster identity and inclusion in multicultural neighborhoods (Superkilen Park Design Team, 2013; Marchart, 2002; Lacy, 1995). By incorporating artifacts and design elements from the international heritage of its local community, the park transformed a fragmented urban area into an inclusive space that celebrates cultural representation and social cohesion (Superkilen Park Design Team, 2013).

Additional projects highlight the integration of art and environmental sustainability. Parc de la Villette in Paris, for instance, converted an industrial site into a sprawling cultural park that blends green spaces with art installations and performance venues, showcasing the potential of large-scale adaptive reuse to foster cultural activity and environmental regeneration (Parc de la Villette, 2020).

Across all these projects, tangible improvements were central to their success. Enhancements to physical infrastructure, such as the addition of pathways, lighting, and green spaces, made these areas more functional and inviting (Gehl, 2011). Improved accessibility features ensured inclusivity for diverse user groups, such as families, elderly individuals, and people with disabilities. Environmental improvements contributed to biodiversity, urban cooling, and air quality, enhancing both the ecological and experiential value of these spaces (UN-Habitat, 2013).

Equally important were the intangible elements that enriched these projects. Community engagement played a pivotal role in ensuring that the designs reflected the needs and identities of residents (Superkilen Park Design Team, 2013). Economic benefits were another significant outcome, with projects like Wynwood Walls and Millennium Park generating increased property values, tourism revenue, and local business activity (Chicago Planning Commission, 2018;

Wynwood Arts District, 2021). These case studies collectively demonstrate the transformative potential of adaptive reuse and emphasize the importance of balancing physical infrastructure with cultural and social dimensions.

5.1. Lessons for Public Scape

The findings from these case studies provide a robust foundation for the development of the Public Scape platform, highlighting critical insights that can guide its design and implementation. A key takeaway is the importance of contextual data integration. The diverse objectives and methodologies of the case studies underscore the necessity for a platform that accommodates a variety of datasets, including spatial, demographic, and cultural information (GIS in Cultural Heritage, 2019).

Another critical insight is the need to balance tangible and intangible elements in public space planning. Quantifiable criteria, such as visitor numbers and economic outcomes, must be considered alongside qualitative elements like the emotional connections communities have with their spaces. This dual focus ensures that public spaces are not only functional but also culturally and socially resonant (Federation Square Management, 2019).

Participation and inclusivity also emerged as pivotal factors in designing effective public spaces. Initiatives such as Superkilen Park exemplify the value of participatory planning, where community engagement informs the design process and ensures that the space reflects the needs and identities of its users (Superkilen Park Design Team, 2013). Public Scape can facilitate this approach by leveraging advanced tools like AI-driven sentiment analysis to gather and interpret community feedback, providing planners with actionable insights to create spaces that resonate with local populations (ESRI, 2023).

The role of contemporary art in public space regeneration is another important lesson. Projects like Wynwood Walls and Olympic Sculpture Park illustrate how art can transform public spaces into vibrant cultural hubs that attract diverse audiences (Wynwood Arts District, 2021). Public Scape must integrate evaluation metrics to assess the cultural and economic contributions of art-driven initiatives, ensuring that artistic elements are strategically incorporated into urban planning strategies (Olympic Sculpture Park Committee, 2021).

Finally, the case studies highlight the importance of employing economic and social metrics as success indicators. The measurable economic benefits of projects like Millennium Park and Wynwood Walls, including increased tourism revenue and property values, demonstrate the value of comprehensive analytical tools. By incorporating predictive modeling, Public Scape can estimate the potential outcomes of proposed interventions, enabling planners to make informed decisions and maximize the long-term benefits of revitalization efforts (Chicago Planning Commission, 2018).

5.2. Implications for Public Scape

The case studies highlight the complexity and diversity inherent in public space revitalization, emphasizing the need for a comprehensive, data-informed platform like Public Scape. By integrating the insights derived from these projects, Public Scape can address key challenges in urban planning while enhancing the efficiency, inclusivity, and impact of public space regeneration (GIS Cultural Resource Management, 2020).

A primary advantage of Public Scape is its potential to improve efficiency by centralizing and automating data aggregation. Currently, urban planners often face the labor-intensive task of gathering fragmented data from multiple sources. Public Scape streamlines this process, reducing the time and effort required to compile and analyze information. This allows planners to focus on designing and implementing effective revitalization strategies rather than being encumbered by administrative hurdles (ESRI, 2023).

Public Scape also has the potential to encourage innovation by leveraging advanced technologies like Geographic Information Systems (GIS), AI-driven feedback analysis, and predictive modeling. GIS integration enables spatial analysis to identify underutilized areas, while AI can process community feedback to reveal preferences and needs. Predictive modeling, in turn, allows planners to simulate the potential impacts of proposed interventions, providing valuable insights into economic, social, and environmental outcomes (GIS in Cultural Heritage, 2019). These capabilities empower planners to explore novel solutions tailored to the specific challenges of urban spaces.

6. AI and Public Space Revitalization

AI and GIS integration offer a transformative approach to public space revitalization, enabling efficient, inclusive, and functional urban planning. Public Scape leverages these technologies to centralize datasets and streamline urban analysis processes, aligning with current developments in GeoAI and digital twins as explored in recent research (Afroosheh & Askari, 2024; Fraunhofer IESE, 2023; Boutayeb, Lahsen-Cherif, & El Khadimi, 2024). AI-augmented GIS integrates environmental metrics, transportation data, and community inputs to automate processes like land use mapping. Predictive modeling simulates intervention impacts, aiding resource allocation for improvements such as green spaces, cultural installations, and accessibility upgrades. Successful examples like Wynwood Walls illustrate the potential of predictive tools to drive economic growth and community engagement (Wynwood Arts District, 2021).

Public Scape emphasizes participatory planning, analyzing real-time feedback with AI-driven natural language processing (NLP). By mapping community needs, the platform identifies intervention areas, as demonstrated by projects like Superkilen Park. Future innovations include digital twins and augmented reality (AR) for design visualization, fostering transparency and equity in urban development (Superkilen Park Design Team, 2013).

With its holistic and forward-thinking approach, Public Scape addresses modern urban challenges, balancing infrastructure improvements with community and cultural needs (GIS in Cultural Heritage, 2019).

7. Conclusion

Public Scape represents a visionary approach to public space revitalization, leveraging the integration of AI and GIS to address the complexities of urban development [Fig. 2].

By centralizing diverse datasets, employing predictive modeling, and incorporating community-driven insights, the platform balances tangible infrastructure improvements with intangible cultural and social needs. Its innovative tools, such as digital twins and augmented reality, empower planners to create inclusive, sustainable, and vibrant urban spaces. While still conceptual, Public Scape offers a forward-thinking framework that redefines how cities can foster equitable and meaningful public environments. As the discourse on AI-driven urbanism continues to evolve, it becomes increasingly clear that future-ready planning must not only be technologically advanced but also culturally responsive and socially inclusive (Boutayeb et al., 2024; Difu, 2025; Wang et al., 2023).

Fig. 2
Concept visualization of User Interface. Source: Author's elaboration

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Regeneration and Optimization of Public Open Spaces, strengthening Tangible and Intangible Connections through Dynamic Strategies

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ABSTRACT
This study proposes a comprehensive task list integrating spatial and temporal dimensions to guide urban planners and policymakers in optimizing public open spaces. This task list emphasizes optimizing spatial characteristics to create functional areas aligned with local cultural contexts while accounting for the dynamic nature of space usage. It highlights how usage patterns shift over time, from daily to seasonal cycles. By acknowledging these spatiotemporal changes, the study provides urban decision-makers with strategies that align long-term urban goals with actionable design interventions. The study offers practical optimization pathways focused on enhancing urban identity, fostering social interaction, and ensuring environmental sustainability. It underscores the need to consider social, economic, and cultural factors, such as users' lifestyles, economic activity distribution, and historical heritage preservation when designing public spaces. In doing so, the framework provides a roadmap for balancing the functional and symbolic roles of public open spaces, ensuring they serve both the immediate and long-term needs of POSs users.

PUBLIC OPEN SPACES | OPTIMIZATION STRATEGIES | SOCIAL INTERACTION | CULTURAL PRESERVATION

1. Introduction

Public open spaces (POSs), as a vital element of an urban's outdoor environment, encompass freely accessible parks, green areas, recreational facilities, sports venues, and leisure spaces (Koohsari et al., 2015). POSs have consistently played a key role in shaping urban and regional development, and these spaces enhance the built environment through their tangible physical attributes, such as architecture, infrastructure, and space design, while also contributing to the historical, cultural, and aesthetic identity of cities (Luo et al., 2024). It can be said that the significance of POSs goes beyond their material characteristics, also serve as social arenas that encapsulate residents' collective memories, social interactions, and cultural values (Luo et al., 2025). These spaces impact residents' well-being across multiple dimensions, including physical, emotional, economic, and psychological aspects. Consequently, POSs reflect diverse ways of living in and conceptualizing cities, embodying complex connections between tangible and intangible elements. In the context of rapid urban transformation, optimizing POSs to address evolving and diverse needs has emerged as a priority. Despite extensive research indicating that different types of POSs exhibit varying physical attributes (Han et al., 2022), and questionnaire surveys revealing distinct behavioral patterns and demands of users (Kiplagat et al., 2022), several challenges persist. Such issues hinder the ability of POSs to function as inclusive urban platforms.

To address these challenges, this study aims to develop an integrated framework that combines the static characteristics of physical environments with the dynamic changes in user needs through the construction of a task list. This approach seeks to help urban planners achieve a balance between functionality and cultural preservation.

2. Conceptual Framework

2.1 Setting goals

The optimization of POSs is guided by two main objectives: a top-down approach that focuses on the overall optimization of physical attributes, and a bottom-up approach that prioritizes user-centered development through the enhancement of social attributes (Theeba Paneerchelvam et al., 2020; Vahabi et al., 2023). Specifically, optimizing physical attributes emphasizes the creation of functional and environmentally friendly spaces. At the same time, optimizing social attributes focuses on improving user experience and interaction by increasing users' sense of participation and belonging, revitalizing spaces, and fostering social relationships and cultural preservation (Hegetschweiler et al., 2017) [Fig. 1].

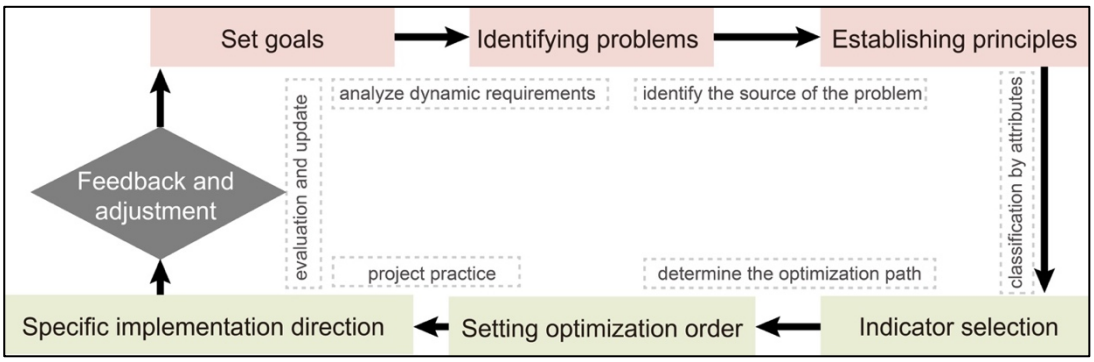

Fig. 1
The overall constructio n of the task list. Source: author's elaboration.

2.2 Identifying problems

The following will discuss the characteristics and problems of four types of POSs, including traditional historical spaces, open street spaces, courtyard spaces, and modern commercial spaces. The classification basis and existing practical problems are derived from the previous empirical research results of scholars in this field (Hunter et al., 2019; Luo et al., 2024; Shatu et al., 2019), addressing both physical and social dimensions [Fig. 2].

Fig. 2
Some of the problems identified in POSs. Source: author's photograph and elaboration.

Key features of traditional historical spaces include narrow, winding streets and alleys, along with pedestrian-oriented transport systems (Xu et al., 2022). Traffic and circulation, increasing population and vehicle numbers strain these spaces, leading to frequent traffic congestion and safety concerns, during peak activity or tourist periods, overcrowding disrupts traffic flow. Public facilities and insufficient cultural facilities fail to meet residents' social and recreational needs, and public functional facilities (like leisure seats, trash cans, etc.) are not fully configured and fail to effectively support diverse activities. In spatial order, street vendors, although contributing to local character, often occupy pedestrian spaces, causing clutter and disrupting the area's overall order.

Due to their lack of clear boundaries or constraints (Yoshihara et al., 2021), open street spaces face challenges in spatial functionality and order. Traffic and circulation, the absence of clear delineation or segregation between motorized, non-motorized, and pedestrian paths results in chaotic parking and obstructed pedestrian flows, impairing spatial order and walkability, and limited public transit coverage further restricts accessibility and utilization. Landscape and aesthetics, disorderly street landscapes, uncoordinated landscape elements, and outdated infrastructure create visual and functional disarray, deterring usage and diminishing appeal.

Courtyard spaces, typically enclosed or semi-enclosed, exhibit higher spatial order but still face challenges related to functionality and facilities. Traffic and circulation, insufficient or poorly managed parking spaces, and mixed vehicle-pedestrian flow create unsafe and inconvenient conditions. Public facilities, limited seating, and activity areas fail to meet users' needs, prompting informal use of spaces (e.g., sitting on flowerbeds or roadside steps). Landscape and aesthetics, overcrowded, haphazardly designed landscaping reduces visibility, comfort, and safety, while the sparse distribution of essential facilities inconveniences users (Chen et al., 2022).

As a concentrated area of commercial activities, the planning and management of modern commercial space needs to balance commercial and public needs, but the following problems still exist. Traffic and circulation, narrow roads, disorganized parking, and motorized vehicle encroachments impede pedestrian and vehicle flows, creating congestion in high-traffic areas. Public facilities, uneven distribution of seating, and activity facilities reduce user comfort. Landscape and aesthetics, encroachment of shopfronts on pedestrian spaces detracts from the street's aesthetics and walkability.

2.3 Establishing principles

From the identified problems, the optimization principles are mainly based on three aspects: traffic and circulation, public facilities, and landscape aesthetics [Fig. 3]. Consideration of natural environments, cultural contexts, and social structures is critical. Additionally, by integrating temporal dimensions, the adaptability and efficiency of space utilization can be significantly improved.

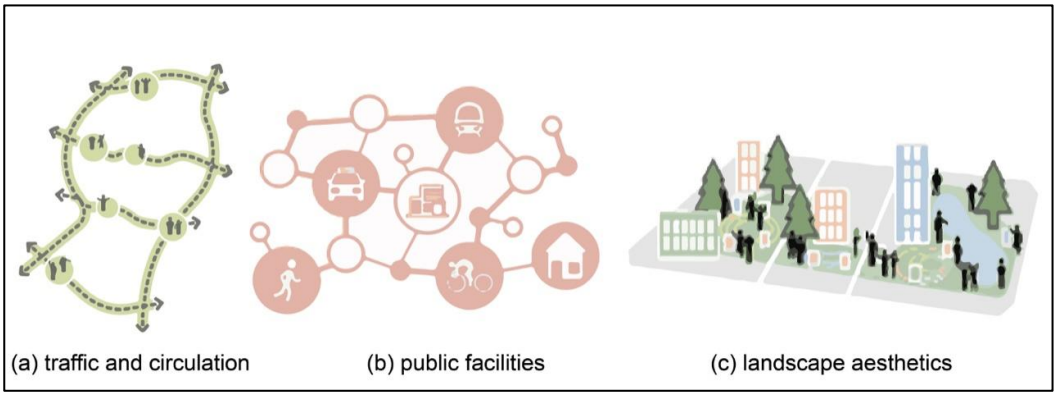

Fig. 3
Optimization principles considered from three aspects. Source: author's elaboration.

3. Development of the task list

3.1 Indicator selection

The task list integrates both spatial and temporal dimensions. Key indicators for the spatial dimension are derived from physical attributes, while those for the temporal dimension focus on user experiences and behavioural dynamics, ranging from the individual to the neighbourhood scale.

3.2. Task list development

The task list is built through the following steps:

- Identification: conduct on-site surveys to identify critical issues in poss.
- Dimension setting: classify observed challenges into tangible and intangible dimensions (physical and social attributes).
- Aims setting: establish overarching aims for each attribute, such as enhancing convenience, functionality, safety, comfort, intelligence, interactivity, culture, and aesthetics (Hunter et al., 2019).
- Aims refinement: decompose aims into measurable sub-aims.
- Optimization directions: align design interventions with refined aims.
- Task list structuring: develop a structured task list with quantifiable indicators, ensuring operational feasibility and temporal adaptability.

The task list is structured around eight key objectives, with specific indicators and explanations as shown in Fig. 4 and Fig. 5.

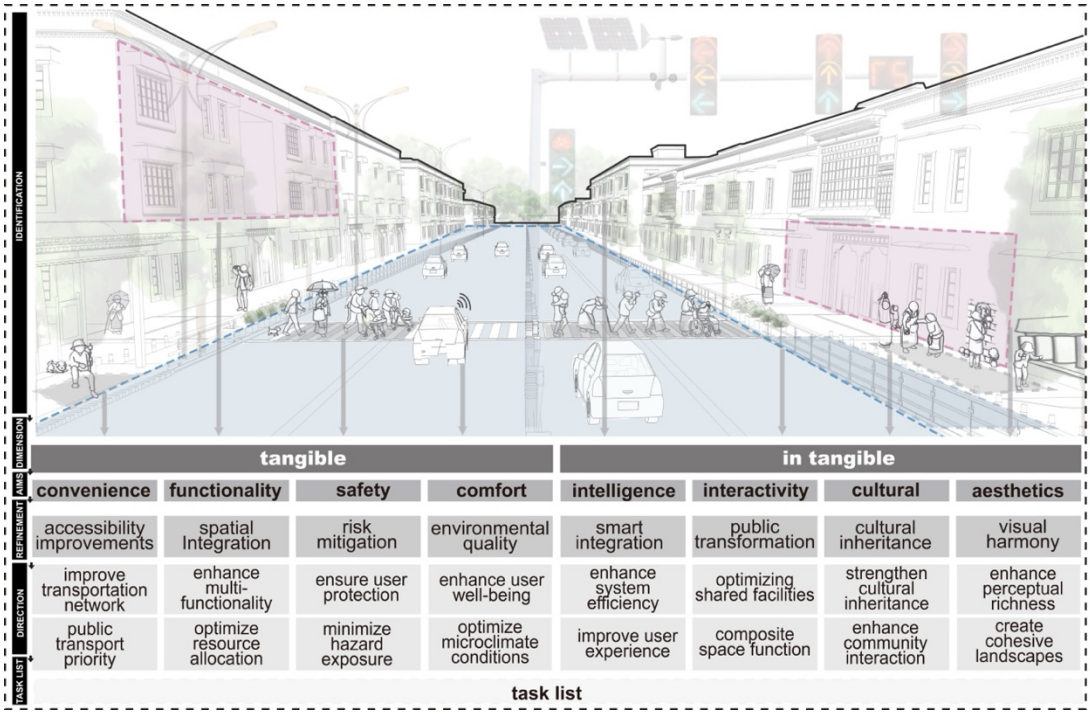

Fig. 4
Task list development process. Source: author's elaboration.

Task list			
	Indicator	Description	Standard for ref
Convenience			
☐	Public transportation	Service radius of bus stops or subway stations	≤300m coverage
☐	Walkability	Width and continuity of pedestrian paths	≥90% barrier-free
☐	Facility density	Number of public service facilities per km²	≥20 units/km²
☐	Parking space ratio	Match between motor/non-motor vehicle parking spaces and demand	≥1:1 ratio
Functionality			
☐	Functional mixture	Mixed ratio of residential, commercial, and office	Mixed-use index ≥0.7
☐	Facility diversity	Types and quantity of public activity facilities	≥5 types/km²
☐	Space utilization	Frequency of use per unit area (e.g., pedestrian	≥50 users/hour
Safety			
☐	Traffic separation rate	Degree of separation between pedestrian and vehicle lanes	≥85% separation
☐	Firefighting facility density	Number of fire hydrants or extinguishers per km²	≥10 units/km²
☐	Lighting coverage	Nighttime illumination coverage and brightness	≥90% coverage, ≥50 lux
☐	Accident rate	Number of traffic or security incidents per month	≤5 incidents/month
Comfort			
☐	Green coverage	Proportion of green area to total block area	≥30%
☐	Sunshade facility coverage	Coverage of shading facilities	Summer shading ≥80%
☐	Noise level	Average noise decibel value in the block	≤55 dB
☐	Air quality	Concentration of PM2.5/PM10 pollutants	PM2.5 ≤35 μg/m³, PM10 ≤50 μg/m³
☐	Seasonal protection design	Design of facilities for seasonal climate adaptation	Summer shading ≥80%, winter insulation ≥70%
Intelligence			
☐	Real-time monitoring	IoT sensor coverage for facility density and usage	≥90% coverage
☐	Barrier-free facilities coverage	Accessibility features (e.g., ramps, elevators)	≥95% coverage
☐	Emergency response time	Average response time for emergencies (e.g., fire, medical)	≤3 minutes
☐	Public Wi-Fi accessibility	Coverage and signal strength of free Wi-Fi	≥95% coverage, ≥-70 dBm
Interactivity			
☐	Public activity space ratio	Proportion of open spaces for social activities	≥15% of total area
☐	Seat density	Number of seats per 100m of pedestrian paths	≥10 seats/100m
☐	Community facility	Average time to reach community centers or parks	≤10 minutes
Culture			
☐	Historic building protection	Proportion of protected and restored historic	≥90% protected
☐	Cultural facility density	Number of cultural facilities per km²	≥3 units/km²
☐	Cultural symbol visibility	Density and distribution of cultural symbols (e.g., sculptures, murals)	≥5 symbols/km²
Aesthetics			
☐	Visual complexity	Diversity of building facades and landscape elements (colors, materials)	Visual richness score ≥ 4/5
☐	Sky visibility	Visible sky ratio in the field of view	≥0.6
☐	Landscape coordination	Harmonization of greening, paving, and architectural styles	Coordination score ≥4/5

Fig. 5
Task list with specific quantitative indicators and explanations. Source: author's elaboration.

It is worth reminding that not all indicators in the task list need to be implemented, and the implementation standards in the list are reference values. Instead, appropriate quantitative indicators should be selected according to the specific conditions of the POSs, and appropriate standard values should be determined.

1. Convenient: Improve spatial accessibility by optimizing the transportation network and prioritizing public transit. Increase road intersection density and network connectivity while

ensuring an efficient distribution of bus stops. Furthermore, aligns parking space allocation with the demand for motorized and non-motorized vehicles (Shatu et al., 2019).

2. Functionality: Promote multifunctional POSs by integrating residential, commercial, and office uses. Increase the diversity of public activity facilities and enhance space utilization efficiency to maintain an appropriate level of user engagement.
3. Safety: Improve spatial safety through traffic separation, fire safety measures, and adequate lighting. Ensure clear demarcation between pedestrian and vehicular zones, enhance the distribution of firefighting infrastructure, and maintain sufficient nighttime illumination to minimize security incidents (Han et al., 2022).
4. Comfort: Improve environmental quality by expanding green coverage and optimizing microclimate regulation. Increase the proportion of green coverage and green infrastructure to improve microclimate conditions while meeting aesthetic and ecological needs (Chen et al., 2022). Provide adequate shading facilities in summer and insulation measures in winter to enhance thermal comfort for users. Regulate noise levels and maintain air quality standards to foster a more comfortable public environment.
5. Intelligence: Integrate smart urban management systems to enhance spatial efficiency (Kiplagat et al., 2022). Deploy IoT sensors for real-time facility monitoring, ensure accessibility features are in place, and improve emergency response times. Employ time-based management strategies to effectively address peak-period traffic challenges to support intelligent urban infrastructure.
6. Interactivity: Optimize shared facilities and multifunctional spaces to foster public engagement. Maintain an appropriate proportion of open spaces for social interactions, ensuring adequate seating and accessible community facilities to enhance spatial usability and encourage social cohesion (Han et al., 2022).
7. Culture: Strengthen cultural heritage preservation and community identity. Monitor the status of historic buildings in real-time, safeguard historic buildings, and integrate cultural elements such as landmarks, sculptures, and murals to enrich urban spaces and reinforce cultural continuity (Hegetschweiler et al., 2017).
8. Aesthetics: Enhance spatial aesthetics through cohesive landscape design and architectural integration. Optimize sky view ratios, and harmonize greenery, paving, and built forms to create a visually engaging and well-balanced urban environment.

3.3. Task list application

The application of the task list is guided by space types, selecting specific indicators based on the characteristics and needs of different spaces. Four examples of spatial types are discussed below to illustrate concrete application pathways.

For traditional historical spaces, optimization should focus on preserving cultural heritage, managing peak crowd density, and enhancing functional diversity (Luo et al., 2024),. Key strategies include increasing green coverage and leisure spaces to improve environmental quality. To regulate visitor flow, intelligent monitoring systems can be implemented, along with entry limits during peak periods. Pedestrian pathways should ensure accessibility, and traffic separation measures can help improve safety. As a reference, maintaining a clear separation between pedestrian and vehicle zones (e.g., at least 85%) is often recommended (Hegetschweiler et al., 2017).

For open street spaces, the primary goals are enhancing transport efficiency, ensuring sufficient walking space, and integrating greenery and public amenities. Streetscape design should align with the surrounding environment, incorporating public seating areas and active street interfaces such as shaded spaces or transparent facades to improve connectivity and visibility. To enhance walkability, pedestrian crossings should be placed at appropriate intervals, and paving materials should balance permeability and durability to facilitate drainage. For reference, public seating is often recommended at an interval of approximately 10 seats per 100m of pedestrian space.

Courtyard spaces should focus on ecological maintenance and user comfort by integrating vegetation and optimizing spatial functionality. Seasonal adaptability can be improved by selecting deciduous trees with dense canopies to provide shading in summer while allowing sunlight in winter. The use of permeable materials for pathways can help reduce heat accumulation and improve drainage. Additionally, rest areas should be well-equipped with seating and sanitation facilities to enhance usability. A common recommendation is to maintain a significant proportion of green space to ensure adequate shading and climate regulation.

For modern commercial spaces, optimization should emphasize improving accessibility, functional diversity, and service infrastructure (Vahabi et al., 2023). Expanding pedestrian pathways, increasing public transport connectivity, and enhancing green spaces can contribute to a more efficient and user-friendly environment. During low-utilization times, repurpose semi-open spaces for public activities. Hard parking and temporary traffic restrictions can ease congestion and improve flow, creating a more vibrant and efficient commercial space.

4. Discussion and conclusion

This study develops a task checklist framework for optimizing POSs from spatial and temporal dimensions, aiming to assist urban planners and policymakers in designing spaces that are inclusive, functionally diverse, and culturally resonant. The proposed task list centers on multidimensional indicators and emphasizes a systematic approach from macro-level planning to micro-level design, it provides clear and actionable pathways for optimizing public spaces, making it a valuable tool for practitioners.

In summary, the task list proposed in this study offers a perspective on POSs design and management. By integrating tangible and in-tangible dimensions, this approach addresses the challenges posed by the diversified demands of POSs in the context of rapid urbanization. Future research could focus on the deeper integration of smart technologies and the development of localized optimization strategies (Luo et al., 2024), further advancing POSs toward greater inclusivity, cultural continuity, and environmental sustainability.

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Promoting local ecologies. Collective practices of symbiotic design

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ABSTRACT
This paper explores the relevance of community-based design practices in responding to current global uncertainties, pollution, climate change, and biodiversity loss. It highlights how collaborative and 'symbiotic' design approaches can promote and encourage the diffusion of a tangible and intangible sense of 'collective ecological consciousness'. The aim is to investigate the potential of design in creating collective knowledge networks through 'rhizomatic' processes, community approaches and local ecological practices. The research emphasises the importance of new forms of civic action in fostering a sense of ecological citizenship and community, addressing socio-environmental issues. The case studies presented illustrate the activities of realities that, through collective awareness actions, develop local ecologically appropriate design practices. The adoption of the Circular Value Framework allows the social values generated to be analysed and highlighted. Design is thus configured as an activist force capable of triggering positive changes, transforming individual and collective behaviour into concrete actions for 'co-futuring'.

COMMUNITY-CENTRED DESIGN | ECOLOGICAL CITIZEN VALUE | BIOINTEGRATION | LOCAL COMMUNITIES ACTIVISM

1. Design and civic action

In order to address the complexity of global challenges, pollution, climate change, and biodiversity loss (Elhacham, Ben-Uri, Grozovski, Bar-On, & Milo 2020), unconventional community-based design strategies are being developed in recent years (Villari 2021).

The design process becomes 'rhizomatic' (Lotti, Vacca, Tanzini, & Ballerini 2022), creating a network of collective knowledge that arises from the connection of different knowledge.

The study highlights the importance of adopting community-centred approaches (Meroni 2007; Priola & Manfroni 2024) that, through a continuous interaction with design, support and guide the necessary social and cultural transformation.

This research aims to reflect on how community-centred design processes, practices and values are changing in response to global uncertainties.

In particular, it aims to identify realities capable of promoting positive behaviour and ecologically appropriate local design practices through collective awareness actions. These include design approaches that aim to stimulate the 'citizen relationship' with the natural world (Phillips Alexander, Baurley, Boxall, Gooding, Knox & West 2024), 'endogenous' practices (Cardini 2022), and design expressions that emerge within a specific community or context.

Therefore, the research focuses on the interconnection between the tangible and intangible dimensions of design, the engagement of local communities, and its capacity to foster reparative practices through which citizens actively contribute to reconnecting with their environment.

2. Eco-social relational practices (background/literature review)

Facing contemporary issues, emerges the need for a radical change and a new sensibility that promotes 'symbiotic relationships' (Albrecht & Van Horn 2016) between humans and the natural environment. This term refers to mutually beneficial interactions between humans and the environment, promoting co-evolution and balance. This concept challenges anthropocentric paradigms, encouraging regenerative and reciprocal connections that support both ecological and social systems.

In this perspective, the tendency is to operate through an holistic approach with local communities, for territories and contexts where designers 'create the conditions' to enact change (Manzini 2019).

In the field of design, expert designers' attention is increasingly focused on local issues (Fagnoni, Manfroni & Priola 2024). There is a radical shift in collective vision and design practices, encouraging the adoption of biocentric strategies concerned with ecosystem dynamics: strategies promoting a deeper understanding of ecological processes, emphasizing the need to align design interventions with the rhythms, needs, and regenerative capacities of ecosystems.

At the same time, we are witnessing the proliferation of a variety of initiatives that contribute to the emergence of different energies and capacities in society, which, when they find a favourable

context, could become powerful resources for the diffusion of 'social innovation' initiatives (Murray, Caulier-Grice & Mulgan 2010).

These are the 'Changing Communities' (Gonzaga, Nam, Rebaglio & Selloni 2023), groups of people, associations, social enterprises capable of addressing complex problems and at the same time regenerating the society and territory in which they operate.

Through collaborative practices they also contribute to regenerating the local social fabric, producing alternative visions.

In this sense, designers are increasingly concerned with intangible aspects associated with design, such as the construction of a 'sense of community' (Yuan 2024), useful to reflect and respond to current social and environmental changes.

Design today has to deal with complex daily aspects and issues, and shifts the focus of its actions from taking care of the tangible and formal aspects (Fagnoni 2022) to enhancing the intangible and relational aspects of the project, creating opportunities for contact and discussion for the development of the territory.

Recurrent is the idea of a design that comes out of laboratories and studios (Campagnaro 2023), which dialogues with and actively involves interested individuals, giving them a role in the decision-making process.

There are emerging approaches aimed at promoting 'ecological citizenship' (Phillips et al. 2024). Platforms that act as catalysts for active citizen participation and for the promotion of positive ecological behaviour, involving and empowering communities through individual and collective actions (Phillips, West, Shepley, Baurley, Simmons, Pickles & Knox 2023).

3. Methodology: Circular Value Framework

Referring to theoretical insights, good examples and practice-based actions, the research examines how designers promote 'community-centred' approaches (Villari 2021), including citizen science, activism and collective learning.

The aim is to map local realities from different international contexts, explore opportunities, communities and movements based on civic engagement that can offer opportunities to re-imagine a collective ecology from different cultures and approaches.

The criteria adopted for the selection of the case studies are: 1) semantic adherence, designer-led realities that carry out activities to develop collective knowledge networks, and foster the dissemination of local community involvement practices; 2) time frame, realities operating between 2015 and 2025; 3) design approach, realities that adopt community approaches by involving citizens and promoting local ecological practices; 4) application field, cases that promote the integration of design and forms of civic action in fostering a sense of ecological citizenship and community, and address socio-environmental issues.

The paper presents a comparative analysis of the mapped cases, with the aim of highlighting their value in addressing complex socio-environmental challenges and disseminating ecological practices.

This qualitative approach explores specific parameters and is mainly based on the use of the Circular Value Framework [Fig. 1], revised and based on the existing five-layer model (Leclercq & Smit 2023).

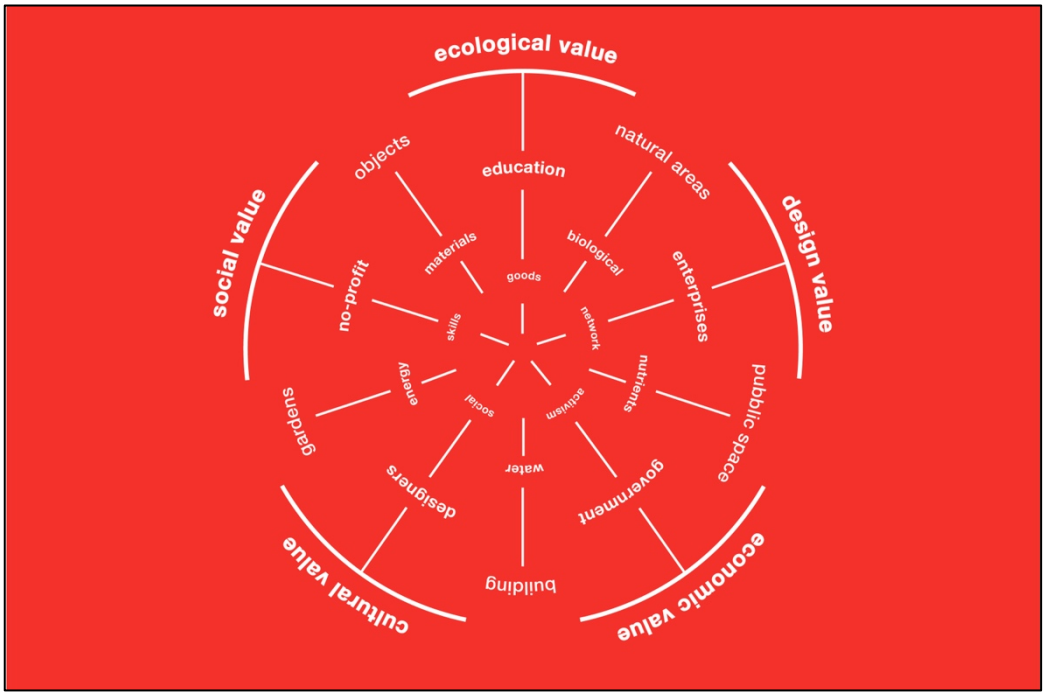

Fig. 1
Circular Value Framework revised and based on the model of Leclercq & Smith 2023. The diagram maps five layers of community-based initiatives: ambitions and activation potential; resource cycles; involved actors; spatial interventions; and generated values.

The first layer of the chart highlights the ambitions of the realities and the activation potential present or needed within the community. The second layer shows the different resource cycles on which the initiatives focus (water, energy, nutrients, materials, biological and plant resources). The third layer presents the possible actors the realities can relate to in order to achieve their ambitions (designers, public entities, private companies, non-profit organisations and institutes). The fourth layer shows the potential spatial interventions (natural areas, public spaces, gardens, buildings and urban objects). The outer layer is formed by the values generated by the realities (social, economic, ecological, design and cultural).

Subsequently, individual case studies are examined using value charts, with the aim of providing evidence on the impact created and identifying the values that the initiatives generate.

These initiatives should not be interpreted exclusively as responses to local problems, but as true experimental cultural laboratories capable of offering new perspectives. To fully assess their value and impact, it is necessary to consider both dimensions, not only the practical and tangible/explicit results, but also the tacit and cultural potential they can bring on a broader scale and in the long term.

4. Different forms of citizen activism

Atelier LUMA[1] is a research laboratory located in the Camargue wetlands region. It experiments with alternative practices of bioregional design (Magnaghi 2020) and establishes new connections with the territory.

The design activities are based on a multifaceted approach aimed at connecting and engaging the Mediterranean community of Arles and various local stakeholders, including artisans, experts, investigating the use of local materials such as agricultural waste, invasive plants or seaweed, activating traditional knowledge and disseminating the results through open source resources, workshops and other replicable eco-social educational activities (Boelen, Sachetti, Travnik, Hofmann, Bouhayati, Finders, & Picon 2019).

Field Meridians Nature School[2]is an educational programme based on urban ecology, developed to generate resilience tools. Their practices include activities to investigate and explore urban micro-ecologies [Fig. 2]. Through workshops and educational programmes, it aims to raise awareness in the local community about the importance of ecology in public spaces such as parks and community gardens. The school collaborates with local organisations to promote waste reduction, land care and resource redistribution. In addition to sharing skills, knowledge and collective values, it promotes the re-connection between people and places.

Ecological Citizen(s) Network+[3] *at the Royal College of Ar*t is a global network of individuals and organisations promoting a form of ecological citizenship.

The network consists of a transdisciplinary team, including design, art practice, citizen science, environmental science, engineering, technology, education, and through awareness and collective action promotes ecological projects, behaviours and values that connect the individual, society and ecosystem.

La Foresta[4] is a community academy located in the Rovereto railway station. This collectively regenerated space is dedicated to eco-social transformation, hosting an open network of people and a variety of participatory, cultural, design and educational activities.

Through co-design paths, the community actively participates in the definition of workshop activities in which self-production techniques are shared and solutions to optimise natural resources are explored.

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[1] Atelier LUMA website: https://www.luma.org/en/arles/atelierluma.html
[2] Field Meridians' Nature School website: https://natureschool.fieldmeridians.org/
[3] Ecological Citizen(s) Network+ website: https://ecologicalcitizens.co.uk/
[4] La Foresta website: https://laforesta.net/

Fig. 2
Field Meridians' Nature School, New York. Source: https://www.instagram.com/fieldmeridians/

Terzo Paesaggio[5] promotes cultural practices with a focus on marginal places. It realises interventions of regeneration and temporary reuse of disused public heritage and soils. It promotes co-creation practices among plural communities by involving resident designers, practitioners, researchers and policy makers. It also experiments with learning and training approaches open to cultural crossover and self-learning.

Barena Bianca[6] is a collective dedicated to raising public awareness of ecological and social issues in the Venetian lagoon [Fig. 3].

The group organises ecological walks in the sandbanks of the Venice lagoon and collaborates with designers to develop installations to educate participants on the ecological importance of these areas and the threats they face. They offer environmental education workshops for schools and local communities focused on the lagoon's biodiversity and environmentally friendly practices.

5. Value of communities relations

The results of the analysis are shown in several value charts [Fig. 4] indicating the extent of value generated by each specific reality. This 'entity of value' refers to a qualitative and comparative assessment of the value produced by each identified case study, considering a number of factors such as ecological, design, economic, cultural and social contributions.

[5] Terzo Paesaggio website: https://terzopaesaggio.org/
[6] Barenabianca website: https://www.barenabianca.earth/

Fig. 3
Barena Bianca, Venezia. Source: https://www.barenabianca.earth/category/education/

By systematically assessing these aspects among the selected cases, the graphs provide a representation of the different degrees of value generated by each initiative, offering insights into the effectiveness and overall contribution of community-centred design in the local context.
The value is verified with a qualitative indication, visually represented by the three levels, where the minimum level corresponds to 'to a minimum extent', the intermediate level represents 'to a limited extent' and the outer level means 'to a large extent'.
The analysis of these relationship-based practices could offer alternative perspectives in the sharing of knowledge and values, to collectively re-imagine how to cope with the socio-ecological adversities that characterise the present moment and the near future (Schneider-Mayerson & Bellamy 2019).
These are activities, initiatives and practices in which the design's capacity and ability to enhance the community, the commons, and the cultural and natural resources of specific territories emerge. These realities and communities are connected to the places in which they operate (Manzini & Thorpe 2018) and contribute to the diffusion of forms of active citizenship that focus on specific ambitions for each project and context.
In this sense, community-centred actions and relationships emerge, promoting design strategies and practices, aimed at orienting the capacity of design towards ways of acting in tune with social and ecological contexts (Fagnoni, Manfroni & Priola 2024).
In this scenario, community members do not limit themselves to developing solutions to address their own needs, but proactively participate in a broader collective design process that brings

together designers and local stakeholders. These communities evolve through an ongoing interaction with design, which not only supports but also drives social and cultural transformation (Gonzaga et al. 2023) in response to the main social and environmental challenges.

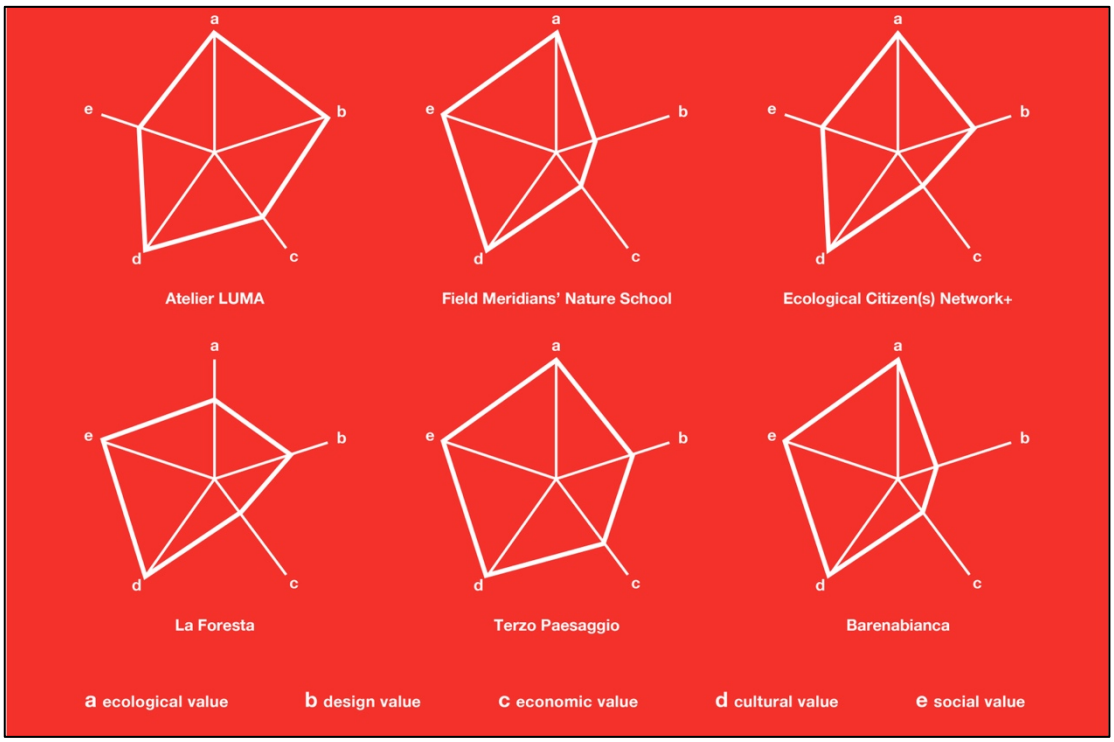

Fig. 4
Community Values Chart represent the ecological, design, economic, cultural and social value generated by each specific mapped reality

6. Co-futuring: a sense of collective ecological consciousness

This paper highlights how the adoption of different collaborative approaches can contribute to addressing environmental challenges and reciprocally benefit communities of citizens, ecological environments and society in general.

The results of these practices include relational approaches that generate scalable and transferable 'social-environmental values' for broader applications in addressing critical ecological issues.

As many of these initiatives are not well established to date, it is complex to bring out and analyse the explicit contribution of design. However, within formally structured communities, such as those presented here, it is possible to identify the potential generated by designers who, together with citizens, address a multiplicity of challenges in dynamic and cooperative ways. One problem that emerged during the collection of the case studies was the lack of information, which limited the comprehensiveness of the analysis. To address this challenge, it will be necessary to explore additional data sources and adopt more effective collection strategies.

The difficulty in measuring the designer's tangible contribution stems from the fact that many initiatives focus on educational and awareness-raising actions aimed at citizens.

This difficulty should not be seen as a weakness in the traditional design paradigm, but as a reflection of the evolution of design towards an expanded approach that goes beyond the

production of objects and includes relational, interactive and collective processes. In this context, design is no longer measured only through tangible results, but also in terms of social impact, awareness and cultural transformation.

In this kind of activity, design triggers 'interactions' that can transform behaviour into positive impacts on the natural world (Phillips et al. 2023). Design becomes a medium for fostering a tangible and intangible sense of 'collective ecological consciousness' [Fig. 5].

The potential of design as an 'activist' force thus emerges, fundamental in addressing the collective challenge of promoting democratic practices and values, actively contributing to the shared construction of 'co-futuring' (Fuad-Luke 2009).

These visions offer critical perspectives on a fragmented present (Morton 2016) and outline pathways and strategies for the co-construction of desirable futures (Escobar, 2018) and positive change.

Fig.5
Relevant aspects for developing a sense of collective ecological consciousness in community-centred design practices

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Moreover, the paragraphs 'Design and civic action' and 'Eco-social relational practices' are to be attributed to Manfroni M., 'Methodology: Circular Value Framework' and 'Different forms of citizen activism' to Priola C. M.. The paragraphs 'Value of community relations' and 'Co-futuring: a sense of collective ecological consciousness' are to be attributed to both authors.

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The Intangible Architectural Design Agency: Navigating the Tangible Construction Process of Public Space in Rural China. The Case Study of Zhaoshan Village

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ABSTRACT
This article examines the construction process of the Zhaoshan Village Community Center in Hubei Province, China, as a case study of the national strategy for rural revitalization. Grounded in ethnographic research, it challenges top-down narratives in public space transformation by exploring the interplay of material and design choices, stakeholder relationships, and socio-economic consequences during construction. By examining the entanglement of different construction systems, it shows how these technologies influence economies, stakeholder relations, and benefits. Using WeChat-mediated interactions between architects, contractors, and workers as a lens, it unveils the underlying hierarchies and negotiations that define construction practices. It reveals the constraints imposed by bureaucratic frameworks and procurement standards, which often prioritize replicability and environmental indicators over local needs. This analysis advocates for an expanded role for architects as mediators, bridging policy mandates with community goals to ensure projects achieve their transformative potential. The findings highlight overlooked intangible socio-economic dynamics in rural regeneration practices.

ETHNOGRAPHIC APPROACH | CONSTRUCTION TECHNOLOGIES | SOCIO-ECONOMIC IMPACTS | ARCHITECTURAL PRACTICE

1. Introduction: Ethnographic Insights into Transformative Rural Revitalization Processes

In November 2023, construction commenced on the extensive renovation of an old factory in Zhaoshan Village (沼山村- Zhaoshancun), in Baohan County (保安镇- Bao'anzhen). It is a central aspect of the rural revitalisation process, which aims to establish the first rural scenic area in Hubei Province, designed by SUP Atelier by THAD design institute. In recent years, China has established a comprehensive framework of policies and investments targeting rural areas, recognizing them as a fundamental component of the nation's overall development strategy. Policies such as the Rural Revitalization Strategy introduced during the 19th Party Congress in 2017, the National Strategy of Rural Revitalization issued the same year, and the Rural Revitalization Promotion Law enacted in 2021 are among the key initiatives that have redirected national attention toward the countryside. Central to this strategy are public infrastructures that serve as nodes of social interaction, fostering identity formation and mediating inequalities and conflicts within rural-urban dynamics. The construction of such infrastructures becomes a space where the negotiation between tangible and intangible realities unfold, redefining both the spatial configurations and the meaning of publicness in contexts shaped by China's socio-political conditions (Smith 2021; Trémon 2023). The term 'publicness'

is adopted here for its versatility across multiple dimensions of the public realm. Rather, it refers to the condition of "being public", encompassing a heterogeneous set of factors – goods, actions, and decisions– that collectively generate public meaning and value.

This discussion is grounded in ethnographic fieldwork conducted as part of my doctoral research, which examines rural revitalization "from the ground up" and challenges conventional top-down narratives.

This bottom-up view is grounded in theoretical frameworks such as Actor-Network Theory (Latour, 2005), a theoretical framework that reconceptualizes society as an assemblage of heterogeneous human and non-human actants, each contributing agency to socio-technical processes whose relationships shape outcomes. This approach allows us to explore how architectural technologies and construction choices influence stakeholder interactions, revealing the micropolitics of rural transformations. The article specifically focuses on the interplay between architectural design choices, construction technologies, and the actors involved in the building process, offering insights into the elusive intangible dynamics embedded in the materialization of national policy agendas.

2. Construction Industry Challenges and Controversies for Architecture practices in Rural Context

Architectural practice, and the construction industry as a whole in which it operates, is inextricably linked to 'socio-economic conditions, as well as governmental policies, that profoundly influence design and construction decision-making.

Given the complexity of rural regeneration processes and their multi-layered interactions between policy, market and local communities, it is essential to critically examine the role and positionality of architectural design and the architect within and in relation to the construction market.

Shifts in the socio-political system and market acceptance have significantly influenced Chinese architecture, reshaping both the profession and the construction industry (Han, 2018). Recognized as a distinct sector only since 1983, the construction industry was unified by a law effective March 1, 1989, addressing qualifications, procurement, supervision, safety, quality, legal accountability, market regulations, and project procedures.

On the material side, these regulations emphasize technologies like reinforced concrete, often prefabricated, which align with the demands for rapid urban development with highly industrialized approach to construction, prioritizing speed, cost-efficiency, and prefabrication (Smil 2013). This paradigm has sidelined traditional materials like clay bricks and wood, further restricted by environmental regulations aiming to curb deforestation or phased out due to resource preservation of raw material (China's reliance on concrete). [1]

Labour from rural areas has played a key role in this growth,[2] with many rural workers acquiring skills in concrete construction through their involvement in large-scale projects, also occurs the knowledge and transmission and the diffusion for its replicability. Consequently, today much of the workforce is specialized, or has the ability, to easily manage reinforced concrete constructions. These shifts have transformed not only the materials of construction but also the social and economic frameworks underpinning the industry, which is now highly controversial in rural areas undergoing regeneration.

Rural revitalization projects face distinct challenges, particularly in how the choice of technologies and materials shapes who participates in construction and who benefits economically. Publicly funded initiatives, designed to improve community well-being, often neglect the social and economic opportunities embedded in the construction process itself. This raises a key question: who truly benefits from these efforts?

However, publicly funded projects are constrained by formal procedures and regulations, including new sustainability metrics like carbon footprints and energy efficiency, adding complexity to architectural choices. These decisions influence not just environmental outcomes but also

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[1] Avant-garde architects have paradoxically embraced concrete, a material linked to mass production, for its expressive potential. See: Bologna, A. (2019). Chinese Brutalism today: Concrete and avant-garde architecture. ORO.

[2] For more: Swider, S. (2015). *Building China: Informal Work and the New Precariat* (1st ed.). Cornell University Press.

economic equity, yet they are rarely considered in procurement processes or tracked through indicators, as they usually rely on intangible and and ungraspable dynamics.

3. Unfolding thought ethnography: a methodological challenge

Without claiming to provide a methodology for measuring the intangible and ungraspable dynamics mentioned above -assuming that's not the desired goal- the research proposes an ethnographic approach to start to identify and track informalities and presences on the construction site in relation to design choices.

Ethnography offers a unique lens for understanding the construction process as a site of negotiation, revealing the interplay between envolved actors and material assemblage. By observing and documenting informal and formal interactions, this methodology unpacks the intangible connections shaping rural revitalization.

WeChat, a widely used communication platform, played a central role in the Zhaoshan project. The interactions among architects, contractors, and specialized teams were often mediated through group chats, categorized by task and stakeholder group. Moreover they became tangible since they became a traces.[3] As Albena Yaneva (2023) has documented, the ways of interacting and the tools used in the practices change according to contextual needs, but they can also change the way we look at the process. As observer researcher I was in the following WeChat groups: Architectural Team (AT), AT+Engineering Team (ET), AT+ET+Contractor (C); AT+ ET+C+Timber Manifactury (TM).

As can already be understood from the list of groups, the timber manufacturing team started direct dialogues with the design team, unlike the other craftsmen who were instead managed through the on-site contractor. This required more consultation time from the design team and a greater level of coordination. As a result, the intensity and structure of communication varied across phases.

For instance, during the construction of the reinforced concrete and steel structures, the frequency of communication between AT and C was significantly reduced, unlike during the construction of the vertical brick closures, which required more continuous exchanges.

These digital interactions provided unique insights into the hierarchy of communication, decision-making processes, and the adaptability of construction practices in response to unforeseen challenges.

4. The Zhaoshan Case Study: Interweaving Technologies and Local Economies

The Zhaoshan project exemplifies the entanglement of technological choices and actor relationships in rural construction. The construction process for the Zhaoshan Community Center

[3] See concept of "documentality" described by Maurizio Ferraris (2009), *Documentalità. Perché è necessario lasciar tracce.* Laterza.

lasted approximately eight months and involved a diverse workforce, including specialized teams skilled in various construction techniques. These teams worked with a range of materials such as timber, reinforced concrete, steel, bricks, and stone.

The Taoli-Numayama Village Villager Center, as the project is officially named, transforming the abandoned site into a public space for both the local and tourist communities. Its goal is to serve as a hub connecting inhabitants of the village, the inhabitants of the town (4km), encouraging a flow of people from nearby cities (105-408km) but also at a national level thanks to the classification as a Level 4A Scenic Area.

Originally built around 2000, the factory processed natural soil into kaolin industrial materials, utilizing the site's topography and cost-efficient construction methods like brick columns and wooden trusses [Fig. 1].

Fig. 1
Interior of the original factory built around 2000, featuring bricks, concrete and wooden trusses. Photo by Sun Jingfen, courtesy SUP Atelier

The design team aimed to transform in new 2,993-square-meter site within a constrained budget. The decline in industrial activity led to the abandonment of the factory and its deteriorating structure, which was later deemed unsafe and had to be demolished. The new centre needs to accommodate a variety of activities that require different spaces of varying dimensions, but which echo the original structure of the factory. To achieve this, the design has provided all of these under a single expansive wooden roof with a span of 12+8 meters. The project required advanced construction technologies and a highly specialized team, expertise unavailable locally and sourced from Wuhan city武汉市 (distance:105 km).

The timber components were designed and prefabricated off-site, enabling quick on-site assembly by a team of 6-7 specialists from the manufacturing company [Fig. 2]. To minimize lodging and

meal costs, the team tracked their time and days on-site closely, as their fee, like the project budget, was at the limit of the service provided. As the most technically complex element, the roof significantly shifted the project's economic geography. Even if it was a deliberate choice by the design team, it reflects a broader strategy to emphasize an innovative feature, enhancing the project's alignment with the government's 'Rural Green Sustainable Development'[4] plan.

Fig. 2
Specialists from the manufacturing company quickly assembling the prefabricated timber structure on-site. Photo by the author

Pragmatically, it also defined the portion of the budget allocated outside the local economy. Paradoxically, this part of the structure was the element that brought satisfaction and merit to the builder and pride to the community as an innovative and exceptional mark. This is something that, as the designers who work in the countryside can attest, does not happen with traditional technologies.[5]

By contrast, other components utilized local labor and materials from the nearest town. Before design began, architects made weekly visits to villages and towns, studying local craftsmanship, including masonry and brickwork. Reinforced concrete was used for the foundations and the first-level frame, a standard and reliable choice to meet safety regulations within the lower budget.[6]

Steel structures, utilizing on-site welded joints, allowed for flexibility in addressing imperfections and design adjustments during construction, unlike the timber structure with nail joints, which is difficult to manage given the low error tolerance [Fig. 3]. As mentioned above, communication with

[4] The development of rural industries and changes in farmers' lifestyles will increase carbon emissions. See Xu T. et al. (2024). Balancing the development and carbon emissions in rural areas of China. *Journal of Cleaner Production*, n° 454.
[5] This statement is supported by interviews and fieldwork done in different villages by the author.
[6] The need for static safety certifications makes standardized systems more economically accessible.

the timber manufactory and design team was direct and frequent during construction. Also, collaboration with other local tradesmen working with the steel structure where the timber frames were placed was complex to manage.

Fig. 3
Image shared on WeChat by the design team to the timber manufacturer, showing timber structures with nail joints and digital interaction with design team. Photo by WeChat instant messaging group, courtesy SUP

Bricks were used for the elevations, always following the echoes of the original structure. The original factory buildings, constructed around 2000, were made of high-quality bricks more than modern ones, as restrictions in recent history on using clay from farmland have altered material production.[7] Even residents frequently visited the site to collect salvaged bricks. So the architects team suggested to recycle these old bricks, selecting only intact ones for reuse. New bricks were reserved for less visible areas, such as interior partitions and inconspicuous exterior walls. The new bricks sourced from Yichang city宜昌市 (408km) differ in size from the reused ones, as they are designed to meet national standards. However, upon arrival, they were found to be slightly smaller than expected. Since these bricks are sold by unit rather than weight, cost-saving measures in production often lead to such inconsistencies, undermining standardization. Many new bricks also had black stains from the drying process.

[7] See: http://en.people.cn/200403/17/eng20040317_137777.shtml (last accessed 27/11/2024)

After testing various masonry arrangements with artisans and message with the architect team, a composite wall method was finalized [Fig. 4]. Finding skilled workers capable of meeting the architects' expectations while managing these challenges within a tight budget and before the National Chinese Spring Festival Holidays proved difficult.

Fig. 4
Image shared on WeChat by the design team to the contractor on-site to coordinate brick assembly. Photo by WeChat instant messaging group, courtesy SUP Atelier

This reflects the historical evolution of China's construction industry, which long ago phased out solid clay bricks. These bricks were central to socialist era building practices, symbolizing a local, manual approach aligned with the ideals of the Cultural Revolution. The shift to hollow blocks and modern walls also had symbolic weight, marking a step toward economic liberalization and moving away from ideologically driven construction practices (Roskam 2020).

Contracted teams from a nearby Bao'an Town 保安镇 (4km) created mock-ups to assess the outcome on a smaller scale. After rejecting the first team, a second team successfully completed the work. The search for labor, led by the local contractor, working closely with the architects, achieved a balance between aesthetic goals, sustainability national compliance, and supporting the local economy. Even unskilled villagers contributed to minor tasks on-site, providing them with an additional source of income [Fig. 5].

This process required extra consultation time from the design team. Communication between the technical advisors and contractors was less frequent during the construction of reinforced concrete and steel structures than during the brickwork for vertical enclosures and timber structure. Contrasting what law and contract ask: architects cannot interfere with the builder (See: Paragraph 2).

Fig. 5
Unskilled villagers contributing to minor on-site tasks. Photo by the author

The findings of this study emphasize the importance of analyzing the intangible socio-economic dynamics of design and construction in rural revitalization, particularly in the creation of public and collective spaces. The process of architectural realization unfolds as a 'cosmogram' (Tresch 2007). —between materials, labor, and public space projects—that require deliberate consideration and study to ensure meaningful outcomes.

Yet these socio-economic dynamics are often overlooked in formal project construction process, which tend to emphasize metrics such as cost efficiency and environmental factors (e.g. carbon footprint), while disregarding the situated complexities and socio-economic implications of material and technological choices. However, rural revitalization offers architects an opportunity—and a responsibility—to challenge these procedures. How can the gap between the construction market and the public interest be addressed when investing in public spaces?

The choice of construction technologies is especially critical in contexts where oversight is limited, as high-tolerance systems susceptible to errors can lead to technical failures, economic losses, and diminished project impact. Conversely, adaptable, locally accessible methods can mitigate these risks, involve local labour, but are unattractive to visitors and not a source of pride for locals [Fig. 6]. However, architects often face significant constraints due to bureaucratic procedures and

public procurement rules, which limit innovation and community-oriented approaches. As government-funded projects place growing emphasis on sustainability metrics like carbon emissions and energy efficiency, architects face the challenge of aligning these technical requirements with broader socio-economic goals. Achieving this balance increasingly depends on the strategies and tools individual architects or firms employ in their design processes —such as through tools like WeChat for monitoring and managing construction processes— highlighting the need to examine how these objectives are being addressed in practice today.

Fig. 5
Local women dancing and enjoying the public space under the wooden structure, proudly filming for their Tiktok account. Photo by the author

In essence, the technologies and processes employed in rural revitalization projects shape not only the built environment but also the economic and social frameworks of the communities involved. For architectural design to fulfill its potential as a tool for empowerment, architects must bridge the gap between top-down directives and local realities. By critically examining these intersections, the profession can redefine its role in rural development.

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Cooperatives and community maps: local development strategies for territorial enhancement

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ABSTRACT
This article explores the role of place-based tools in valorizing local resources and to new networks of territorial relations by analysing two case studies: the 'Terra delle Balestrate'Community Cooperative and the Atlas Stories and Places. It is positioned at the intersection of the scientific debates on the territorialism approach by matching theoretical perspectives on local identity, social cohesion and the narration of places. The methodology adopted qualitative-quantitative methods. The results highlight how the community, understood as intangible infrastructure, actively acts in the narration and valorisation of the social, cultural and environmental stratifications that define the local space. These practices reinterpret territorial values and identities, strengthening the sense of belonging and socio-economic networks. However, limitations emerge linked to the absence of integrated territorial policies that can amplify the impact of these initiatives on a broader scale. The article concludes with a critical reflection on future developments, highlighting the need to integrate local planning and territorial policies to foster generative and durable local development.

COMMUNITY COOPERATIVE | COMMUNITY MAP | BOTTOM-UP | MARGINALITY

1. Introduction

Within the now decade-long debate on the development of territories, the contribution lays the groundwork for initial reflections on the impact and role of community-based approaches and with the community. In territories characterized by multi-fragility there are marked forms of community associationism in which territorial rootedness acts as glue for spatial enhancement activities. Specifically, here we investigate Community Map (CM) and Community Cooperatives (CC) as tools but also actors capable of strengthening social ties and spatial identities.

CCs are defined as support tools for the valorization of the local cultural heritage that, by responding to the needs of the population and improving the quality of life, can act in dimensions of sustainability and foster citizens' participation in the management and provision of collective goods and services (Apulia Region 2014), while the CM can also be defined as an identity map of a territory through which the community, through perception, depicts the material and immaterial components that define collective identities (Magnaghi 2010).

It is in this perspective that we question the proactive role that these elements play in the reconfiguration of social dynamics as well as the necessary preconditions for them to be able to activate material and immaterial valorization synergies of local identities. On the one hand, these Maps, the outcome of both tangible projects, can be assimilated into forms of identity narration; and intangible processes of self-recognition and exploration of identity stories that have coined the territory. On the other hand, these Cooperatives that embody the tangible and intangible dimensionality of connections, projects, and interactions present themselves as tools/actors capable of generating new socio-spatial relations as well as asset enhancement and community management. Community co-operatives are the focus of ongoing doctoral research, in which the Community Map discussed in this paper was developed as part of an experiment conducted by the research team.

The structure of the study is divided into five parts: the first outlines an initial framing of the topic and the research question guiding the entire reflection; the second, outlines the theoretical frame of reference; the third defines the methods used, the application and discussion of which are reported in the fourth part. The last section offers initial reflections on the limitations of the study conducted and the future development of these tools.

2. Local Development: Community Cooperatives and Community Maps

The territory considered as a network of historical, social and environmental stratifications is an active witness to local identity (Magnaghi 2010; Magnaghi 2012; Magnaghi 2020). Mutable over time and endowed with dynamism, it, in its meaning as a rur-urban organism, does not follow an immodifiable biological path but has the capacity to regenerate/re-cycle within itself (Carta *et al.* 2017).

As an active subject, together with the community living there, it plays a relevant role in the definition of local development strategies, where local development means a multidimensional process (Pasqui 2005; Lucatelli 2020) with variable characteristics that can be modeled in relation to local contexts (Vinci 2020) and where the relational dimension holds, with equal dignity, the same relevance as that of governance (Angelini & Bruno 2016).

Considering cities as a mixed and complex living organism made up of material and immaterial infrastructures (Dyer, Dyer, Weng *et al*. 2019), communities are to be understood as active actors of the territory who, acting in the perspective of community making, generate new identities, relationships, connections as well as material and immaterial projects that transform territorial marginality into opportunities for enhancement. Two bottom-up tools of local development fit into this case of proactive and generative activism: Community Cooperatives and Community Maps.

Community Cooperatives, based on participatory and self-organizing models, offer the inhabitants of territories the opportunity to be active players in the management and valorization of local resources starting from existing needs for a higher quality of life (Moulaert *et al.* 2013; Alfonsi 2020; Bianchi 2021). Through democratic processes of local governance, they foster the creation of new economic and social relations, promoting cohesion and inclusion (LegaCoop 2011; EURICSE 2024; LegaCoop 2024). At the same time, these bodies represent a concrete example of how public space and local heritage can be transformed into vectors of sustainable development, generating a positive impact both in tangible (new infrastructures and services) and intangible (strengthening of collective identities) terms (Pezzi & Urso, 2018).

Community Maps, on the other hand, constitute a tool for the exploration and narration of the territory, in which local communities are involved in the representation of the tangible and intangible resources of their living space (Clifford *et al.* 2006; Madau 2015; Summa 2009). Through participatory mapping, collective memories, socio-spatial relations and networks of cultural and economic exchange are highlighted, making visible those intangible aspects that usually do not emerge in formal representations of the territory (Magnaghi 2010). These maps not only offer a dynamic and inclusive snapshot of territories, but also become an empowerment tool for local communities (Saija & Pappalardo 2018), capable of strengthening their awareness and ability to influence decision-making processes.

3. Methodology

The article explores two different experiments to highlight their capacity to contribute, both on a material (cooperatives) and immaterial (maps) level, to the strengthening of local identities and territorial regeneration. The methodology adopted in this study follows a qualitative-quantitative approaches, aimed at exploring the different role of the two projects in territorial narrative processes.

The selection of the case studies was guided by specific criteria:

- Territorial relevance: two emblematic contexts of territories characterised by marginality, but also by a strong identity link with the territory where a tool (Local Action Group) or a policy (National Strategy Inner Areas) of local development was already in place.
- Complementarity: one case represents the material dimension of regeneration practices (Community Cooperative), the other the immaterial one (Community Map).
- Data accessibility.

A qualitative-quantitative methodology was used for the analysis of the case studies, combining content analysis of official websites with qualitative interviews with the protagonists.

4. Atlas Stories and Places of Santo Stefano Quisquina and 'Terra delle Balestrate' Community Cooperative

To explore the role of CC and CM in local processes, two emblematic case studies were selected:

- 'Terra delle Balestrate' Community Cooperative (Sicily); [1]
- Atlas Stories and Places of Santo Stefano Quisquina (Sicily). [2]

The 'Terre delle Balestrate' CC, founded in 2020, has 22 members, including citizens, professionals, etc. It stems from the promoter group's previous experience in associative initiatives and aims to enhance the local cultural identity. The cooperative's activities include organizing experiential tours, events to promote traditions and typical products, educational projects with schools and participation in territorial initiatives. A central objective is the deseasonalisation of tourism, fostering sustainable and lasting development of the local socio-economic fabric.

This CC represents an example of local self-organization aimed at the valorisation of the cultural heritage and territorial resources, as an active response 'from below' able to compensate for local systemic abandonment (Saladino, 2024). Situated in a context characterized by problems of depopulation and socio-economic marginality, the cooperative has distinguished itself for initiatives aimed at recovering ancient local traditions and craftsmanship, introducing new crops, and defining experiential routes for both tourists and school children. Thanks to a participatory governance model, the cooperative has promoted social inclusion projects, training for young people and sustainable tourism development. The case analysis focuses on how the cooperative has strengthened the sense of belonging and local identity, creating new economic and social opportunities.

The Atlas Stories and Places is a participatory mapping project created to enhance the intangible cultural heritage and collective memory of territories and communities. Through the direct

[1] Web Site: https://www.terredellebalestrate.it/
[2] Web Site: https://www.atlantestorieluoghi.it/

involvement of inhabitants, the Atlas collects and narrates stories, traditions, significant places and identifying symbols, creating a shared platform of knowledge accessible to all. The project aims to strengthen the sense of belonging and social cohesion, offering an innovative model for the protection and promotion of local peculiarities in a perspective of sustainable development and cultural tourism. It is part of a project aimed at mapping the tangible and intangible resources of a Sicilian Mountain territory, known for its rich historical and natural heritage. The Atlas is implemented as part of the project 'Land of Skies, Water and Stones' funded by the PNRR, Mission 1 - Digitalisation, Innovation, Competitiveness and Culture, Component 3 - Culture 4.0 (M1C3). Measure 2 'Regeneration of small cultural sites, cultural, religious and rural heritage', Investment 2.1: 'Attractiveness of historic villages', funded by the European Union - NextGenerationEU.
Realized through a participatory process that actively involved the University of Palermo,[3] a team of experts and the local population, the map contributed to the emergence of collective narratives and shared memories, becoming a fundamental tool for cultural promotion not only for tourists but also for the local population. This case examines the impact of the map in building socio-spatial networks and strengthening connections between residents and their territory.

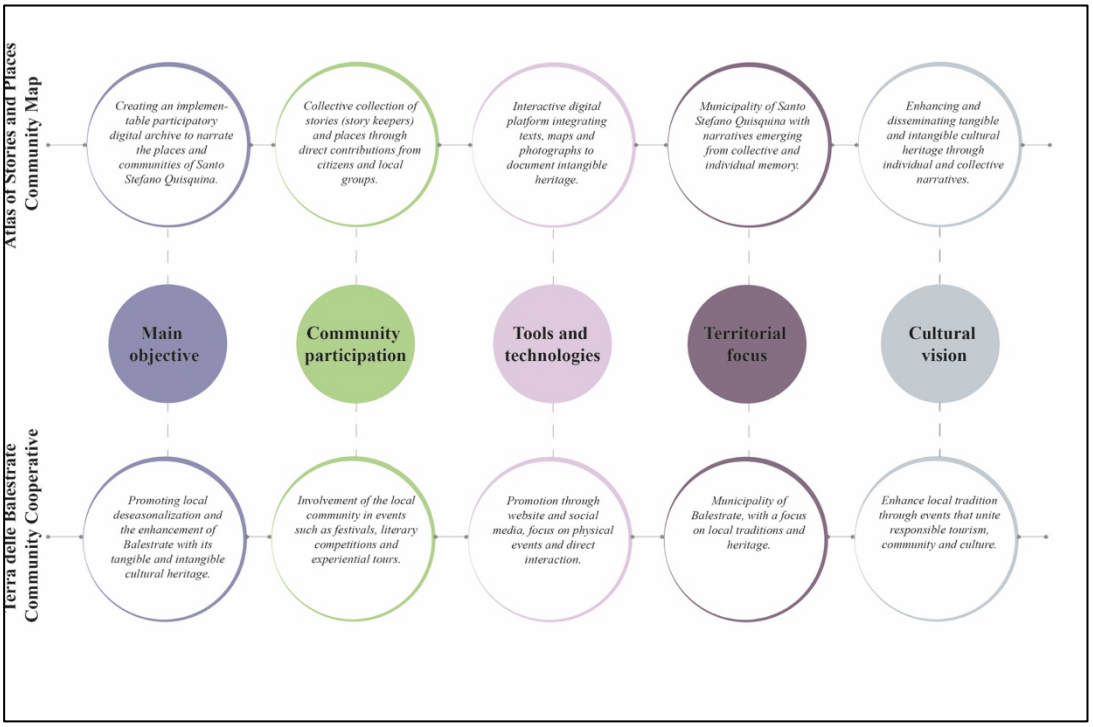

Fig. 1
Case studies compared

[3] The Atlas Stories and Places of Santo Stefano Quisquina is the result of a research-action process on the territory conducted by the Augmented City Lab of the Department of Architecture of the University of Palermo. The working group is structured as follows: Prof. Maurizio Carta (Scientific Coordinator); Prof. Barbara Lino (Scientific Coordination and Co-Director of the research group); Researcher Annalisa Contato (Project Activity Manager); Prof. Daniele Ronsivalle (Member of the research group); PhD Student (Member of the research group, scholarship holder); Prof. Sandro Scalia (Photo and Video Expert); Dott. Valerio Rabante (Publication graphics expert); Arch. Marco Ingrassia (Participatory processes, graphics and web expert).

The two cases were chosen for their complementarity: on the one hand, the cooperative represents an active player in territorial regeneration through economic and social projects; on the other, the Atlas is a narrative and strategic tool that integrates local knowledge into territorial development processes. Their comparative analysis highlights how community-based approaches can act synergistically to strengthen social ties, local identity of marginal territories. Both the 'Terra delle Balestrate' CC and the CM project 'Atlas Stories and Places' show affinities with the dimension of the intangible understood as both interactive, project-based and connective with urban dynamics [Fig. 1].

In the context of the relationship between tangible and intangible, the 'Terra delle Balestrate' Community Cooperative and the 'Atlas of Stories and Places' represent two complementary approaches that exemplify innovative and inclusive dynamics. Through concrete territorial enhancement initiatives, the cooperative creates a bridge between the material dimension (physical projects, such as regenerated spaces) and the intangible dimension (the collective identity and sense of belonging of the local community). At the same time, the Atlas, with its narrative mapping, explores and amplifies the intangible interactions between collective memory and the territory, emphasizing the transmission of local stories as tools to strengthen social cohesion.

Both initiatives are located in a 'grey zone' between the real and the symbolic, contributing to the construction of inclusive and sustainable urban imaginaries. While the 'Terra delle Balestrate' cooperative operates mainly at the socio-economic level, supporting new forms of participation and local development models, the Atlas acts at the cultural level, strengthening identity perception and the quality of social relations. Together, they demonstrate the transformative potential of synergies between the tangible and intangible in reshaping contemporary urban and rural space.

Both case studies explore territorial and social marginality through innovative and participatory approaches. The 'Terra delle Balestrate' Community Cooperative tackles marginality through the valorization of local tangible and intangible resources, such as regenerated spaces and cultural traditions, promoting a vision of sustainable development based on collective participation. The 'Atlas of stories and places', on the other hand, interprets marginality in terms of cultural invisibility, bringing often neglected places and communities back to the centre of the narrative through the collection and enhancement of local memories.

These tools not only manage and enhance local resources, but also profoundly influence social and spatial dynamics, strengthening collective identities and socioeconomic networks. The cooperative generates a tangible impact through the direct involvement of citizens in the management of common goods, while the Atlas fosters an intangible aggregation, building bridges between past and present to promote cultural cohesion.

In terms of sociality, both cases demonstrate an inclusive approach: the cooperative creates opportunities for aggregation through shared activities and community services, while the Atlas

transforms intangible heritage into a catalyst for dialogue and the rediscovery of a sense of belonging. These integrated processes make it possible to decline the concept of marginality as an opportunity for redemption, consolidating social networks and local resources [Fig. 2].

5. Conclusions

The two experiments presented show how community and territory are interconnected in a dynamic relationship. The community, considered as an intangible infrastructure, plays a central role in the narration and enhancement of the cultural, social and environmental stratifications that define the territory. These practices reinterpret local values and identities, responding to the growing social need for an inseparable link with places and their meanings.

Although with different approaches and results, both case studies converge in promoting new relational networks rooted in social and territorial ties. On the one hand, the Atlas operates in a narrative and conservative perspective of memories and tangible and intangible cultural heritages; on the other, the Cooperative acts in the active valorisation of local resources, nurturing a shared sense of belonging and identity. However, both instruments face limitations linked to the lack of integrated territorial policies that can amplify their impact on a larger scale. The analysis of the case studies highlights that the activation of spatial regeneration and enhancement processes through such "tools" requires the presence of certain preconditions. Among these, key factors include: active community involvement, a strong sense of place identity and awareness of heritage value, as well as integration within broader territorial dynamics and strategic frameworks.

Future developments call for strengthening synergies between local initiatives and more inclusive policy agendas that can support these instruments as drivers of generative and durable local development. In particular, it is necessary to explore how such practices can be formally integrated into spatial planning processes, promoting a cohesive vision that enhances both the tangible and intangible dimensions of community heritage.

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