Emilio Rossi (Editor)

Innovation Design for Social Inclusion and Sustainability

Design Cultures and Creative Practices for Urban Natural Heritage

Federico II University Press

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Cover image
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Università degli Studi di Napoli Federico II

BA

Beyond Accessibility

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Collana **Beyond Accessibility**

Caratteri e scopi della collana

La possibilità di fruire appieno del patrimonio culturale, nelle sue diverse espressioni e dimensioni, è una libertà fondamentale della persona, basata sui principi cardine di eguaglianza e non discriminazione delle norme internazionali a tutela dei diritti umani. Tra queste, la Convenzione delle Nazioni Unite sui diritti delle persone con disabilità sancisce che è riconosciuto il diritto di tutti gli individui alla vita culturale in condizioni di uguaglianza, adottando misure adeguate a garantire l'accesso ai prodotti culturali, di qualsiasi tipo e natura, e ai luoghi che rappresentano o che accolgono attività culturalmente significative. Questo principio è confermato nella Carta dei diritti fondamentali dell'Unione Europea, che riconosce il diritto delle persone con disabilità a beneficiare di tutte le garanzie per la promozione di autonomia, inserimento sociale e professionale, e partecipazione alla vita della comunità. Ma il tema dell'accesso e della piena fruizione riguarda tutti gli individui, poiché alla luce della nuova accezione di disabilità, introdotta dall'Organizzazione Mondiale della Sanità nel 2001

(ICF, 2001), ogni persona, nell'arco della propria vita, può trovarsi in una situazione che gli provoca condizioni di limitata abilità, fisica, mentale, intellettiva e sensoriale. Per questo, i concetti di abilità/disabilità, riferiti alle persone, si legano a quelli di accessibilità/barriera/ostacolo, riferiti all'ambiente, dal momento che, le caratteristiche dei contesti fisici e informativi, possono ridurre o annullare, ma anche favorire e valorizzare, le sue capacità funzionali e di partecipazione sociale, realizzando di fatto, i presupposti per lo sviluppo di diseguaglianze e discriminazioni, o al contrario, le premesse per garantire uguaglianza e inclusione. Del resto il Codice dei Beni Culturali e del Paesaggio sancisce che promuovere la conoscenza del patrimonio culturale e assicurare le migliori condizioni per la sua piena fruizione per tutti, sono attività centrali per la valorizzazione dei siti culturali, i quali sono chiamati, in maniera attiva, a offrire adeguati livelli di accessibilità, fisica e/o percettivo-cognitiva, soddisfacendo i bisogni e le esigenze espresse, implicite o speciali, della più ampia fascia di pubblico, a prescindere da diversità e disabilità, temporanee o permanenti.

Sulla base di queste premesse, la collana intende ospitare gli esiti di ricerche e applicazioni sul tema della progettazione inclusiva per l'accessibilità, la fruizione e la percezione fisica, cognitiva ed emotiva del Patrimonio Culturale, dai siti di interesse culturale ai prodotti culturali, di qualsiasi tipo e natura, ai luoghi che rappresentano o accolgono attività culturalmente significative, secondo l'approccio del Design for All. Tale approccio impone al progetto una dimensione inclusiva che va oltre il concetto di disabilità, ponendo al centro il rispetto dell'uomo reale, la sua variabilità, diversità e autonomia, in una chiave human-centred. Nella collana il tema del progetto inclusivo si integra con quello delle tecnologie digitali applicate all'esperienza di fruizione, le quali, se concepite e sviluppate anch'esse secondo principi inclusivi, possono rappresentare strumenti innovativi di grande efficacia per il potenziamento delle abilità umane, il superamento delle barriere e l'accesso alla cultura di un pubblico sempre più vasto e globale, contribuendo ad una reale valorizzazione del Patrimonio Culturale, e per questo, al miglioramento della società.

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Preface

Antonio Marano

Preface

Antonio Marano

In an era marked by rapid urbanization and environmental challenges, the imperative for the design practices that prioritize social inclusion and sustainability has never been more pressing. In this scenario, the Design discipline plays a fundamental role in promoting cultural and operative interventions by working with both final users and market stakeholders. “Innovation Design for Social Inclusion and Sustainability: Design Cultures and Creative Practices for Urban Natural Heritage” emerges as a critical work that seeks to bridge the gap between design, community engagement, and ecological stewardship. The works included in this book do not only provide valuable elements for critical reflections for the Discipline but are also a legacy of the academic commitment toward high-quality education in the international pedagogic setting provided by the Erasmus+ Blended Intensive Programmes (BIPs). Accordingly, this volume is not merely an academic endeavour; it is a clarion call for design students, educators, and practitioners to embrace a holistic approach that recognizes the interconnectedness of social equity and environmental responsibility.

The contributions within this book reflect a diverse array of perspectives and methodologies, underscoring the multifaceted nature of Design as a tool for social change, which imperatively ask present and future generations of designers to address the two emerging driving forces of present times, social inclusion and sustainability precisely. Each section and chapter elucidates the role of design cultures in fostering inclusive practices that empower marginalized communities while simultaneously addressing the urgent need for sustainable solutions. Philosophical, cultural, operative, methodological, and technical aspects are covered to instill curiosity and to open a reflection on what the present times can offer in terms of design advances. The authors, drawing from their extensive expertise, present innovative frameworks and case studies that illustrate how Design can serve as a catalyst for positive transformation in both cultural and natural settings.

For students of Design programmes, this work offers invaluable insights into the ethical dimensions of their practice. But it can also be seen as a first attempt to gather a set of emerging topics that can be later incorporated into their professional practice. This book challenges them to consider

not only the aesthetic and functional aspects of their designs but also the broader societal implications, and how to confront them in a perspective of global competitiveness. The emphasis on collaborative academic initiatives highlights the importance of interdisciplinary approaches, where Design intersects with social sciences, environmental studies, technological pushes, and community activism. Such collaborations are essential in cultivating a new generation of designers who are equipped to tackle the complexities of contemporary challenges.

Moreover, the value of Design studies in shaping a better society cannot be overstated. As we navigate the intricacies of urban cultural and natural heritage, it is imperative that we adopt a mindset of inclusivity and sustainability. This volume serves as an attestation of the potential of Design studies, and the multitude of disciplines connected to it, to foster international dialogues, inspire creativity, underline the value of high-quality teaching and learning practices, and promote resilience within communities. It is a reminder that Design is not an isolated practice but a communal endeavour that thrives on shared knowledge and collective action.

In the context of an increasingly interconnected world, the Erasmus+ Blended Intensive Programme has provided a unique platform for exploring the intersection of innovation design, social inclusion, and sustainability. Thus, this book is a vital and vibrant contribution to the discourse on Design's role in addressing pressing social and environmental issues. It invites readers to reflect on their own practices and to engage with the transformative power of the Discipline in creating a more equitable and sustainable future for all people. As we embark on this journey through the pages of this book, the reader is inspired to innovate, collaborate, and advocate for a world where the design practice serves as a bridge to inclusion and sustainability.

Introducing innovation design for social inclusion and sustainability

Emilio Rossi

Introducing innovation design for social inclusion and sustainability

Emilio Rossi

This essay examines the concept of "innovation design" in Design studies, highlighting its strategic its contribution in linking creativity, technology, and user-centred approaches to tackle societal challenges, both social and environmental. In particular, the importance of social inclusion and sustainability is discussed to advocate for participatory design that empowers marginalized communities while minimizing environmental impact. The role of academic institutions in training future designers through interdisciplinary collaboration is underscored, particularly via the Erasmus+ Blended Intensive Programme (BIP) "Innovation Design for Social Inclusion and Sustainability" (InDeSIS).

Introduction

In Design studies, the concept of "innovation design" is multifaceted and fluid; it integrates creativity, technology, and user-centred methodologies to develop a wide set of solutions that address complex societal challenges (Cross, 2001; Brown, 2009). Both products and services are often included in this cultural and theoretical framework, whose are asked to introduce novel and fresh ideas to shape "liveable futures" where the needs of present generations are synergistically combined with the need of market competitiveness and aesthetical quality. It encompasses a range of processes, from ideation to prototyping, emphasizing iterative development and stakeholder engagement. By leveraging diverse perspectives and interdisciplinary collaboration, innovation design seeks to create products, services, and systems that are not only functional but also resonate with the needs and aspirations of users (Kelley and Kelley, 2013). This is particularly relevant in an era characterized by rapid technological advancement and shifting social dynamics – like the one where we live – where traditional design paradigms often fall short in addressing the nuanced realities of diverse populations. When it comes design practices, a kind of resiliency coefficient needs to be considered as the rapid evolution of society constantly shapes evolutionary scenarios to confront (see Schön, 1983). As such, innovation design serves as a critical framework for fostering transformative change across various sectors, including education, healthcare, and urban development.

Design practices and emerging opportunities

In the global scenario of present society, where both environmental, economic, and social issues are apparent and generate systemic frictions in the way people live and prosper (see Manzini, 2015), the emerging opportunities introduced by social inclusion and sustainability seem to define for the Design community a new cultural horizon where to propose development of innovative solutions. Beyond the techno-centric and product-oriented pure approaches, the need to embrace a goal-oriented mindset to overcome the "here and now" seems to be more interesting to explore the real potential of the design innovation (Kumar and Gupta, 2022). When confronted with the emerging opportunities of social inclusion and sustainability, this elicits twofold reflection.

The application of innovation design for social inclusion allows to focus on creating equitable opportunities for marginalized and underrepresented groups. Instead of top-down design approaches, participatory methods that actively involve these communities in the design process are prioritised, ensuring that their voices and experiences shape the outcomes. By addressing systemic barriers and fostering accessibility, innovation design when applied to social inclusion's issues can empower individuals and communities, enhancing their capacity to engage with and benefit from societal advancements (Vavik and Keitsch, 2010). Furthermore, "inclusive innovations" not only address immediate needs but also contribute to long-term social cohesion and resilience, ultimately fostering a more equitable society (Kohon, 2018). Conversely, the pushes produced by the idea of innovation design when applied to sustainability emphasizes the development of solutions that minimize environmental impact while promoting social and economic well-being (Ceschin and Gaziulusoy, 2018). This approach promotes the integration of principles promoting ecological protection, resource efficiency, and circular economy, encouraging the creation of products and services that are not only viable but also regenerative. In this framework, innovation design can address the pressing global challenges and foster a holistic understanding of the interconnectedness of social, economic, and environmental systems.

The search for innovation in Design through social inclusion and sustainability

The convergence of innovation design for social inclusion and sustaina-

bility represents a transformative paradigm that seeks to address the intertwined challenges of equity and environmental awareness (Arond et al., 2011; Dillar et al., 2013). Through the integration of inclusive practices into sustainable design processes, or vice versa, designers can elevate themselves as key actors of present times in generating positive systemic transitions to anticipate promising living and consumption models where the need to guarantee the prosperity of natural ecosystems is sided to the respect of needs of all populations that live in urban, suburban, or natural environments. Consequently, this paves the opportunity to create a new set of "enabling solutions" that not only meet the needs of diverse populations but also promote ecological integrity. It is expected that this convergence encourages a holistic approach to Design studies by recognizing the interdependence of social and environmental systems in fostering systemic innovations that are both socially responsible and ecologically sound, which ultimately can actively contribute to the creation of solutions capable to impacts that culturally and technically are better, both now and in the future. Accordingly, the potential for this integrated framework to drive systemic change, creating resilient communities and sustainable futures, is significantly higher.

The opportunities introduced by the converging scenario of design for social inclusion and sustainability also remark the crucial role played by academic institutions in training the new generation of designers (see: Jameson, 2019; Norman, 2024). Universities play a vital role in fostering innovation design by serving as incubators of creativity and critical thought. They cultivate interdisciplinary collaboration, bringing together diverse perspectives that enrich the design process. Through research, education, and community engagement, universities not only empower students to become change-makers but also create vibrant ecosystems where ideas can flourish.

Innovation Design for Social Inclusion and Sustainability

"Innovation Design for Social Inclusion and Sustainability" – InDeSIS – was the name of an academic teaching and learning project developed

under the Erasmus+ Blended Intensive Programme (BIP)[1,2] led by the "Gabriele d'Annunzio" University of Chieti-Pescara (Italy) in the academic year 2023/2024 and has involved three European universities: Slovak University of Technology in Bratislava (Slovakia), University of Minho (Portugal), and University of Applied Sciences Berlin (Germany). Idea & Sviluppo srl (Coesum), an Italian company working in Additive Manufacturing and Rapid Prototyping, has provided support and guidance during the studio activities at "Gabriele d'Annunzio" University of Chieti-Pescara in June 2024
InDeSIS was born with the idea to deliver high-quality training on emerging design aspects that are considered relevant today, such as Design for social inclusion and Design for sustainability (Figure 1).

Fig. 1 InDeSIS: Studio activities at the University of Chieti-Pescara in Italy, June 2024.

1 As defined by the European Commission (2025), BIPs are short, intensive programmes that use innovative ways of learning and teaching, including the use of online cooperation. BIPs have added value compared to existing courses or trainings offered by the participating HEIs. By enabling new and more flexible mobility formats that combine physical mobility with a virtual part, blended intensive programmes aim at reaching all types of students from all backgrounds, study fields and cycles.

2 Consistent with the structure of the Erasmus+ BIPs, students received a 60-hour teaching offer comprising both cultural and technical activities, delivered via online and studio sessions. The studio session was held at the Department of Architecture, "Gabriele d'Annunzio" University of Chieti-Pescara in Italy in June 2024.

The topics proposed for InDeSIS, and presented in this book, are consistent with the recent trends of Design studies focused on social and environmental issues and aimed at producing new professional and cultural skills into learners. This because contemporary design practice is evolving as reaction of global instances and requires designers to adopt a new design-oriented attitude to properly work with global markets, which are raising the attention toward the creation of enabling solutions that are both socially inclusive and sustainable. The will to provide learners enrolled in Design programmes at these institutions the opportunity to get novel cultural notions, methodological frameworks, design skills, and advanced project management competencies to properly face such emerging instances in a creative way were ate the basis of the InDeSIS initiative.

Structure of the book

This book gathers the main cultural contributions presented by InDeSIS's academic staff during the online teaching sessions, used by students in the studio session, and later presents the student projects. The book is organised in three main parts.
Part 1 – Design Cultures – presents the cultural contributions at the intersection of Design, social inclusion, and sustainability through various perspectives. Rossi discusses the role of design education as a reflective practice, while Baláž presents a visual philosophy for authentic design. Celik emphasizes holistic UX research methods, and Massimo Di Nicolantonio proposes a system-oriented design scenario. D'Onofrio focuses on service design, Cipressi examines enabling artifacts, and Sampaio and colleagues address additive manufacturing. Finally, Pulcina highlights product and process personalization, all aimed at fostering inclusive and sustainable practices.
Part 2 – Creative Design Practices – contains the innovative projects and design experimentations made by students that promote social inclusion and sustainability. In particular, this section contains a work written by Rossi, which outlines creative practices that foster these values; Cipressi and Pulcina present a cultural discussion to connect the eight innovative solutions developed by students in the studio session at Department of Architecture, "Gabriele d'Annunzio" University of Chieti-Pescara in Italy in June 2024, and the tailored for Pescara's natural areas. Finally, the eight student projects are presented to showcase fresh perspectives and practical applications. These highlight the role of emerging designers in addres-

sing social and environmental challenges, emphasizing the importance of creativity in driving positive change.
Finally, Part 3 – Conclusive Comments from Universities – contains final remarks and considerations written by academics that led international student teams, and their critical viewpoints on the value added by the InDeSIS experience. These also provide original insights and reflections on the whole learning experience provided by the programme, including considerations on the lesson learnt and the incorporation of best practices into teaching and learning at the national level, or at their institutions.

Acknowledgments

The successful realization of the edition of InDeSIS in the academic year 2023/2024 stands as a testament to the collaborative spirit and unwavering dedication of numerous individuals. This educational project, which has culminated in the production of this book, would not have been possible without the invaluable contributions of both the staff and students from the four participating institutions. Their enthusiastic support has been essential in navigating the complexities of the teaching activities and ensuring that the project met its educational objectives.
This book is not merely an individual achievement, but rather a reflection of the power of collaboration and shared commitment to advancing knowledge and learning in Design studies.

InDeSIS was:

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PART 1
DESIGN CULTURES FOR INNOVATION

A design culture on social inclusion and sustainability

Emilio Rossi

A design culture on social inclusion and sustainability

Emilio Rossi

The intersection of social inclusion and sustainability in Design highlights the need for an informed design culture that integrates diverse perspectives. Emphasizing interdisciplinary collaboration is essential to advocate for innovative, equitable solutions to contemporary challenges. By prioritizing community engagement and environmental awareness, designers can develop practices that enhance accessibility and minimize ecological impact, ultimately fostering social change and promoting a more inclusive and sustainable future.

Introduction

The evolution of contemporary societal challenges, increasingly linked to a convergence of environmental, social, and economic forces, requires designers to engage in a new informed culture that transcends the mere application of technical skills (Souleles, 2017). If design is still viewed as a discipline dedicated to fostering positive living conditions by interrelating technological advancements and social perspectives, the need for a design culture has never been more apparent. As society becomes increasingly complex, it is essential to move beyond mere aesthetic sophistication and embrace holistic practices that integrate the skills necessary to guide creative endeavours toward new horizons (Chen et al., 2016).

The demand for innovative applications – such as products, services, and environments – requires companies and organizations worldwide to collaborate synergistically with designers to propose enabling solutions that extend beyond mere functional objects (Manzini, 2015). Therefore, developing an informed design culture that anticipates future scenarios is essential for generating pivotal discourses that shape environments and user experiences in daily life.

In this context, an informed design culture cannot rely solely on soft and hard skills. It must encompass modern values, methodologies, and practices to guide designers in their quest to create innovative solutions. In an era marked by pressing challenges such as social inclusion and sustainability, the importance of fostering an open and shared design culture that prioritizes the development of socially cohesive, people-centred, environ-

mentally compliant, and affordable solutions cannot be overstated. Such a culture not only enhances the relevance of design practices but also ensures that they are responsive to the diverse needs of society.

From silos of knowledge to informed design culture

The evolution of design culture has transitioned from traditional, discipline-specific practices to a more collaborative and interdisciplinary approach that enhances a variety of subjects (Sanders and Stappers, 2008). This shift is a natural consequence of scholars' commitment to addressing emerging societal challenges that extend beyond the creation of objects for impersonal markets. However, the temptation to remain confined within monodisciplinary environments can jeopardize the circulation of valuable knowledge essential for collective growth (Corsini and Moultrie, 2021). This is particularly critical in light of contemporary challenges that require integrated approaches drawing on diverse expertise and perspectives. Accordingly, holistic approaches are necessary to address the complexities of our time.

Knowledge silos pose risks to the progression of design culture. They limit the sharing of practices and the utilization of alternative knowledge sources that are vital for navigating the complexities of the present. To foster the circulation of open knowledge across interdisciplinary research fields – ranging from natural to anthropic environments – it is essential to promote interdisciplinary convergences that integrate design principles into service and product design processes. This integration would enhance the efficacy of design solutions, rendering them not only innovative but also equitable and sustainable. A cultural shift in how problems and contextual conditions are addressed requires designers to adopt new mindsets.

An informed design culture that promotes cultural milieus at the intersection of social inclusion and sustainability shapes a promising trajectory for creating solutions centred around both users and contexts. Diverse human abilities can be empowered by artefacts that perform well across environmental, social, and economic dimensions. Moreover, the concept of accessibility extends beyond human-product interaction; it encompasses a mature understanding of how design practices can minimize ecological impact while advocating for social equity and ensuring economic viability. Diverse user needs and abilities can be harnessed to conceive solutions that are enabling and beneficial for all, dismantling barriers to participation and ensuring that diverse voices are heard and valued.

Design for social inclusion and sustainability: Looking for a cultural convergence

The cultural imperatives of social inclusion and sustainability are evident and strategic for fostering innovation in design culture by combining insights from various fields. However, this also lays the groundwork for an expanded knowledge base that designers must engage with, stimulating interdisciplinary collaboration with engineers, social scientists, and community members. Such collaboration is essential for developing effective design solutions in a context of increasing sociotechnical complexity.

Different cultures prioritize social inclusion and sustainability in unique ways. The contribution of social inclusion is crucial for designers to move beyond traditional user-centred approaches toward holistic practices that incorporate users' needs from the outset of the design process, enabling empathy- and need-based interventions that can evolve over time. In terms of sustainability, evidence and experiments conducted by both academics and designers highlight how specific projects that reflect cultural values in their design processes underscore the importance of context. These approaches demonstrate how cultural values applied to informed design practices can holistically inform sustainable and inclusive design.

The integration of social inclusion into design practice is recognized as a powerful tool for actively involving stakeholders in the design process (Lee and Cassim, 2009), acknowledging that all users are experts in their own experiences and can provide valuable insights that lead to more effective solutions with environmental impacts. When users actively participate, the co-design process fosters the creation of more accepted solutions, as stakeholders feel a sense of agency in the design process. Simultaneously, the environmental quality of interventions is enhanced when users co-develop solutions that respect local heritage and values. This not only improves the quality of the final projects but also builds trust and collaboration within communities, ensuring that interventions are sustainable over time.

The relationship between sustainability and design practices encourages the adoption of principles such as lifecycle assessment, circular design, and resource efficiency (Vezzoli, 2018). In the context of human-system interaction, circular design plays a fundamental role by focusing on creating products that can be reused, repaired, or recycled, thereby minimizing waste and resource consumption that typically affect community life.

Social inclusion and sustainability can be viewed as two facets of the same coin when addressing fundamental yet strategic aspects (Tovar-Gálvez, 2022). For instance, designing products that are easy to use for individuals

with diverse needs and abilities not only promotes social inclusion but also provides an opportunity to understand the environmental constraints that enhance usability for a broader audience while considering the socio-economic factors underlying circular models. When viewed as a promising cultural trajectory impacting design practices, projects that successfully integrate these principles emphasize the creation of products that are accessible to all while demonstrating a positive impact on the environments in which they operate. This ultimately allows for qualitative demonstration and quantitative assessment of the impact arising from the combination of inclusive and sustainable design practices at various scales.

Fig. 1 Design for social inclusion and sustainability: A conceptual framework (Rossi).

Opportunities for the spreading of the design culture

In the context of a cultural transition that may positively stimulate design culture, differing cultural values and priorities can hinder collaboration between social inclusion and sustainability.
Regarding institutional barriers, universities, organizations, and industries that promote interdisciplinary design approaches focused on social inclusion and sustainability can accelerate the processes of open innovation for global competitiveness. To achieve this, it is crucial to overcome hierarchi-

cal structures that may limit collaboration and the sharing of ideas across disciplines, ultimately producing positive impacts at both environmental and socioeconomic levels.
Overcoming methodological barriers is essential to reduce gaps in knowledge progression and skill development, thereby facilitating the effective integration of eco-inclusive practices that can further promote innovation in culture and education. If implemented correctly at the academic level of, students – future designers – can be trained with novel cultural frameworks enhancing their ability to create eco-inclusive solutions.
Emerging trends such as social entrepreneurship, key enabling technologies, and the growing emphasis on environmental responsibility present opportunities for advancing inclusive and sustainable design practices. Social entrepreneurship, in particular, focuses on creating social value alongside economic profit through enabling solutions, while digital platforms for participatory design can enhance stakeholder engagement and facilitate collaboration across diverse groups to protect global ecosystems.
Innovative strategies for interdisciplinary collaboration can be promoted through cross-disciplinary education programs, workshops, and digital teaching and learning platforms. These initiatives can help bridge gaps between disciplines and foster a shared understanding of inclusive and sustainable design principles from a global perspective. Academic curricula that integrate design thinking with social sciences and environmental studies can be proposed to prepare future designers to address complex societal issues. Furthermore, collaborative platforms that connect designers with community members and societal actors can facilitate ongoing dialogue and co-creation, ensuring that design solutions comply with environmental standards and real-world needs.
By promoting inclusive and sustainable design practices that link designers and policymakers, it is possible to establish frameworks that incentivize collaboration and support community-led initiatives. Societal actors can create dialogical ecosystems for innovation to enhance the implementation and acceptance of novel designs. Policies prioritizing funding for projects emphasizing social inclusion and sustainability can drive systemic change and encourage the adoption of best practices across industries.

Conclusion

The convergence of social inclusion and sustainability in design is crucial for addressing contemporary challenges (Di Maggio et al., 2021). A new ge-

neration of solutions that are not only innovative but also equitable and sustainable can emerge from an interdisciplinary design culture that prioritizes community engagement and environmental awareness. To achieve this, the integration of diverse perspectives and expertise is crucial to develop novel design practices that effectively respond to the needs of all stakeholders while accelerating the use of innovative technologies.

In the scenario of cultural transition, designers, societal actors, and educators must prioritize inclusive and sustainable practices in their work, alongside the introduction of enabling platforms for open dialogue. Ongoing collaboration across disciplines and cultures is vital for creating a more inclusive and sustainable future, where design serves as a powerful tool for triggering convergence of efforts and ultimately fostering social change within cultural ecosystems that are accessible, sustainable, and reflective of the diverse communities they serve.

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The role of reflective creative practices to advance social inclusion and sustainability in design education

Emilio Rossi

The role of reflective creative practices to advance social inclusion and sustainability in design education

Emilio Rossi

In a world increasingly shaped by social and environmental challenges, Design education stands as a catalyst for positive change. In this scenario, reflective creative practices are strategic to equip future designers with the needed design culture to address the urgent issues of social inclusion and sustainability. As conventional design frameworks evolve, there is a clear need for an innovative educational approach that promotes critical thinking, empathy, and ethical responsibility. Accordingly, Design schools play a pivotal role as centres to fuel innovative thinking. Through a proposed model focusing on four pathways – "awareness", "engagement", "empowerment", and "impact" – this work demonstrates how experiential learning can transform students into proactive agents of change.

Introduction

The contemporary society is being increasingly characterized by a growing sense of complexity that affect multiple dimensions. Social and environmental challenges do not only produce new pushes to global markets but also require designers to act responsibly in the creation of solutions act in tune with a system-led perspective (Mulder and Loorbach, 2018). In this scenario, the role of designers is becoming crucial not only for creating aesthetically pleasing objects but also to develop innovative artefacts that promote social inclusion and sustainability. This shift in responsibility requires a new cultural stance in Design education to embrace interdisciplinary approaches to train future students to address complex issues (Davis et al., 1997; Brown, 2012; Mian, 2013).

Design education plays a pivotal role in equipping students with the skills and mindsets needed to address these challenges. Informed education in Design serves as a catalyst for integrating new meaningful values and cultural perspectives into the design processes. In this way, enabling solutions produced by creative practices can operate effectively at various scales and contexts of use. As the world grapples with pressing issues such as social inequality, human diversity, environmental degradation, and the urgent need for sustainable development, Design schools are uniquely positioned to foster an innovative culture, more aligned to the evolution of present times (Conley, 2011; Giaccardi and Redström, 2020). This culture

can promote social inclusion and sustainability synergistically and through broad-minded teaching and learning methodologies, while also providing consistent pedagogical pathways that extend beyond theoretical knowledge.

Design discipline often transcends traditional theoretical boundaries and demands immediate application to create products, services, and systems of solutions (Holmlid, 2007). Educational practices must facilitate new learning activities to create opportunities for students to develop and test their ideas in real-world contexts and through iterative processes (Zimmerman et al., 2007). Providing the opportunity to experience these situations by being exposed to complex phenomena is essential – not only for students. In this scenario, the role of reflective creative practices is apparent, as they foster creativity, critical thinking, and interdisciplinary collaboration to tackle complex societal problems with deeper empathy and a sense of responsibility (Schön, 1983).

Equipping future designers with a cultural mindset that prioritizes reflective practices creatively – as well as deeper ethics – is paramount for enhancing practice-based professional development (Manzini, 2015). This can further expand the capability to navigate the intricate interplay between social needs and environmental imperatives. As global complexities continue to evolve, an informed education in Design studies grounded in experiential teaching and learning can enhance the creation of inclusive and sustainable artefacts (Shea, 2012), though this transition requires novel teaching and learning models. At the level of personal growth, the contribution provided by these practices extends the mere acquisition of technical skills; instead, it encourages students to engage deeply with the ethical dimensions of their work – a conscious look at emotions, experiences, actions, and responses that contributes to shaping a more equitable future for all.

Design education and the value of reflective creative practices

Design education is inherently a reflective creative practice, wherein students – future designers – are often encouraged to engage in critical self-assessment throughout experimental and experiential design processes (Cross, 2011). This reflective approach that fluctuates between reflection-on-action and reflection-in-action (Schön, 1983) allows students to examine their assumptions, biases, and the broader implications of their design choices. A design education hinged around creativity and reflection empowers students to consider the social, cultural, and environmental con-

texts of their work in a new way, and this can be particularly useful when it comes important topics such as social inclusion and sustainability since it promotes the development of innovative outcomes – from challenging current problem spaces to driving the creative quest for new solutions and shaping the physical and virtual artefacts (Bason, 2014).
The reflective practice in design education is not merely an ancillary component; it is central to the design action itself. As Schön (1983) posits, reflection-in-action allows practitioners to think critically about their decisions as they unfold, enabling them to adapt and refine their approaches in real-time. This self-learning process is essential for developing a nuanced understanding of the complexities inherent in design challenges. Learning how to navigate between ambiguity and uncertainty, by objectivity and possibility, as well as resilience and adaptability becomes an indispensable step in addressing the multifaceted social issues posed by present times.
Through project-based learning, students can foster a holistic understanding of the impact of their designs, and this ultimately can encourage them to think critically about the long-term implications of their work (Altay et al., 2016; Fathallah, 2021).
Design education as a reflective creative practice not only enhances students' technical skills but also instils a deep sense of social and environmental consciousness. As the society continues to evolve and determines new issues linked to social inclusion and sustainability, Design education can play a pivotal role in generating responsible attitudes needed to properly address global market via informed practices.

Toward a new teaching and learning model

The contemporary landscape of contemporary society introduces new opportunities for Design education to expand its impact beyond aesthetic considerations. The need for structured teaching and learning models that effectively integrate the principles of social inclusion and sustainability can be motivated by considering some important trends.
In terms of scenario, the complexity of social and environmental issues requires a multifaceted approach to Design education. Often, traditional curricula primarily focus on technical skills and aesthetic principles; less attention is paid to the ethical and social dimensions of the design practice (Cross, 2011). Bridging this gap would allow students to engage with diverse interdisciplinary fields by getting confidence with holistic under-

standing (Manzini, 2015).
From the pedagogical point of view, the need for a reflective practice in Design education cannot be overstated. As Schön (1983) emphasizes, reflection-in-action is crucial for practitioners to adapt and refine their approaches in real-time. A structured model could encourage design students to critically assess their choices, consider the implications of their work, and learn from their experiences (Kuzmina et al., 2023). Self-learning processes foster deeper sense of responsibility and ethical awareness – these are essential qualities for designers working in contexts that demand social inclusion and sustainability.
Operatively, engaging with communities through real-life practices is vital for fostering social inclusion and to enhance sustainability at different scales (i.e., social, sociotechnical, etc.). This would allow students to understand the real-world implications of their designs and ensures that diverse voices are heard in the design process. Participatory approaches enhance the effectiveness of design interventions and promotes a sense of ownership among community stakeholders (DiSalvo et al., 2012).
At the organizational level, structured teaching and learning models facilitate the assessment of outcomes related to social inclusion and sustainability. By establishing clear evaluation matrixes, it is possible to measure the impact of designs (Bason, 2010). This focus on assessment also reinforces the importance of evidence-based design practices.

A teaching and learning model to integrate social inclusion and sustainability in design education

To effectively develop a teaching and learning model that effectively integrates the principles of social inclusion and sustainability while reinforcing the sense of reflection and creativity, a comprehensive teaching and learning model is proposed (Figure 1). Conceived for Design education, this model is structured around four key pathways: a) “awareness”, b) “engagement”, c) “empowerment”, and d) “impact”. Each pathway encompasses specific strategies and activities that promote reflective and creative practices, and foster a deeper understanding of the social and environmental dimensions of design.
“Awareness” aims at cultivating an understanding of social issues and sustainability challenges among students. In particular, the attention revolves around the following three points:

- Curriculum integration. Introducing foundational courses that cover

topics such as social justice, environmental ethics, "equality, diversity, and inclusion" (EDI), and the role of design in addressing societal challenges increases the value of Design programmes by closely aligning the teaching offer to market needs (Rossi and Brischetto, 2014). Operatively, this can include case studies of successful design interventions that promote social inclusion and sustainability.

- Lectures and workshops with experts and local stakeholders. The contribution of practitioners and experts working on the social and sociotechnical aspects of design practice contribute to develop first-hand information and insights; the sharing of experiences is also supported. This exposure could help students to recognize the complexities of social and sociotechnical issues, and the potential of design as a tool for positive change (van der Bijl-Brouwer and Bridget, 2020).
- Use of reflective journals. Encourage students to maintain reflective journals where they document their thoughts on social inclusion and sustainability, and their evolving understanding of the designer's role in society as well as their impact on local and global markets. This practice fosters critical self-assessment and personal growth (Schön, 1983) while promoting reflection on the scales of their designs.

"Engagement" is intended to actively involve students in the design process through hands-on experiences and community interaction. Three topics are essential to consistently implement it:

- Collaborative projects. Facilitating interdisciplinary projects that require students to work with peers from different fields actively stimulate deep reflections and consistent application of experiential learning. This allows students to tackle complex problems from multiple perspectives by using unstructured yet innovative approaches to problem solving (Manzini, 2015) – switching from problem solving to looking for opportunities for positive change.
- Community-based design. Collaborations with local organizations and communities help students to identify real-world challenges and get confidence in working with complex scenarios. Students can engage in participatory design sessions, where they co-create solutions with community members, ensuring that diverse needs are included in the design process (DiSalvo et al. 2012).
- Field studies. On-site active engagement with local communities affected by social and environmental issues stimulates experiential learning and contribute to promote practice-based professional learning settings. This is essential to provide consistency to reflective practices. These experiences provide students with firsthand insights into the

challenges faced by different groups of users, enhancing their empathy and understanding.

"Empowerment" is a powerful tool to equip students with the needed skills and confidence to implement inclusive and sustainable design solutions. To do this, the following aspects are essential:

- Skill-building workshops. Studio-based activities that focus on specific design skills emphasize the importance of ethical considerations in design decisions (Cross, 2011). At the same time, studio activities expose students to real-life problems and live projects with communities, reinforcing the reflective side of experiential learning through self-learning.
- Mentorship programs. Establish mentorship opportunities where students can work closely with experienced designers and community leaders actively involved in addressing social inclusion and sustainability is essential to develop consistent learning, while reducing gaps in teaching and learning. Real-life activities are also important to provide better market readiness. This guidance helps students navigate the complexities of design and fosters a sense of agency in their work.
- Reflective practice sessions. Incorporate regular reflective practice sessions where students can discuss their experiences, challenges, and successes in their projects promote collective growth and mutual support among peers. This structured reflection encourages critical thinking and continuous learning.

"Impact" aims to assess and communicate the outcomes of final design interventions and their contributions to social inclusion and sustainability in an informed way. To do this, the following elements are needed:

- Evaluation frameworks. Assessing student projects is crucial to provide learners consistent insights on their work so that they can reflect on the different levels of their practice (pedagogical, ethical, technical, etc.). For this reason, the development of evaluation criteria that allow students to (self-)assess the effectiveness of their design solutions in addressing social and environmental issues is a fundamental step toward the reflective reasoning. This could include proactive (i.e., goal-oriented) metrics related to community engagement, sustainability, social inclusion and user satisfaction (Bason, 2014).
- Showcase events. Exhibitions and presentations where students can share their projects with the broader community. This not only highlights their work but also fosters dialogue about the role of design in promoting social change.
- Professional and educational networks. Create networks for graduates

to stay connected and share their experiences in the field is vital to fuel the discussions on social inclusion and sustainability, and their value in driving the development of innovative solutions as well as reporting market impressions. This ongoing engagement can provide valuable insights and support for current students, reinforcing the importance of community in design practice.

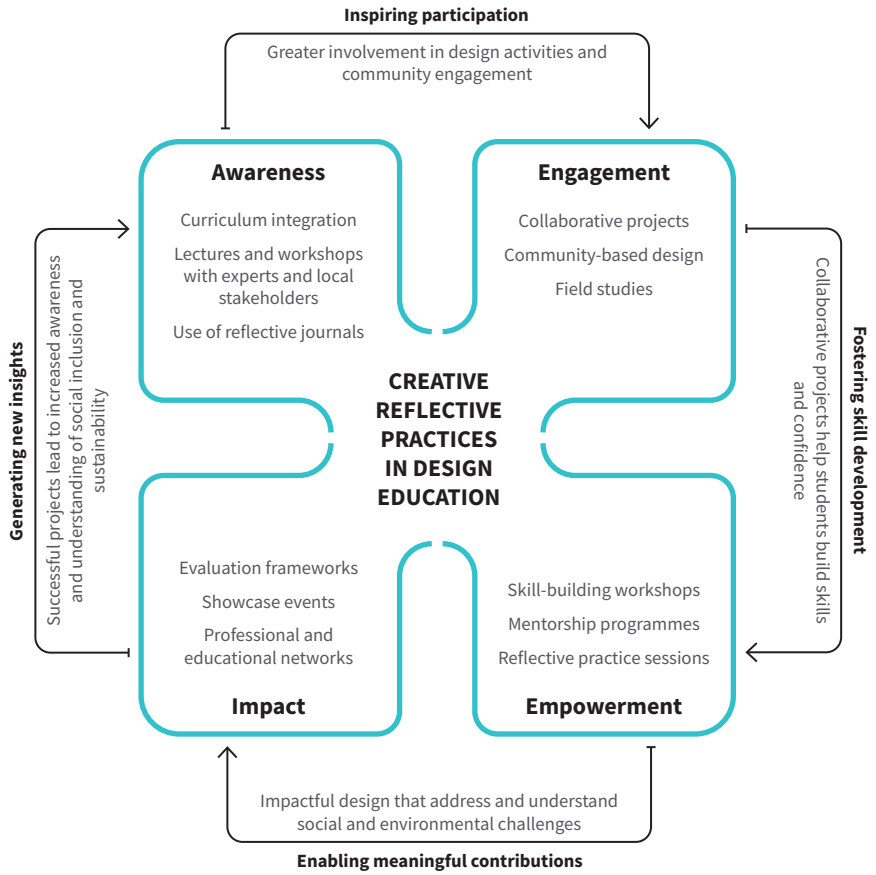

Fig. 1 Teaching and learning model for Design education: The pathways of “awareness”, “engagement”, “empowerment”, and “impact” (Rossi).

By structuring the teaching and learning model around these four pathways – “awareness”, “engagement”, “empowerment”, and “impact” – Design education can effectively promote reflective creative practices that prepare students to become responsible designers. This framework

emphasizes the importance of integrating social inclusion and sustainability into the design curriculum through converging cultures (Figure 2), ultimately fostering a new generation of innovators equipped to address the pressing challenges of our time.

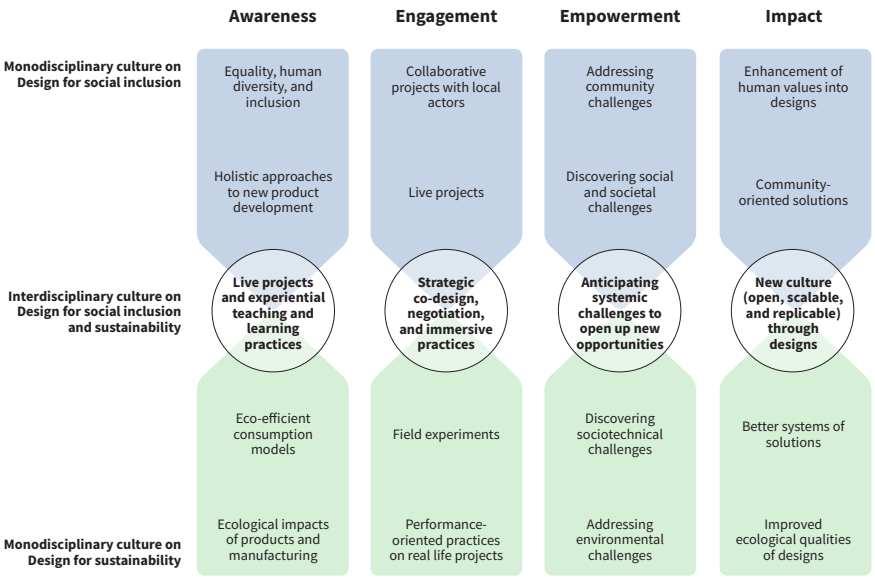

Fig. 2 Teaching and learning model for Design education: Interplays between social inclusion and sustainability through reflective creative practices (Rossi).

Conclusion

In the evolving scenario of the present society, Design education stands as a powerful key driving force to generate the needed culture to address the challenges raised by social inclusion and sustainability. By fostering a reflective creative practice that emphasizes empathy, critical thinking, and interdisciplinary collaboration, design programs can equip students with the needed skills and knowledge to effectively deal with the complexities of contemporary markets.

The proposed teaching and learning model for Design education integrates interdisciplinary elements such as collaboration, experiential learning, and community engagement to underscore the importance of reflection as a self-learning process. Accordingly, this reflective creative practice not only enhances students' technical skills but also trigger deep senses of so-

cial and environmental consciousness, which are required to contributing to the development of enabling solutions that are both socially inclusive and sustainable.

As the field of Design studies continues to progress to follow the evolution of society and global markers, the integration of reflective creative practices into Design education will be paramount in preparing future designers to confront the multifaceted challenges. Through an informed culture of creative reflection, Design education has the unique opportunity to empower students to become agents of change, capable of properly addressing the pressing issues of present and future time.

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Authentic design and visual philosophy for social inclusion and sustainability

Martin Baláž

Authentic design for social inclusion and sustainability: A visual philosophy

Martin Baláž

World is currently facing new challenges in the field of technology, ecology, but also culture and creativity. An authentic approach to design should define an equally authentic emotional relationship between the product and the person, the user. A new, motivating, inspiring, socially important product – an iconic element or structure, should consider the needs of a modern living space. One of the inspiring views on thinking in our design context can be philosophical: movement is the basis of the process of creation and change; it is the basis of perception.

Introduction

Perception interacts with thinking to arrive at knowledge. Our perception is dominated by the visual and auditory systems, the quality of which depends on the kinaesthetic one. Emotionality, activity or attention subsequently depend on their joint integration. Just like the diversity in students' character personalities, the variety of design assignments offers a broad-spectrum of themes and so the diverse design process approaches have to be mastered by students. Substantial disagreement exists concerning how designers in many fields, whether amateur or professional, alone or in teams, produce designs. The paradigms may reflect differing views of how designing should be done and how it "actually is done", and they both have a variety of names. The problem-solving view has been called "the rational model" (Brooks, 2010), "technical rationality" (Schön, 1983) and "the reason-centric perspective" (Ralph, 2010). The alternative view has been called "reflection-in-action" (Schön, 1983), "coevolution" (Dorst and Cross, 2001), and "the action-centric perspective" (Ralph, 2010). For communication in authentic design, Star Status Design philosophy (proposal by Baláž and Rejta) looks for new symbols and research tools, and provides a platform for their development. When developing such a tool for an intellectual creator, it is necessary to actively work with the atmosphere of space-time, the sense of the present, with a single modern moment (Baláž, 2022). Communication is the exchange of information through symbols. Symbols are intricately woven into individuals' ongoing perception of the world. They seem to contain a vaguely understood capacity that, as one

of their functions, defines the very reality of this world. A symbol has been defined as any tool that can be used to create an abstraction. The basis of symbolism is the abstraction of values that people place in other people and in the things, they own and use (Gordon, 2009).

Authentic Design

In relation to society, technology, and art, design is characterized by philosophical and aesthetic innovation and stands as a hallmark of modernism. Design, as a creative force, represents the most immediate and dynamic path to innovation. Star Status Design is a philosophy based on a personal, comprehensive model of design thinking, and an authentic design strategy. It analyses and redefines the designer's proximity to the philosophy of design through a variety of exploratory perspectives. These perspectives can be leveraged by designers, creators, educators, researchers, and students to inform their independent design actions. As designers, we adhere to the Star Status Design philosophy, which is rooted in our personal, authentic approach to design. This philosophy is distinguished by independent intellectual exploration of context, contextual analysis, and the development of complex design values using a nonlinear methodology in the design process.

Through interdisciplinary epitome components within an infinite research grid, we create a new, complex context – a constellation and composition of authentic values for independent artistic and art-engineering design, development, research, and education. We embed values of authenticity and complexity into design. We never follow a linear path. Instead, we employ our ability to explore, search, and observe spacetime, generating new contextual constellations. We nonlinearly validate the values of authenticity and complexity in design concerning inclusion, sustainability, aesthetics, and the quality of experience beyond mere functionality. Authentic creation is currently structured around five thematic pillars that embody design creativity. We refer to these levels of authenticity as Body, Action, and Anima, with their intersection forming the research Grid and cultural Impact-Transfer. A stable-dynamic synthesis of form also characterizes the living symbol of Star Status Design, acting as a start button and an eye that never loses its capacity to discover, explore, and observe the world.

The creation within inspiring design focuses on form and its transformations, the beauty of the world, and the role of harmony in society. On one hand, it explores anthropomorphic designs imbued with the sensual ten-

sion of the “body”; on the other, it introduces revolutionary sharp geometric objects, where each element represents a rupture. These elements aim to create a profoundly balanced combination of technical and aesthetic design and its transformations. A significant distinction in transformations lies between non-fundamental transformations, which react to actions, and fundamental transformations-actions themselves. Most philosophical discussions about action concentrate on physical actions in the form of bodily movements. Many philosophers regard mental actions as a distinct category, separate from physical actions. Actions can be rational or irrational, depending on the reasons behind them. This closely ties to the philosophy of action because we typically hold people accountable for what they do – one cannot, for instance, draw without engaging in thought. This focus on action is central to the creative process in design inspiration. The capsule project was developed during the covid-19 pandemic, a period that compelled us to raise new questions about life philosophy, culture, and society. How does our work transform us? How do we want our design to influence others? Our definition of cultural interest in a new society, referred to as “interest solutions,” leads to a new lifestyle that contrasts with perspectives on today’s post-postmodern society. Capsule design reshapes contemporary lifestyles and is grounded in authentic motivation for social action, promoting inclusivity and sustainability. The grid serves as a philosophical foundation and applied research framework, functioning as a reference system for structuring content. It acts as a rational framework for organizing elements relative to a base, to other elements, or to parts of the same element. A holistic view of the design research process – spanning fundamental research, applied research, and resultant design proposals – reveals our non-linear thinking and working methods, which have driven our outcomes.

In the following section, we present a more comprehensive visual philosophy through a mental model of thinking. We also introduce contextual constellations and a value-based grid to clarify the key points of our non-linear design thinking. The most critical components of the Star Status Design epitome for this research are the characteristics of the intellectual creator and the spatiotemporal atmosphere. The intellectual creator is an individual capable of generating knowledge from perception, a consistent designer with imagination rooted in independent intellectual research and the development of concepts through Star Status Design. The spatiotemporal atmosphere embodies a sense of presence, a synesthetic experience of the absolute aura of a super-minimalist product, reflecting the past, present, and future as a unified modern moment. Star Status Design

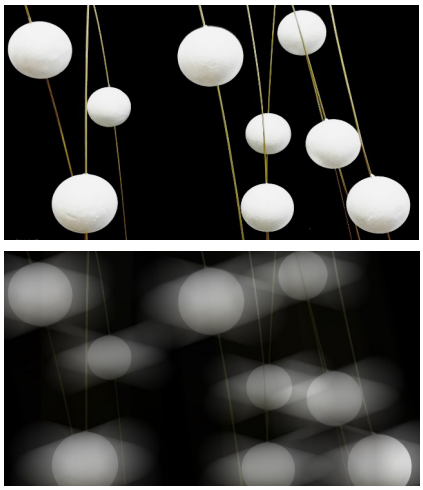

Fig. 1 "White Square 1 in 3 Denotation" by Star Status Design – Mental model of Visual Philosophy (Authors: Baláž, Rejta, 2022).

morphing signifies change, action, and the essence of unity in creation and dissolution, never accepting the world as it was given. Our contextual compatibility reshapes and redefines proximity, rooted in harmony as an analogy of contrasts – individuality with objectivity, beauty with function. This occurs through fluid thinking and the designer's morphing point of view, encompassing spatial depth and scale. For research through design (Research by Design), we developed and authenticated the Star Status Design nonlinear visual thinking model as a non-linear analytical tool (Figure 1). The nonlinear design thinking research and the study of elements in space took place within a static-dynamic–static-dynamic context documented in the diploma thesis Grid, 2022 by Erik Rejta.

Visualizing the authorial non-linear thinking model was considered a crucial step in scientifically and artistically demonstrating the authentic functionality of such a design model and its novel dimension compared to current linear forms. The Grid research within Star Status Design Creations showed that moments exist in the creative design process that cannot be formally recorded. Consequently, we expanded the concept of Star Status Design visual models of thinking with a work that confirms that authentic and complex thinking in design hinges on the ability to understand context and to create connections. Rather than following prescribed steps, it fosters compatibility between design and artistic reasoning. The artistic-scientific work White Square 1 in 3 Denotation by Star Status Design takes the form of a visual essay/collage, documenting the spatiotemporal organization of context through visual elements of content expression. The design interrogates relationships between objects and visual and verbal references.

Concept X: Dimensions of design reality

The space we inhabit consists of physical entities – design, artifacts we use daily, and devices we operate regularly. Yet, we continually engage in designing projects for the intangible spaces of the future. It is crucial to recognize that products possess an authentic and continuous social, cultural, and mental status beyond their "object" status. They represent a complex amalgamation of material, social, and spiritual values, and should seamlessly align with overlapping tangible and intangible layers. This essence is integral to our design philosophy.

The accelerated pace of virtual and digital experiences introduces intangible design at the very moment of their inception. This convergence blurs

the boundaries between objects and experiences. However, despite advances in computational processing, no single program has yet achieved the depth of human understanding and the flexibility of human thought. Star Status Design seeks to address how designers connect with "being in the world" – past, present, and future. From the perspectives of design, culture, society, technology, and art, we layer ideas that intertwine heritage with future concepts of physicality, grounded in the essence of authentic design. Our philosophy advocates for natural design rooted in genuine creativity, communication, and an awareness of the constellation of social contexts and relationships that define statuses. Thus, a designer is defined as an intellectual creator – an individual capable of "creating knowledge" through perception and as a "permanent" creator with the imaginative capacity driven by independent research and development. Star Status Design X is a conceptual work. It visualizes a seemingly unknown or empty space in the mind or environment, which the designer can fill in infinite expressive ways through the exploration of interconnected statuses in context and gaining new perspectives. These expressions embody freedom and the potential for infinite expansion, redefining the structure between body, mind, and soul, human identity, place, and space.

We perceive the current design space in three dimensions of design, each reflecting a nonlinear authorship philosophy. These dimensions articulate the simplicity within the complexity of design – design simplexity – as understood by designers. Vision Design Dimension comprising visions and narratives that allow us, through design and its creative tools, to communicate freely. Independent artistic exploration is one such tool. Mental Design Dimension visualizing the dynamic mental model of a designer aligned with the Star Status Design philosophy. Continuous visual reimagination of the profound creative process is inspired by the natural functioning of the world around us, as seen in previous works like White Square 1 in 3 Denotation (Authors: Baláž, Rejta, 2022) (Figure 2). Authentic Design Dimension representing comprehensive, authentic design derived from a novel perspective on the context in which the design naturally operates. This dimension emphasizes culture, innovation, and identity, radiating substance, atmosphere, and spirit.

Is the philosophy of design and the nonlinear thinking model of a designer the missing element in the post-postmodern era for the post-pandemic generation? We now face a new paradigm in design, research, and communication within the creative process. As designers, we must prepare for unknown situations and establish new standards. Our role is to equip the art of design for the next generation in a post-postmodern society, whe-

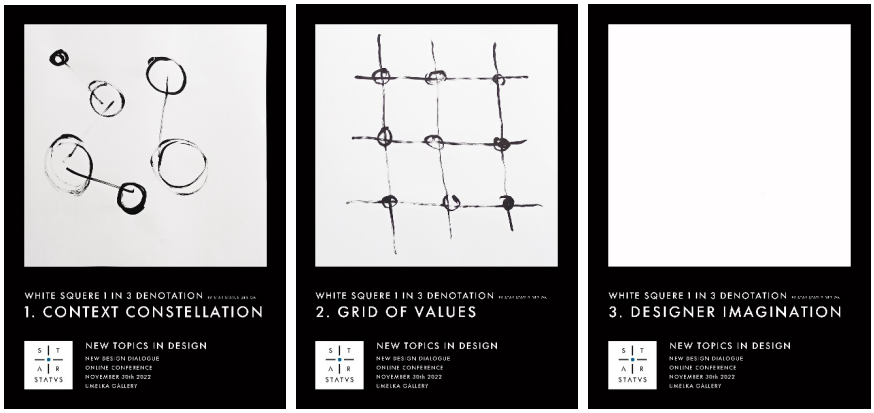

Fig. 2 "White Square 1 in 3 Denotation" by Star Status Design – Mental model of Visual Philosophy (Authors: Baláž, Rejta, 2022).

re diverse opinions make defining values challenging. The design process necessitates deeper intellectual engagement with products and their movement through time-space, enabling us to draw richer inspiration for the future. The new art of interdisciplinary experience fosters open-minded thinking, synergistic strategies, and independent artistic research. Star Status Design anchors itself in general design practice to illuminate the distinctions between traditional "design thinking" and innovative approaches.
Visual philosophy represents a parallel creative response by authors working in academic and research domains. Through their works, they aim to facilitate the perception of design processes, develop systematic methodological approaches to design independently, and escape the stagnation of creativity. The authors seek solutions to the current state of the field that would allow art disciplines to foster creativity positively. Their methodological approach stems from a philosophy of a humane, open society with high participation from creative disciplines, fostering inclusivity and sustainability.

Conclusion

The mission of the Baláž studio, open to international and interdisciplinary connections, is to integrate contemporary methods and create new models of creative thinking, thereby raising the quality and diversity of research and artistic outputs. The studio is based on the non-linear authorial

“Star Status Design” (Proposal by Baláž and Rejta) method for design research and creation of independent intellectual design development through the visual philosophy of “Star Status” and “Authentic Design Essence”. It integrates interdisciplinary values, focusing on authentic design for social inclusion, sustainability, and experience quality beyond functionality, supported by the use of “action centric” tools for authentic independent artistic research and define and create original languages through visual philosophy. The harmonization of inclusive design and sustainable engineering into a new whole is a compositional system of authentic design and the foundation for the process of formation and change, leading to new knowledge for society. The Studio follows the philosophy of authentic approach to design, characterized by independent intellectual research of context, analysis of interrelationships, and the development of social values through a non-linear method during the authentic design process. In the InDeSIS project creation process, universities have focused on further defining the theme of design intervention in public spaces. This specification is fully in line with the current focus of the studio and reflects the preferred orientation of collaboration across disciplines within the Faculty of Architecture and Design at the Slovak University of Technology in Bratislava, Slovakia (Figure 3).

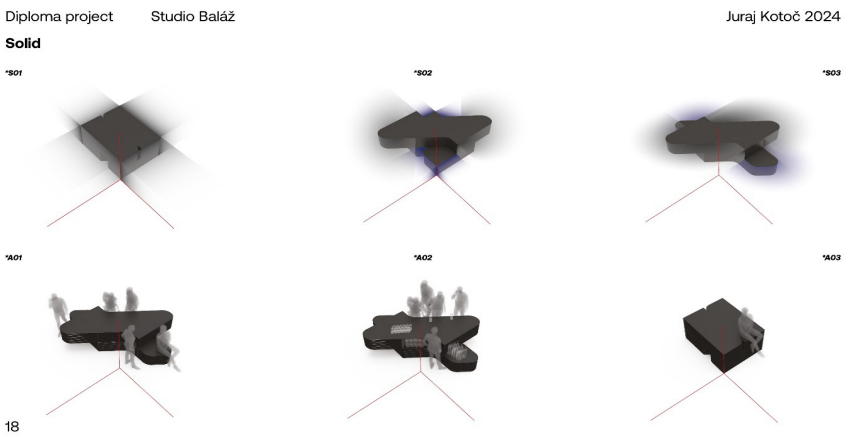

Fig. 3 “Solid”. Author: Juraj Kotoč, Diploma Project, Studio Baláž, 2024 – Design intervention in Public Space.

The approach of visual philosophy used for the InDeSIS project is based on the studio’s research setup, which aims to define a new type of signi-

ficance for authentic design for social inclusion and sustainability – design interventions as independent designer's inputs with solitary products design artefact in the environment. Design interventions into the social dimensions of public spaces through the visual philosophy are the inclusive entries of designers with authentic products, systems, interactives, or presentation tools into historical, current, or future layers of the environment and strategic locations in selected areas, such as mixed reality elements, information systems, or cultural platforms. Imagination and design sketching ideation – "action-centric" tools of the visual philosophy help verify authentic design by students in collaboration with colleagues from other universities. An interesting finding is that all parties quickly aligned on the issue of culture, inclusivity, and sustainability. As a lecturer, I positively assess the high compatibility of all participants, including educators. This is a sign of inclusion and sustainability beyond the project, and in my opinion, it represents the greatest value this collaboration has brought.

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Holistic research with UX methods for social inclusion and sustainability

Pelin Celik

Holistic research with UX methods for social inclusion and sustainability

Pelin Celik

This paper explores how holistic research methods, combined with User Experience (UX) and Systems Thinking, can promote social inclusion and sustainability in design education and practice. It presents an education framework that guides design students through iterative processes focusing on context, concept, and implementation to understand user needs and create user-centred ideas. Using the authors UX process and Systems Thinking tools, students can address complex socio-ecological challenges. Accordingly, the paper emphasizes the importance of a systemic view that not only considers individual user needs but also larger societal and planetary concerns. The framework ultimately aims to equip future designers with the skills and mindset necessary to create meaningful and sustainable design solutions.

Introduction

Design, as a discipline, has evolved significantly in recent decades, moving beyond traditional aesthetic and functional concerns to address complex societal issues such as social inclusion and environmental sustainability (Jones, 2018). In today's interconnected world, designers are increasingly called upon to create solutions that consider the user, as well the broader socio-ecological systems in which their products or services operate. This shift might demand an expanded methodological practice in design education that goes beyond conventional design practices to incorporate holistic research and User Experience (UX) methods that prioritize human-centred, socially inclusive, and sustainable outcomes. Holistic research, in the context of design education, is an approach that looks at the full spectrum of factors influencing a design project at the cultural, social, economic, and environmental dimension. It moves away from a narrow focus on product usability or market trends, instead integrating multiple perspectives to develop comprehensive solutions that meet diverse needs. Authors such as Don Norman (2013) suggest, "design should make technology usable and understandable, not create barriers".

UX aligns with the principles of Systemic Design, where designers must consider the interrelations within complex systems, such as the interactions between human behaviour, technologies, and environmental impacts (Norman, 2013; Meadows, 2015). By incorporating UX methods

that prioritize user needs and systemic design approaches that consider environmental and social systems, designers might create solutions or interventions that contribute to both social inclusion and sustainability.
In this regard, holistic research with UX methods is particularly well-suited for addressing challenges related to social inclusion and sustainability, as these issues inherently involve multiple stakeholders and layers of complexity. It is particularly valuable in addressing issues like social inclusion, where marginalized groups are often overlooked in traditional design processes (Manzini, 2015).
The paper first examines the definition of UX. Secondly, it explores the UX process of the author and methods for social inclusion, focusing on how designers can address user needs. Third, it discusses Systemic Design and Systems Thinking methods, expanding the design focus from human-centred to planetary and systemic concerns. Lastly, it highlights the importance of integrating holistic approaches in design education to prepare future designers for complex, sustainable solutions.

UX design: A definition

When introducing design students to the concept of User Experience for the first time, they often lack a clear understanding of its definition and the significance of the framework in crafting effective solutions.
UX design achieved over the last years a growing importance in design education, but also in various industries. Its understanding is influenced by individual backgrounds, industries, and the specific interests of researchers leading to varied interpretations of the term (Zarour and Alharbi, 2018). In human-technology interaction, UX plays a crucial role in successful product design and is defined as a dynamic, context-dependent, and subjective process (Law et al., 2009). Forlizzi and Battarbee (2004) describe UX as an evolving relationship between a user and a product over time, emphasizing not only immediate usability but also emotional and experiential dimensions. Hassenzahl (2010) further identifies UX's dual nature, highlighting pragmatic (functionality) and hedonic (pleasure) qualities. The growing emphasis on UX in recent years has also led to the evolution of professional bodies, reflecting the shift in focus from usability to a broader understanding of user experience (Rusu et al., 2015). In Human-Computer Interaction (HCI), UX has been described as the interplay of individual perception, emotion, cognition, motivation, and action, shaped by interactions with place, time, people and objects (Kuliga et al., 2015).

These definitions align with both the authors' perspectives and the International Organization for Standardization (2019), which defines UX as the perceptions and responses of individuals resulting from the anticipated or actual use of products, systems, or services. The author's UX teaching concept at HTW Berlin builds on these foundational definitions to provide a comprehensive understanding. UX can capture emotions, beliefs, preferences, sensations, physical and psychological responses, behaviours and abilities that occur before, during or after use, all influenced by the interactive system, the user and the context (Figure 1).

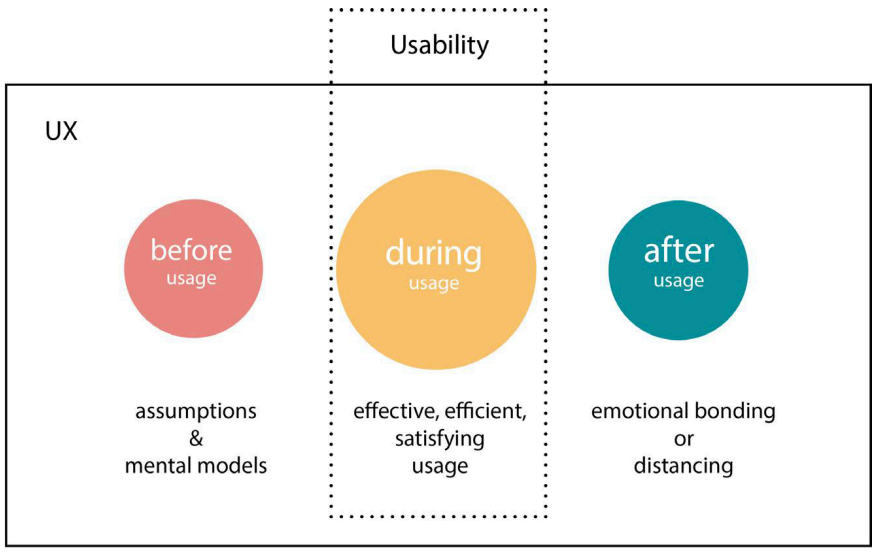

Fig. 1 UX framework (Celik).

This definition is essential when teaching designers about UX. They must grasp the holistic perspective, as UX extends beyond the brief interaction during use, often referred to as usability. A complete, UX encompasses three key phases, all of which designers need to research and consider in their work. First, the user has certain assumptions and mental models before purchasing or using a product. These mental models have been shaped by product experiences and personal socialization, such as reading from left to right or opening doors (see Norman, 2013). Second, during use, the user evaluates whether a product was efficient and satisfying to use. This moment essentially describes usability. The final point in the UX, according to ISO (2019), addresses the moment after use – specifically,

whether the user forms an emotional connection due to positive usability or experiences a sense of detachment due to negative usability. Whether a UX is perceived as positive or negative depends on the overall process and the detailed examination or research of these individual phases.
There is no product in user's daily life without UX. Every product that engages in interaction with the user or is used by someone generates a user experience. Design students are thus introduced to holistic research in UX through this model (Figure 1).
Nevertheless, some students and researchers have difficulties in differentiating UX from usability, as the two concepts overlap in many areas, particularly in their measurement (Bevan, 2010). Therefore, it is important in education to explain the difference and emphasize that UX is not UI. UX design focuses on the overall experience a user has while interacting with a product or service, emphasizing usability, accessibility and the emotional responses elicited during the interaction (Hassenzahl, 2010). It involves understanding user needs and behaviours, as well as optimizing the functionality and efficiency of the product (Norman, 2013). In contrast, UI design is concerned specifically with the visual and interactive elements of a product, such as layout, colours, typography, etc. (Sutcliffe, 2016). While UX sets the overall experience and journey of the user, UI brings that experience to life through aesthetic and interactive elements. Essentially, UI is a component of UX, as a well-designed interface contributes significantly to the overall user experience but does not encompass the entire process of user interaction (Garrett, 2010).

UX process and methods for social inclusion

In today's technology-driven industries, the rapid pace of innovation might overshadow the fundamental need to prioritize UX, particularly concerning social inclusion. As the challenges of modern society become increasingly complex, there is an urgent need for a UX mindset and the incorporation of UX tools in both the design process and the education of designers (Harte et al., 2017). This focus on UX shifts attention from mere technological advancement to understanding and addressing user needs, which is crucial for creating inclusive products that resonate with diverse populations. Unlike Design Thinking, UX design centres on empathizing with users and considering their experiences as the foundation for developing e ective solutions (Kelley and Kelley, 2013). By fostering a strong understanding of UX principles in design education, emerging designers can better address the

pressing social issues of today and tomorrow.
To introduce design students to the UX process, the author uses a Venn diagram of Human Centred Design (HCD) as a foundational tool defined by three main areas: Desirability (what the user needs and wants), Feasibility (what is financially achievable) and Viability (how it can be technically or aesthetically implemented). HCD serves as the basis for UX and introduces a four stage product development process: Understand, Define, Design and Evaluate.
This means that, as a designer, one must first research and analyse the needs, mental models and usage habits of the user to define the necessary functions, then proceed with the design and finally test the outcome. These four stages are intended to be iterative and interactive.
Building on the HCD framework and the ISO 9241 framework (Figure 1), the author has developed a three-stage UX process in her teaching over the past 10 years. This process, aimed at making the UX methodology more accessible to designers and managers, consists of three phases: Context, Concept and Implementation (Figure 2).
In the Context phase, designers focus on analysing "WHY" questions to understand the user's needs and actions within their context. In the second phase, Concept, design students generate ideas by addressing the question of "WHAT" should be designed, defining actions and goals. Finally, in the third phase, Implementation, the focus shifts to answering "HOW" to design the shape and interaction of the product or service. Like HCD, the process is iterative, allowing experimentation and the acceptance of mistakes.
In the WHY phase, key methods include user observations, qualitative interviews, questionnaires, diaries, cultural probes, user journeys, empathy mapping and the participation of "design mentors" (Celik and Kampe, 2017). Design mentors (Figure 3) are users with no design background, who work with designers to share their experiences and desires, enriching the project as real personas (not marketing personas). It is a method that extends the real persona approach by allowing users to participate in the project as design mentors in the sense of cocreation. He/she brings in his/her user knowledge and user needs in the context of the project and thus generates valuable insights. He/she does not accompany the project temporarily, but throughout the entire project – from research to the final product.
Students use the Real Persona Canvas to describe the users' needs in detail. To help students understand the underlying psychological needs, the author utilizes Need Cards from interaction design, based on Hassenzahl's

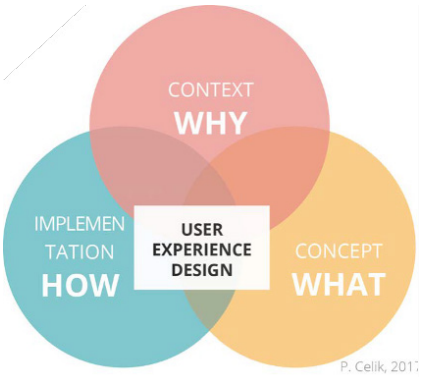

Fig. 2 Three phases of UX process (Celik).

Fig. 3 Design Mentor in the UX process. (Celik, credits: F. Deraed, 2019).

and Diefenbach's work (2012), which draws from Sheldon's self-determination theory (2001). These cards (Figure 4) identify eight fundamental human needs: Autonomy, Competence, Relatedness, Stimulation, Popularity, Physicality, Meaning and Security.

Fig. 4 Need Cards by E&ID Tools by Hassenzahl et al. (credits: Celik).

Over the past years, the author has had highly positive experiences using these cards in education and industry, as they provide designers with an objective way to assess user needs during their research.
In the second phase, key methods include brainstorming, idea mapping and storytelling with user scenarios to explore creative solutions. Tools like user journeys and stakeholder mapping help students visualize the user's experience and identify all involved parties. Decision-making is facilitated using tools such as the 2x2 matrix, allowing students to prioritize ideas based on impact and feasibility, followed by fast prototyping to quickly test and refine their concepts. In the third phase, students focus on evaluating their final designs, ensuring that the proposed solutions meet user needs and align with the project's goals through usability testing and feedback loops.
The three-stage UX process and its methods emphasize the importance of design students first understanding the "why" behind every design challenge. By thoroughly analysing the user's context, needs, and motivations in the initial phase, designers can create more meaningful and social inclusive solutions. This user-centred approach, combined with different methods in each stage of the UX process, ensures that the resulting desi-

gns foster social inclusion by deeply aligning with the real experiences of diverse users.

Systemic design approach for eco-social inclusive design

Sustainability in an eco-social context might require a more systemic approach to ensure that products and services not only meet immediate user needs but also contribute to the long-term well-being of the environment and society. According to authors such as Jones (2018), the evolution of design can be conceptualized through four distinct stages, each reflecting a shift in focus and methodology. Design 1.0, known as “Design as Craft”, emphasizes traditional craftsmanship where the aesthetic and functional qualities of products are dominant. In this stage, designers operate primarily as skilled artisans, creating tangible objects with limited consideration for user experience. The transition to Design 2.0 marks a significant evolution towards “Design for Experience”, where user-centred design principles come to the forefront, prioritizing the emotional and experiential aspects of product interaction. This phase underscores the importance of understanding user needs and behaviours to create meaningful experiences. As design continues to advance, Design 3.0 introduces “Design for Organizational Transformation”, focusing on how design can drive change within organizations by fostering collaboration, innovation, and adaptive strategies to meet complex challenges. Finally, Design 4.0, or “Design for System Change”, reflects a holistic approach that addresses broader societal and environmental issues. This stage emphasizes systemic thinking, urging designers to consider the interconnectedness of social, economic, and ecological systems in their solutions, ultimately positioning design as a powerful tool for transformative change in an increasingly complex world (Jones, 2018) (Figure 5).

Systems Thinking in design is an approach that views products, services, and experiences as part of a larger network of interrelated systems. Instead of focusing solely on the product or service, designers are encouraged to understand the larger context in which their designs exist, including the interactions between users, communities, the environment and economic structures (Meadows, 2015). This holistic perspective is essential for creating sustainable solutions that account for the long-term impact on both society and the planet. It enables design students to consider the broader impacts of their decisions, from material selection and energy consumption to social equity and user behaviour. This kind of thinking encourages

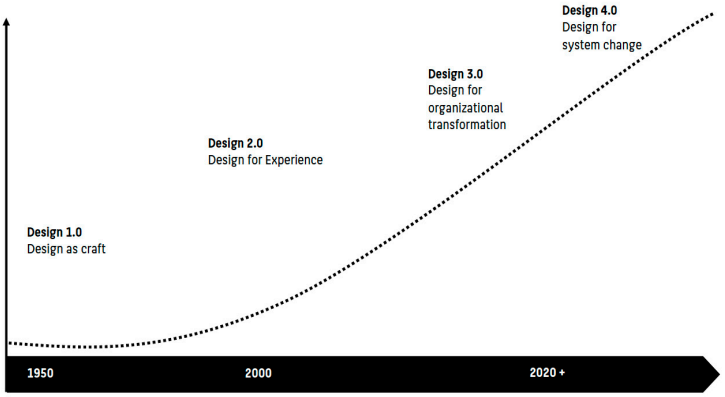

Fig. 5 Jones' Design definition on a timeline to visualize the evolution (Celik).

designers to move away from linear models of production and consumption, instead it promotes circular economies in which materials and resources are reused and repurposed (Irwin, 2015).
In her teaching the author uses an ecosystem map (Figure 6) to visualize the three main levels of systems that play a significant role in designing sustainable and inclusive solutions. The Economic/Industrial System level encompasses the production, distribution, and consumption of goods and services, highlighting the interconnections between industries, markets, and economic policies. The Social/Human System level focuses on the interactions among individuals and communities, addressing cultural, social, and behavioural factors that influence human experiences and societal structures. Finally, the Ecological/Environmental System level examines the natural environment, including ecosystems, biodiversity, and the interactions between living organisms and their physical surroundings, emphasizing the importance of sustainability and the impact of human activities on the planet. These interconnected systems illustrate the complexity of addressing global challenges and the necessity for a holistic approach in design and problem-solving.
Another key method in Systems Thinking that the author uses in her teaching with design students is the Iceberg Model (Stroh, 2015). Students use the author's Iceberg Mapping Canvas (Figure 7) to understand primarily the mental models underlying an event.
For example, when designing interventions for urban spaces to create li-

veable environments for both people and nature, it is crucial to explore the mental models associated with a given event. By analysing these men-

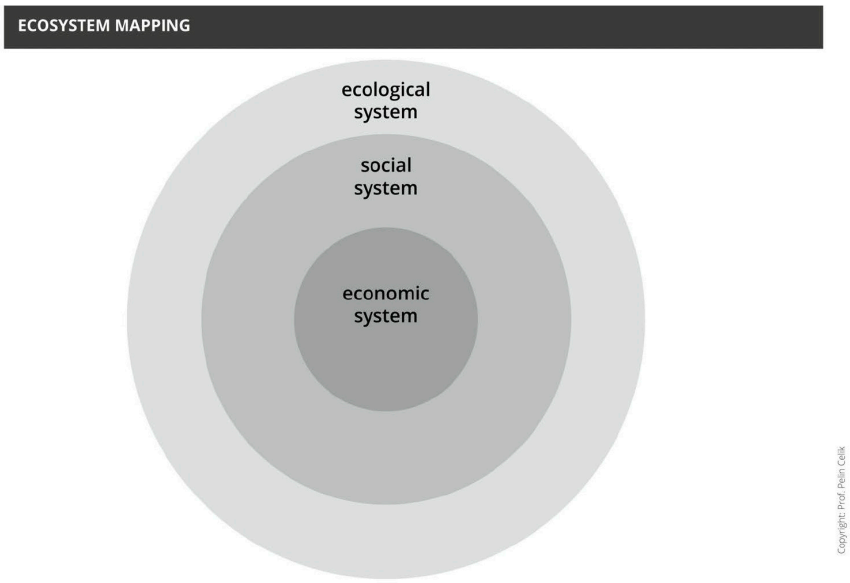

Fig. 6 Ecosystem mapping to visualize the complexity within systems (Celik).

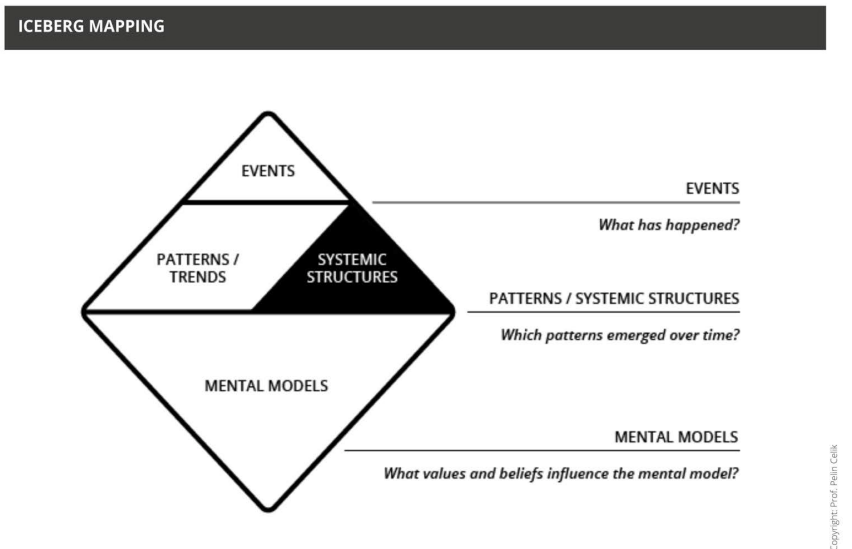

Fig. 7 Iceberg Mapping canvas (Celik).

tal models, designers can develop interventions that positively influence them, leading to more inclusive and sustainable design solutions. One example of using the Iceberg Model in the context of urban design could involve addressing the issue of overcrowded public parks. When students analyse the event of overcrowding, they begin by identifying the visible aspects above the waterline of the iceberg, such as the number of visitors, lack of seating and inadequate green spaces. However, to understand the underlying causes, students delve deeper into the submerged parts of the iceberg, exploring the mental models that contribute to the overcrowding. For instance, they might discover that community members have a mental model that equates public parks with social gatherings, relaxation and outdoor activities, leading to a high demand for these spaces. Furthermore, they might identify barriers to accessing less crowded parks, such as transportation issues or a lack of awareness about alternative locations.
With this comprehensive understanding, students can design targeted interventions, such as creating a community awareness campaign to promote lesser-known parks, improving public transport routes to these areas or even redesigning popular parks to include more spaces for gathering and activities. By addressing both the visible symptoms and the underlying mental models, the students' interventions can foster a more balanced use of urban green spaces that benefits both people and the environment.

Conclusion

This paper has delved into how holistic research methods, when combined with UX and Systems Thinking approaches, can be instrumental in advancing both social inclusion and sustainability in the field of Design. The framework provided demonstrates the importance of embedding these approaches into design education, emphasizing that a successful designer in today's world might understand more than just aesthetics or functionality.
By taking students through a structured, iterative process that starts with empathy and understanding the context of users, the author has shown with her UX process how crucial it is for designers to ask the "why" behind every design challenge. Understanding the needs, motivations, and mental models of users enables students to develop ideas that are not only practical but deeply resonate with the people they are designed for. The methods highlighted are powerful tools that help students grasp complex socio-ecological challenges.

The author's approach ensures that students can create interventions that are sustainable and scalable, capable of addressing the pressing challenges of our time such as urbanization, environmental degradation and social inequality.

This holistic, user-centred, and systems-driven approach to design education prepares the next generation of designers to be mindful of the broader impacts of their work. By equipping them with the right tools and mindsets, they are not only able to address individual needs effectively but are also empowered to design solutions that positively contribute to the larger, interconnected systems in human living. This method of teaching and design ensures that design remains a force for positive change, helping to create a more inclusive and sustainable future.

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System design scenario for social inclusion and sustainability

Massimo Di Nicolantonio

System design scenario for social inclusion and sustainability

Massimo Di Nicolantonio

The strategic perspectives on Design for social inclusion and sustainability can be seen today as a converging opportunity to address the complexity of present society, which needs urgent actions to shape positive futures. In this scenario, the design culture must consider what kind of vision people and communities will be keen to accept to live better and longer. A system-oriented innovation perspective is presented to all designers, whose are urgently asked to not only propose efficient solutions such as physical products, but to think holistically and coordinate the global efforts in intercepting the new opportunities introduced by present times to propose sets of solutions that are both inclusive and sustainable.

The design culture on social inclusion: From products to enabling artefacts

As a cultural reference point, it can be said that the traditional and perhaps one of the most diffused ideas about designing for social inclusion is the one aligned with the notion of accessibility and/or designing for the human disability. Although this idea was one of the most preferred for long time, there is large consensus that it generates biased design results and promote a latent attitude toward social exclusion. The outcome of social exclusion is that affected individuals/communities are prevented from participating fully in the economic, social, and political life of the society in which they live (Young, 2000; Peace, 2001). Indeed, social inclusion is the process of improving the terms on which individuals and groups take part in society, improving the ability, opportunity, and dignity of those disadvantaged because of their identity. As such, it is the convergence of three key driving forces: social stances, political actions, and economic developments (Figure 1). The European Union's vision on social inclusion can be synthetized in some key elements, including promotion of active inclusion, integration of marginalized communities, contrast to discrimination, enhancing access to affordable, sustainable, and high-quality services like healthcare and social services; but also to promote the social economy, the community-led local development, investing in healthy social infrastructure, to support the physical, economic, and social regeneration of deprived communities, and enhancing the accessibility to information.

Fig. 1 The concept of social inclusion (Di Nicolantonio).

"A good design enables, a bad design disables"[1]. Design for social inclusion is a methodology that enables and draws on the full range of human diversity. Most importantly, it means including and learning from people with a range of perspectives (Holmes, 2018). Design for social inclusion is strictly connected with the holistic view and idea of a design process that looks to the future, considering transformations of every condition and mankind, and act to propose enabling solutions. Accordingly, Design for social inclusion means designing for real users; it is not for standard users or disabled ones, it then embraces a holistic sense of consideration toward the notion of human diversity to design artefacts that go beyond the mere idea of functional objects. Therefore, Design for social inclusion can be considered as an umbrella-term used to describe a design practice, an education and a research activity that contributes to social inclusion by using bottom-up multidisciplinary and holistic processes linking human dimension, socio-economic instances and environmental opportunities, or constrains. As such, it introduces an expanded perspective to work with innovative design practices such as: Inclusive Design, Universal Design,

1 Paul Hogan (1934-2019), President Emeritus of EIDD Design for All Europe.

Co-design, the Design for disability, but also Accessible design, Design for the bottom of the pyramid, etc.
Design for social inclusion applies some of the principles of traditional design culture to the "big picture" offered by the systemic challenges of present times like healthcare, education, inequalities, emerging economies, social justice, the pressures driven by the climate change, the need of democracy, etc. It redefines how problems are approached by identifying real opportunities for the change and involves users since the early design stages, to help designers in the process of definition of more complete and resilient solutions[2]. Therefore, Design for social inclusion is a design activity that indirectly confronts with the idea of Product-Service System (PSS) – an integrated set of products, services, and communication strategies – that either an actor or a network of actors (i.e., companies, institutions, NGOs, etc.) can use to create and develop new values. Therefore, it is a goal-oriented design practice that aims at achieving relevant goals through a set of artefacts smartly and inclusively designed (see: Zurlo, 2010).
It has been said that this design practice alludes to employing more than one strategy; this indeed contributes to obtain enabling results and good practices. However, this inevitably bring the attention on a simple question: how? Some actions and cultural goals can be proposed to further clarify its intrinsic potentiality (Rossi, 2020; 2021).
The first action needed to generate an inclusive project is involving users into the design process. This allows designers to frame complex issues and address promising avenues for the new product development. This practice often refers to HCD, UX, and usability. However, users are not only considered as abstract subjects from which to extract design parameters; they are active generators of design insights. For example, designers consider what users need and what they are eager to use, what makes them happy, what they find useful, etc. Secondly, introducing Co-design as a strategy about designing with, not for. A design-led process that uses creative and participatory methods to design solutions with users. Consistent with the first two actions, the third action involves the application of inclusion-oriented design principles to help designers in equipping the projects with themed lists of key elements that foster flexibility, simplicity and intuitiveness, tolerance to errors; solutions are therefore containers for perceptible information and lower the physical efforts needed for their use, regardless the size.
In terms of cultural goals, it must be said that designing for all potential

2 See: Helsinki Design Lab: http://www.helsinkidesignlab.org.

users represents a crucial factor, since it entails the respect of the human diversity in all its dimensions and forms such as socioeconomic, sociological, psychological, ethnic, etc. At the design level, this refers to promote social inclusion and equality, making the fruition easy and pleasant for all possible end-users, avoiding psychological and physical stigmas, making the solutions aesthetically pleasant as well as socially, environmentally and economically sustainable, improving end-users' quality of life and including potential end-users in the design process. Designing solution for the "base of the pyramid" (BoP) the second strategic goal. BoP refers to the poorest portion of the global population living with an annual income below a certain purchasing power parity threshold (PPP). Designing solutions for the BoP requires a particular focus on developing principles, approaches and tools, as addressing specific issues that are different from those in high-income markets (i.e., energy management). By extension, if a solution can meet the needs of those that live at the margin of the society – the excluded ones – means increasing the chances to meet the needs of all potential users. Finally, it is important to design inclusive artifacts, which means designing any kind of solution that mitigate the exclusion of people from the normal life. Accordingly, a wide range of solutions can be proposed, including products, services, product-service systems, communicative artefacts, etc.

The design culture on sustainability: Eco-objects and transition solutions

Strictly connected to where and how people live, the cultural scenario of sustainability is characterized by nouns and adjectives that radically criticize the current consumption models based on uncontrolled growth. These are indeed producing environmental, economic, and social problems worldwide. This condition imposes a discontinuity to the present scenario where we live. "It's the prime function of the designer to solve problems. My own view is that this means that the designer must also be more sensitive in realizing what problems exist…" (Papanek, 1972). As designers of our future, we must consider more than one implication for our actions, and we must assume a critical position to find more than one way to promote a sustainable scenario. Designers must reflect about the impact of their actions as consumers and professionals; they must consider the impact of contemporary lifestyle providing answers on how to mitigate the negative anthropic impacts while examining more how new

services and products can generate positive effects. How to understand the impacts of products and what other meaning can be linked to the term 'impact' – to consider if it is only a negative meaning or not – and how to revert the actual scenario into something better for the future prosperity must be the main cultural trajectory for any designer today.
As intellectual output, we can introduce some essential concepts driving local and global economies, richness, wellbeing and ways of living, along with resources as systemic impacts. We must promote the concept of discontinuity with the past: since we don't live in a world with limitless resources, so we should look at an idea of development rather than growth; therefore, we must work on the idea of sustainable development (UN WCED, 1987; UN, 2017)[3]. Based on this concept, the "2030 Agenda for Sustainable Development" adopted by all United Nations Member States in 2015 provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart, the 17 Sustainable Development Goals (SDGs) (Figure 2) call for an urgent action for all developed and developing countries, in a global partnership. The SDGs recognize that ending poverty and other deprivations must go together with strategies that improve health and education, reduce inequality, and spur economic growth-all while tackling climate change and working to preserve our oceans and forests.

Fig. 2 Sustainable Development Goals (UN, 2017).

3 The SDGs build on decades of work by countries and the UN, including the UN Department of Economic and Social Affairs. See: https://sdgs.un.org/goals

It has been said that the sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (UN WCED, 1987) [4]. So, what about the Design discipline? Sustainability in Design is not just about the environment or the green colour. According to Vezzoli et al. (2018), Design for Sustainability is "a design practice, education and research that contributes to sustainable development".
The design practice considers keywords like "less", "better", "smarter", "quality", "context", as well as key questions like "who" do we design for? "what" do we design? "when" does our design matter? "how" can we design better? "where" do our products operate? and "why" do we design? The starting point is to consider four levels of innovation: (i) product innovation, (ii) product-service system (PSS) innovation, (iii) spatio-social innovation, and finally (iv) socio-technical system innovation. More than one design approach can be considered (Ceschin and Gaziulusoy, 2018).

Design for social inclusion and sustainability: A convergence for system innovation[5]

If social inclusion and sustainability are paramount today for Design studies. A convergence between these forces can be proposed to sustain an idea of integrated innovation. However, because the present societal scenario asks for sets of solutions, rather than isolated interventions, a system-oriented innovation process for social inclusion and sustainability needs to be explored. This new cultural exploration is intended to provide designers and researchers a knowledge agenda on which to set the future professional practice; thus, designers and researchers could rethink their design culture by reconsidering the notion of human diversity and social inclusion in proposing sustainable perspective to operate systemic transitions.
This can be done by evolving the perception of the design interventions through a converging lens that consider the human diversity as a positive stimulus for new proactive designs and scenarios, and the environment as

4 The UN's World Commission on Environment and Development, headed by Gro Harlem Brundtland, Prime Minister of Norway, was set up as an independent body in 1983 by the United Nations. Its brief was to re-examine the critical environment, to develop proposals to solve them, and to ensure that human progress will be sustained through development without bankrupting the resources of future generations.
5 This part is largely based on the work of Rossi (2020; 2021).

the place where inclusive effects are generated through sustainable solutions. By considering the emerging issues and interrelations with sustainability at all scales, social inclusion can act as a catalyst for intercepting relevant concepts like wealth, prosperity, human wellbeing and environmental protection (European Commission, 2010), which are today important topics useful to design long-lasting interventions (Rossi, 2020).
To do this, an inclusive design scenario and a design framework for inclusive and sustainable system innovation must be created.
The Inclusive Scenario is structured around several key components that collectively guide the design of interventions fostering social inclusion within a sustainable context.
First, the concept of "inclusive goals" encompasses a set of strategic parameters that outline the essential preconditions for any new design intervention or study focused on social inclusion. Within this framework, the notion of "long-term social innovations" is particularly significant as it emphasizes the capacity of new solutions to be innovative not only in the short term but also in the long run, impacting social dynamics positively. This innovation is crucial for ensuring that interventions remain relevant and effective over time. Additionally, the idea of "sustainable connections" plays a vital role referring to both tangible and intangible elements that establish lasting sustainable qualities in any socially inclusive environment. These connections are essential for creating spaces where individuals can thrive together. Furthermore, the "opportunities for positive change" highlight the mindset that designers and researchers must adopt. It underscores the importance of culturally aligning with the principles of social inclusion, fostering an attitude that encourages collaboration and engagement with diverse communities.
The second component, "solution's conditions and features", delves into the sustainable characteristics that new inclusive projects and studies should embody. This aspect focuses on the design-oriented conditions necessary for transforming or solidifying inclusive interventions into strategic actions that effectively link the environment, society, and economy. By establishing these conditions, designers can create a framework that supports the long-term viability of their initiatives. Within this context, the characteristics of the solutions are crucial. They include the development of "competitive business models and sustainable productions", which serve as essential requirements for implementing new inclusive interventions, whether they take the form of studies or projects. Additionally, the "quality of design processes" is a critical consideration, as it addresses the qualitative aspects of the procedures and methodologies employed by

designers and researchers. This includes approaches such as co-design and action research, which are instrumental in fostering innovation and inclusivity. Lastly, the concept of “meaningful semantics and affections” is vital, as it encourages the use of language and aesthetics that resonate with broader audiences, moving beyond traditional notions of design that cater only to specific groups.

The framework of system design for social inclusion and sustainability (Figure 3) builds upon the information provided in the inclusive scenario by introducing new parameters that facilitate the development of effective strategies (Rossi, 2020). This framework links the scenario with three strategic elements that help the understanding of the WHO, HOW, and WHERE. This further aligns with the notion of scenario discussed by Manzini et al. (2009, p.15), described as “a designable vision of complex systems based on a clear motivation – what is the goal? – and practicality – the actions required to support its implementation”.

The system design framework for social inclusion and sustainability elaborates a more evolved understanding of individuals, placing greater emphasis on their social interactions and the quality of living environments and communities (Rossi, 2020). Accordingly, the proposed solutions need to confront with this evolved idea of users.

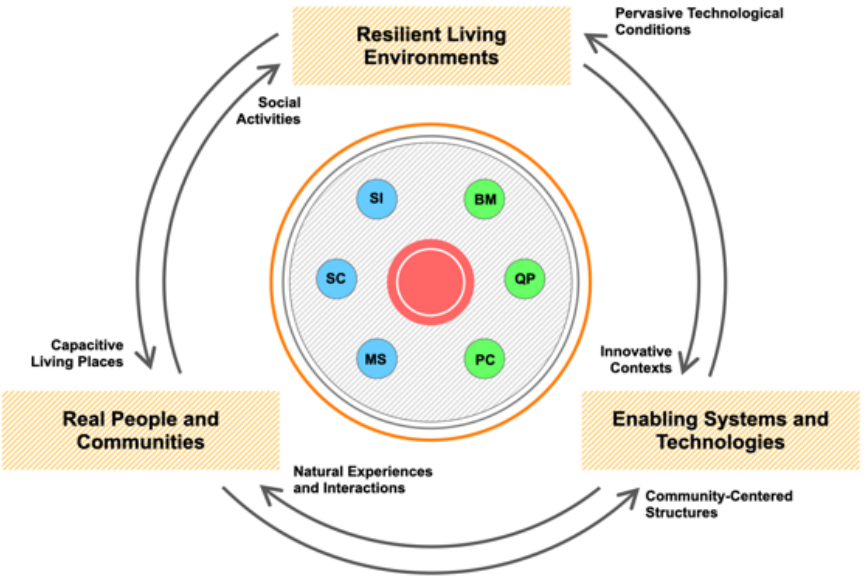

Fig. 3 System design framework for social inclusion and sustainability (Rossi, 2020).

Conclusion

Current social dynamics require holistic interpretative lenses capable to face the emerging needs of users. Therefore, designers should interpret the complexity of present and future society to propose enabling artifacts by using different design approaches that act at the intersection between social inclusion and sustainability. The attention is not on the WHAT, but on the HOW, the WHY, and the WHO. It is known that the present society requires new consumption models and innovative artefacts designed to meet the present and future needs, so that the pressing social, economic, and environmental issues can be fully met. Therefore, different design approaches promote the development of sustainable artefacts to help people to live ecologically better and longer. The design of inclusive and sustainable solutions allows to intercept the present needs and establish favourable conditions for socioeconomic and environmental prosperity.
The new ideas and visions surrounding the concepts of social inclusion and sustainability requires a structural evolution of paradigms and reference models used in the Design discipline. The proposed scenario for system innovation suggests considering artefacts as inclusive enablers to generate sustainable effects (Rossi, 2020; 2021), and this inevitably allows to overcome the traditional idea of object in favour of an improved one of solution. A system-oriented perspective has been presented as a converging approach merging holistically social inclusion and sustainability. The novelty of this new strategic vision can be found in the richness of elements composing it. This new system approach can be also used for integrating the teaching curricula, by inspiring teachers and training students in considering the complexity of society since the beginning of the design-research stages, or to improve outdated cultural and design models that limit the design creativity as well as slowing down the cultural evolution of the Design discipline (Rossi, 2020).

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Services for social inclusion and sustainability

Alessio D’Onofrio

Services for social inclusion and sustainability

Alessio D'Onofrio

Service Design has become a key strategic discipline that tackles important issues related to sustainability and social inclusion. By incorporating participatory methods, systemic thinking, and a focus on human needs, it reshapes how we define values in terms of access, fairness, and impact. By optimizing resources and embracing inclusive design, Service Design fosters social equity, lowers barriers, and improves overall well-being, providing a transformative route toward ethical and sustainable development.

Introduction

Within the modern context of growing social inequalities and pressing environmental issues, Service Design has become a strategic discipline for the development of innovative solutions promoting social inclusion and environmental sustainability. Accessible and sustainable Service Design involves making basic services accessible to everyone, regardless of age, ability, or socioeconomic condition, through the elimination of physical, digital, and cultural barriers. At the same time, environmental impacts must be minimized by optimizing energy efficiency and reducing resource waste. Based on participatory methodologies, systemic approaches, and the integration of plural multidisciplinary perspectives, today Service Design explores the intersections between social inclusion and sustainability to foster an improved collective well-being that guarantees natural resources for future generations.

The role of services

Nowadays, services belong to the foreground of our everyday life, and they have been defined as activities aimed at responding to individual or collective needs (Tassi, 2019), allowing the realization of a wide range of purposes, and creating relationships between different spheres of our life. Services are pervasive in all aspects of life, becoming a fundamental structure for our lives, a sort of "soft infrastructure of modern society" (Penin, 2018). This different conception has led to changing our vision towards a

different logic, a “service-dominant logic”, where a new way of conceiving goods and services as a single integrated solution in which the services incorporate the goods (Vargo and Lusch, 2004).

In this perspective, the modern-day economic landscape is increasingly defined by what is referred to as the “Service Revolution”, marking an era wherein the economy becomes increasingly driven by intangible inputs and service-based activities. This major change reflects profound shifts in what ways value is created and perpetuated within the world economy. The underlying factor in this transformation was, however, the integration of services around the existing products and applications, a strategic approach that is highly effective in fostering sustainable development and competitive advantage. Now widely referred to as “Servitization” (Vandermerwe and Rada, 1988), is the strategic importance of an integration of tangible goods together with supplementary value-driven intangible services, fuelled by the impact of advanced technologies like the Internet of Things (IoT), big data analytics, and Artificial Intelligence (AI), that make it possible to integrate products and services in such a way that the sharp lines that used to exist between them become blurred. This integration represents a more general transformation both in consumer expectations and business practices, where values are perceived in terms of complete solutions and not in discrete products. Beyond the private sector’s profit-driven dynamics, there is also a wider economy of considerable non-profit and public-oriented activities.

The social economy, made up of governmental bodies, non-profit organizations, and sectors in healthcare and education, has been found to be deeply involved in promoting innovation, economic growth, and jobs creation. In that respect, there has emerged the so-called “Sharing Economy” (Belk, 2014), which comes in two different forms: 1) the “peer economy”, based on principles of collaboration and direct interpersonal exchange; 2) a more commercially oriented interpretation of the sharing economy based on digital platforms (such as Uber and Airbnb), that act as intermediaries using technological structures to connect consumers with providers of services. Therefore, the Service Revolution not only transforms the economic landscape but also challenges the prevailing models of value creation, exchange, and consumption (Figure 1). It continues to shape a dynamic and complex economic future through the integration with new technological tools and acceptance of different models of economic involvement the produce impacts at different levels.

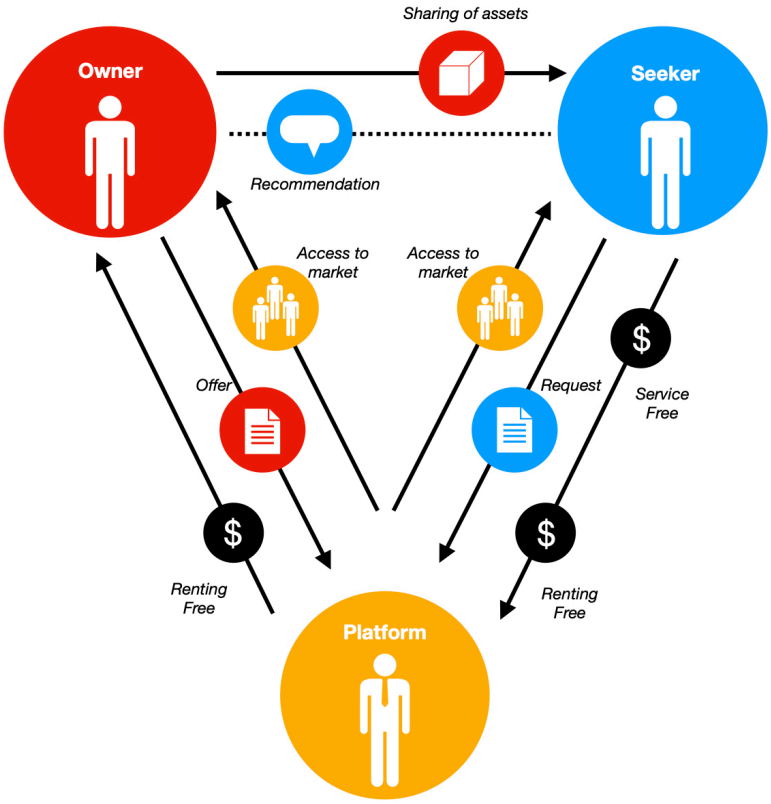

Fig. 1 Model of sharing economy (D'Onofrio).

Services for sustainability

The quest for sustainable development represents a critical juncture in the progress of the economy and society, driven by the recognition of the limits of a model reliant on non-renewable resources and environmental degradation. Designing services is one of the important approaches that offer effective and user-centered solutions to contemporary challenges. Its importance in the ecological transition became clear when it was realized that it wasn't enough to improve or create sustainable products, but that a broader approach was needed, one that integrates the design of services, systems design, and social innovation.

Since the 1980s, there has been a significant shift in design approaches aimed at mitigating environmental impact. Initially, efforts centred on

individual product improvements like reducing material usage or facilitating product disassembly. Over time, however, this focus expanded to encompass the entire product lifecycle. This broader approach, known as Life Cycle Design (LCD) considers every stage of a product's existence, from resource extraction to end-of-life disposal, within a holistic framework. By the 1990s, attention had shifted from individual products to a systemic approach. Design for Sustainability began to consider the entire ecosystem in which a product or service operates, integrating social, economic, and environmental aspects, while embracing ethical labour practices and the living conditions of individuals involved in production processes. This new socio-cultural dimension positions the designer as a link between the world of production, the users, and the social environment in which these processes take place, ultimately empowering users to adopt alternative and more sustainable lifestyles (Vezzoli et al., 2018).

Together with Life Cycle Design, another prominent approach has emerged in recent years to further this agenda: Product-Service System (PSS), a systems-oriented perspective that integrates products, services, and the necessary infrastructure to deliver a cohesive solution to customer needs. This approach emphasizes the design of innovative interactions among stakeholders directly and indirectly involved in the satisfaction system. By prioritizing environmentally and socio-ethically beneficial solutions, PSS goes beyond traditional manufacturing models, where companies primarily sell products. Instead, PSS combines products and services to achieve enhanced competitiveness, attract and retain customers, and meet environmental and social goals (Vezzoli and Manzini, 2008).

A defining feature of PSS is its shift from ownership-based models to access-based ones. This transition is reflected in three primary classifications of PSS (Figure 2): 1) Product-oriented PSS where companies sell a product but provide additional services, such as maintenance, repair, etc.; 2) Use-oriented PSS, where companies retain ownership of the product and offer its use or availability to customers through models such as leasing or sharing; 3) Result-oriented PSS, where companies sell the outcome or capability provided by a product, rather than the product itself.

At its core, PSS design represents a paradigm shift in how companies deliver value to customers, focusing on the integration of products and services into cohesive, customer-centric offerings. It puts emphasis on understanding customer needs, fostering value co-creation, and tailoring solutions through customization. A lifecycle perspective ensures sustainability and efficiency at all stages of a product's existence. Risk-sharing models align provider and customer interests, while service innovation and collabora-

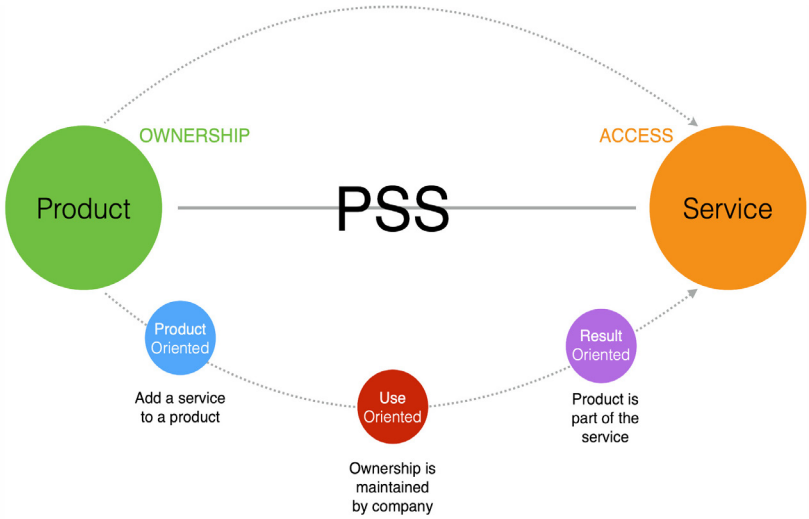

Fig. 2 Features of sustainable PSSs (D'Onofrio).

tive ecosystems enhance offerings and generate new opportunities and feedback-driven continuous improvement ensures competitiveness and relevance. PSS design addresses environmental and social challenges, redefining business practice in the modern age and creating comprehensive and sustainable value.

Services for social inclusion

Service Design has increasingly assumed a pivotal role in promoting social inclusion, addressing key challenges in access and equity within modern societies. It enables channels for access to services and products in a more accessible way, challenging economic and logistic barriers that prevent marginalized populations from participating due to their enhanced accessibility. Using methodologies such as co-design, design thinking and human-centred design approaches and involving users in the earliest stages of development, ensure that services are user-friendly, accessible, and tailored to real needs, showcasing the responsibility of designers to help bring about social change and address complex human problems.
The history of Service Design has been influenced by socially conscious manifestos like First Things First (Garland, 1964; Lasn, 1999), which shifted the focus on concerns related to accessibility and social equity. This

change led to the development of ideas such as “social design” with its offshoots, including “social impact design” and “design for social innovation” (Resnick, 2019). These models point toward Service Design as an important tool in achieving ethical, sustainable, and inclusive goals. Moreover, new research fields like Transformative Service Research (TSR) have emphasized the role of services in improving the quality of life for people and communities (Rosenbaum et al., 2011).

Service Design is critical to creating inclusive infrastructures meeting the needs of vulnerable populations and involves marginalized communities at all stages of the process. This methodology does not only clear the barriers from access but also gives users’ lived experiences top priority and thus ensures that services genuinely answer the requirements of the users. The inherently inclusive character of social design enhances the social impact by harmonizing services with moral obligations around equity and accessibility. For example, as society goes further into digitalization, Service Design needs to consider the different abilities of users, including older people and those with limited digital literacy. Practices such as universal accessibility and assistive tools demonstrate ethical commitment to ensuring that such basic services reach all.

In the public sector, Service Design plays a crucial role in promoting social equity by tackling economic disparities and ensuring that everyone has equal access to healthcare, education, transportation, and welfare, which are often only available to privileged groups. It works to redistribute resources through inclusive practices, helping to reduce inequalities and making public services available to everyone. By acting as a catalyst in the social and solidarity economy, it encourages sustainable and collaborative solutions within local communities. By focusing on human-centred and participatory approaches, Service Design considers the diverse needs of users, creating meaningful experiences that reflect societal norms while addressing both individual and collective challenges. These approaches not only enhance user satisfaction and the longevity of solutions but also foster trust between institutions and communities, ensuring that outcomes genuinely meet real needs rather than relying on abstract assumptions.

Inclusive Service Design is based on principles that promote equitable opportunities for all stakeholders in the service ecosystem (Fisk et al., 2018) (Figure 3). In a nutshell, Service Design provides both accessible and sustainable solutions while promoting at the same time a more equitable and inclusive society, thus strengthening its function as both a moral and strategic instrument for tackling modern challenges.

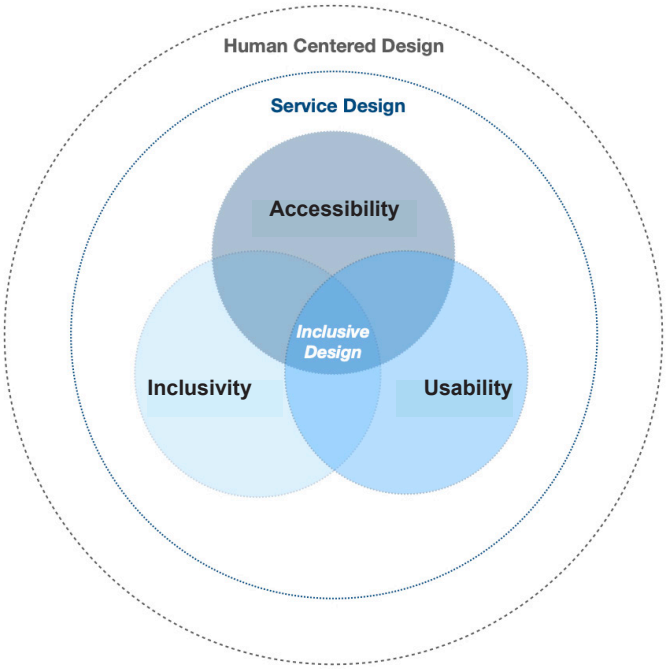

Fig. 3 Structure of an inclusive service (D'Onofrio).

Conclusion

In conclusion, services and Service Design are important means for overcoming challenges such as sustainability and social inclusion. They combine participatory methodologies with systemic approaches to user-centred, ethically suitable designs for the needs of society. It opens ways of redefining value creation in terms of access, equity, and impact through Service Design because, most importantly, it provides a means of overcoming barriers while optimizing and promoting inclusion. Not only transforming the services into instruments of the collective welfare, but also, this strategic discipline promises to be a cornerstone for ethical and sustainable development in a complex and changing world.

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Enabling artefacts for inclusion and sustainability

Sarah Jane Cipressi

Enabling artefacts for inclusion and sustainability

Sarah Jane Cipressi

Enabling artefacts are mixes of products and services designed to empower individuals by making everyday tasks accessible to all, regardless of physical, cognitive, or sensory abilities. These artefacts foster independence, social equity, and sustainability through long-term usability and reduced waste. Inclusive design, with user participation at its core of the generation of synergies between tangible outcomes (products) and intangible architectures (services), to ensure that these can meet real needs. By merging inclusivity and sustainability, these designs help create a more equitable, resilient, and environmentally conscious future and introduce innovative perspectives for designers to act systemically.

Introduction

Nowadays, discussing sustainability necessarily involves considering inclusion, especially in design projects. Creating something inclusive also means ensuring sustainability. These two concepts, often mistakenly regarded as separate, are, in fact, deeply interconnected. Sustainability must encompass social, economic, and environmental dimensions (Corsini; Moultrie, 2021). Consequently, inclusivity, related to the well-being and prosperity of current and future societies (Pocock, J. et al, 2016), cannot be separated from the concept of sustainability. An inclusive process is naturally sustainable as it focuses on designing artefacts, tools, and services that address the real needs of people, avoiding the production of excessive or marginal items. In fact, from the point of view of sustainability, it is necessary to reduce waste and the placing on the market of goods that are not strictly necessary, thereby reducing the impact on production. Additionally, by integrating inclusive design practices, we foster a culture of long-term usability. This contrasts with the typical cycle of planned obsolescence, where products are designed to last for a short time, forcing frequent replacements and, consequently, greater environmental damage. An inclusive approach, on the other hand, pushes designers to think beyond immediate consumer trends, focusing instead on the creation of durable, flexible, and adaptable products that can evolve with the user's needs over time (Holmes, 2018). This process also encourages community involvement in design and production, making it sustainable from a soci-

etal perspective. The growing focus on social inclusion, alongside social and environmental sustainability, is leading to a paradigm shift within design culture. A new vision is needed in a context of constant change and increasingly pressing social and environmental crises. Designers the have a responsibility to make a meaningful contribution, addressing not only aesthetic or functional concerns but also the societal impacts of our work. In this way, they are called to tackle new challenges related to social, economic, and climate changes. Initiatives like those in Europe increasingly encourage new generations of researchers and designers to find innovative solutions to address these urgent issues, intending to create a better world for future generations. For instance, the UN's Sustainable Development Goals and Horizon Europe's work program both emphasise the importance of addressing inequalities and climate change through design and research, pushing for solutions that are forward-thinking and beneficial on a global scale. These programs, while promoting technological innovation, also stress the need for inclusivity and sustainability, highlighting how these concepts can no longer be considered an afterthought in sustainable design, but rather essential components of it.

Enabling artefacts: A conceptual framework

Sustainability and social inclusion have become key terms for the future, and good design must address them. Adopting methodologies and tools of inclusive design means creating artefacts made for people, enabling them to perform tasks effectively. As stated by the Design Council (2008), "inclusive design represents an approach where designers try to create products and services that meet the needs of the widest possible audience, regardless of age or ability"[1].

Inclusive design aims to integrate the needs, expectations, and desires of individuals with reduced abilities – motor, perceptual, or cognitive – into the design process. These needs are not extraordinary but are often shared by people of different ages, health conditions, economic status, and cultural backgrounds, whether their abilities are reduced temporarily or permanently. In this context, the concepts of accessibility and usability become fundamental. Instead of rigidly assessing "levels of ability" or "disability", which often fails to capture the complexity of the human condition, the design adopts a method based on the shared needs and expectations of

1 See: www.designcouncil.info/inclusivedesignresource.

individuals across various ages, autonomy levels, and health statuses (Tosi et al., 2019). This approach adapts to everyone throughout different life stages. For example, an inclusive design might create products that cater equally well to an elderly person with reduced motor skills and a young adult without any perceived impairments. This universal approach to usability benefits all users, making the design process more effective and holistic. Operationally, this means shifting from designing "for disabled people", "for the elderly", or "for the visually impaired" to a design that enhances complete usability and handling, simplifies instructions, and improves the visibility and legibility of components, texts, symbols, and icons (Tosi et al., 2019). The central aspect here is recognising that the needs and expectations of people with reduced abilities are a normal part of the design background.

By integrating these needs early in the design process, it ensures that the final products are more accessible to a larger part of the population, without the need for post-production adaptations or specialised versions. Creating everyday products that are fully usable, safe, and enjoyable for everyone does not merely involve adapting solutions designed for optimal abilities for those with reduced capabilities. Instead, it requires restructuring the design process – starting from the highest levels of needs and broadest expectations down to the lowest levels of ability – to create products that are enjoyable and easy to use for everyone. This means designing more consciously and purposefully, in a more sustainable way, improving both product quality and the overall user experience. Furthermore, this method reduces the necessity for separate solutions aimed at specific demographics, thus reducing waste and duplication in production.

The co-participation (re: co-design) of users and their involvement in the design process is certainly a good practice for social sustainability. In line with this vision, the Human-Centred Design (HCD) philosophy plays a crucial role. User engagement is central to this process. Understanding users' needs, desires, and limitations through empathy ensures that products, services, or systems are designed to be truly useful and accessible (Tosi, 2020). Empathy is the key to creating designs that resonate with people on a personal level, going beyond superficial adaptations and creating solutions that improve the quality of life for users. A direct interaction with real users is essential for creating meaningful and inclusive solutions. This interaction leads to a co-design process where users, as experts in their own experiences, guide the design, resulting in more effective and tailored solutions. Such collaboration also fosters a sense of ownership among users, ensuring that the final products are not only functional but also emo-

tionally resonant with the people they are designed for (Rizzo, 2009). This highlights the importance of adopting an inclusive and sustainable design approach. Only by following this path can we design services and systems that enable everyone to participate fully in everyday activities.
This is why these designs are often referred to as "enabling artefacts" – they do not just meet practical needs but also empower individuals to engage with their environments more fully and independently. Accordingly, the idea of artifact extends the conceptual model usually assigned a design intervention, shifting the attention from the object to the expected impact that it can produce. On this matter, it is important to note that this intriguing concept unleash creative developments in the design practice, making the boundary of the discipline more permeable to interdisciplinary and intercalary contaminations, such as the Service Design. Indeed, enabling artefacts are here proposed as the translation of a product-service system (PSS) into the disciplinary dimension of social inclusion: combination of tangibility with intangibility, namely products and services.
In this perspective, designing an enabling artefact means creating something that not only meets the user's real needs, allowing them to act independently and efficiently but also serves as an educational tool. It also refers to the creation of dialogical physical interfaces allowing users to benefit of functional architectures, both sustainable and inclusive. These artefacts encourage society to rethink daily life, prioritise collective needs over individual ones, and reduce waste by making more mindful purchasing decisions. In this sense, inclusive design acts as a form of activism, challenging the status quo and promoting broader societal shifts toward sustainability. These values stand in contrast to our throwaway culture, which is a culture of temporary gratification through cheaply made, limited-use products that are discarded without thought. But these outdated values cannot endure, and the challenges that we face every day require thoughtful planning and smart solutions to address current and future needs.

Enabling artefacts: Examples

Inclusive and sustainable designs range from fashion to urban design, packaging to communication. Technology is indispensable in creating an accessible, inclusive, and sustainable world. New digital tools are crucial for developing and producing these products and to connect them to the multitude of services that exist today. For instance, 3D printers allow for the easy production of items that previously required more steps or spe-

cialized skills, and even enables self-production using sustainable or recycled materials. Examples include Microsoft's adaptive accessories and Ikea's ThisAbles project. Microsoft's adaptive accessories (Figure 1) offer a flexible, user-friendly system designed in collaboration with the disability community to empower individuals who struggle with traditional mouse and keyboard setups. These accessories enhance productivity by allowing users to customise their devices, creating a tailored setup that meets their needs. With three main components, the system allows users to configure, 3D print, and personalise their mouse, keyboard inputs, and shortcuts. As described, the tangible product is the physical interface through which users can obtain a set of results provided by intelligent architectures; therefore, it can be affirmed that enabling artefacts are inclusive product-service systems (I.PSSs). Specifically, the physical product is supported by an intangible service that makes all users capable to obtain a kind of results regardless their psychophysical condition (re: (dis)ability). Finally, it is intrinsically connected to sustainability in the way interfaces are manufactured and the use of eco-design requirements (i.e. dematerialization of components and functions).

Fig. 1 Microsoft's adaptive accessories (source Microsoft Adaprive Accessories, 2022).

On the other hand, Ikea's ThisAbles initiative (Figure 2), created in partnership with non-profits Milbat and Access Israel, consists of 13 designs that can be downloaded and 3D-printed at home or in local production spaces. These designs make Ikea furniture more accessible for people with physical disabilities, with components like larger light switches, easy-grip handles, and couch leg extenders that adapt existing furniture to the needs of disabled individuals. These projects underscore the importance of user involvement in the creative process. This example is emblematic because it is a service-based application that is implemented through tangible workstations. Echoing the concept of I.PSS, ThisAbles is an inclsuive service-based infrastructure born to produce sustainable outcomes.

Fig. 2 Ikea's ThisAbles: 3D Printer (source: Um, 2019).

Another standout project is Eone's inclusive watch (Figure 3), initially developed for people with visual impairments but usable by everyone. This watch can be read by touch during moments when sight is hindered, such as in dark environments, empowering anyone to access time.
The concept of I.PSS is here more oriented on the tangible side of the design intervention.

Fig. 3 Eone inclusive watch (source Cakeordeath (via Flickr - license CC BY-NC 2.0): https://www.flickr.com/photos/cakeordeath/42558517190/).

Conversely, Grace[2] is a series of universal add-ons that can be used to make beauty products more accessible and inclusive, designed by Frolic Studio. Grace focuses on something as small as the application of mascara, enabling someone to perform a simple, confidence-building task can elevate the quality of life. The project provides in three different types of grip add-ons to the standard mascara applicators and can be reused with every new mascara. Each grip is designed to support the physical needs of the individual. Co-design process is at the basis of this project: designers worked closely with people with arthritis, tremors, cerebral palsy, and var-

2 See Frolic Studio: https://www.frolicstudio.com/portfolio/grace-disability-friendly-makeup

ious dexterity challenges, which provided invaluable insights to address the ergonomics, material choices, and aesthetic decisions.
Additionally, Italy boasts high-quality, barrier-free designs that integrate social inclusion and sustainability, emphasizing both the materials used and their applications. An excellent example is the "Da Cosa Nasce Cosa" project, led by designer Elisabetta Bianchessi's T12 lab[3]. This initiative merges inclusive, ecological, and relational design with the circular economy, using industrial production waste to create objects. The project includes a training course accessible to both deaf and hearing individuals, promoting social resilience through the co-design and production of objects while breaking communication barriers. Alongside the physical dimension of the design, the idea of learning process behing the project is supported by an informed service that provides consistent messages so that knowledge is instilled into users, which are not passive actors (people getting information), but active players (agents for the change) that are in charge to implement the project's message over time. The I.PSS concept is here provided and defined as a goal-oriented learning process mediated by a product and a service architecture.

Conclusion

Enabling artefacts represents a crucial element and an emerging paradigm for achieving inclusive and sustainable design. These objects are not merely tools but become means of empowerment, allowing individuals to fully engage with their environment, regardless of physical, cognitive, or sensory limitations. The concept of enabling artefact is linked to the one inclusive product-service system (I.PSS) in the way that both inclusive and sustainable qualities are balanced within multi-scalar interventions that act at both tangible and intangible scales, namely at the product and service design levels of intervention.
By prioritising usability, these artefacts facilitate independence, providing users with greater autonomy in their daily activities. Beyond meeting immediate practical needs, enabling artefacts play a broader social role: they promote equity by ensuring that everyone, regardless of ability, has equal access to resources and opportunities. From a social perspective, enabling artefacts helps create a more inclusive environment by allowing accessibility.

3 See T12 lab: https://www.t12-lab.it/da-cosa-nasce-cosa/

Technological advaces are also promoted by establishing clear research and development forces needed to connect products to services, and vice versa. These artefacts challenge the preconceived notions of "normal" products and establish new design standards where inclusivity is a fundamental principle. In doing so, they contribute to social change, fostering more welcoming, accessible, and equitable communities. At the same time, enabling artefacts are inherently sustainable. Their design often combines multifunctionality and long-lasting, reducing the need for frequent replacements and single-use products. Besides, the combination of products and services foster a modulation in the levels of intervention, giving designer, users, and market stakeholders the opportunity to tailor the different efforts needed in making effective solutions. This indeed minimizes waste and encourages more mindful consumption patterns. By addressing the needs of a wide range of users from the outset, designers avoid the need for additional products or post-production adaptations, thereby reducing material and environmental costs.

In conclusion, enabling artefacts are catalysts for change that operate at both product and service design scales. Therefore, they contribute to both in how we design and in how we live. To face the pressing global challenges, such as population ageing and environmental crises, sustainability and inclusion become increasingly crucial. They represent a future where the Design discipline is not just meant as a means to solve problems, but an enabler useful to create new opportunities.

Through the innovative convergence between inclusive and sustainable design, we can move away from a culture of exclusivity and waste to embrace one that values diversity and responsibility. In doing so, we not only meet the needs of the present but also pave the way for a more equitable, resilient, and sustainable future.

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From prototypes to end user products through additive manufacturing

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From prototypes to end user products through additive manufacturing

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This paper challenges the notion that Additive Manufacturing (AM) is limited to prototyping by demonstrating its significant role in final product development. Through its ability to create complex geometries, optimize material usage, and consolidate parts, AM has evolved into an effective strategy for producing functional end-use products. The incorporation of Design for Additive Manufacturing (DfAM) principles enables designers to fully exploit AM's capabilities, resulting in upgraded performance and reduced production time. Moreover, the integration of AM with conventional techniques, such as overmoulding in hybrid products, showcases its potential to provide customizable and multi-manufacturing solutions. Two case studies are presented to support these potentialities. The first case study examines the integration of Fused Deposition Modelling (FDM) with injection moulding, while the second one utilizes parametric design principles for the programming and production of a bench using large-scale robotic extrusion. The results demonstrate the potential of AM as a strategic manufacturing solution, illustrating its applicability across different sectors and the possibility of transitioning from a prototyping tool to a strategic manufacturing solution.

Introduction

Additive Manufacturing (AM), as defined by ISO/ASTM 52900:2021, refers to the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive manufacturing methodologies. This technological evolution has significantly influenced product design and development, offering advantages such as design versatility, geometric freedom, and part consolidation, along with the ability to integrate multiple materials and optimize product topology. Though initially perceived as suitable mainly for prototyping, AM has evolved to create functional final products. Developing new products through AM is becoming an imperative in today's industry, mainly because AM technology enables the production of products in just one step (Sampaio et al., 2020).
AM technology encompasses seven distinct processes, each offering advantages based on the material and design requirements. These processes enable the rapid development of complex geometries and customized designs. One of the key innovations is the ability to test form, fit, and function

at an early design stage, allowing for better product validation. As a result, AM is not only improving efficiency but also increasing user involvement and providing an opportunity for a hands-on user experience.

Moreover, AM technology allows for promoting accessibility and inclusivity (Rossi, 2023; Sampaio et al., 2023a), since it enables (i) the creation of custom products tailored to individual needs, (ii) augments the production of niche products for small and diverse populations, since it is economically feasible to produce low volumes, (iii) creates access for individuals and communities that were previously excluded from traditional manufacturing process to participate in the design and creation of products, (iv) supporting, at the same time, local production and, production for geographically isolated communities. Decentralizing the manufacturing process promotes also sustainability by reducing the need for long-distance transportation of goods. This reduces carbon emissions associated with global supply chains and logistics. Additionally, AM has other advantages in terms of sustainability (Mehrpouva et al., 2021; Agrawal, R., 2022) since it (i) reduces waste material, because unlike traditional subtractive manufacturing, which cuts away material, AM builds products layer by layer, using only the material required, (ii) enables the design of lightweight yet strong structures, which is particularly useful for industries like aerospace and automotive. By offering customization, efficient resource usage, and localized production, additive manufacturing aligns with the goals of social inclusion and sustainability, fostering a more accessible and environmentally responsible design approach.

Therefore, AM has the potential for producing functional end-use products, moving beyond prototyping. To support this, two different design strategies are nowadays implemented. A comparation of the two approaches in the AM process is represented in Figure 1, from scratch and optimizing existing designs. In the first approach, the entire workflow, from defining specifications to post-processing, is tailored to AM, allowing early integration of design, material, and manufacturing considerations. This results in reduced time, material waste, and operations, as the product is optimized for AM from the start.

On the other hand, the optimization approach focuses on refining existing designs. It typically requires more time and resources due to the limitations of pre-existing designs. This process is called as Adaptive for Additive Manufacturing (AfAM), which consists of rethinking, redesigning, and refining an existing design, using AM to improve product functions. In summary, designing from scratch maximizes AM efficiency, while optimization requires additional time and resources. This process highlights the

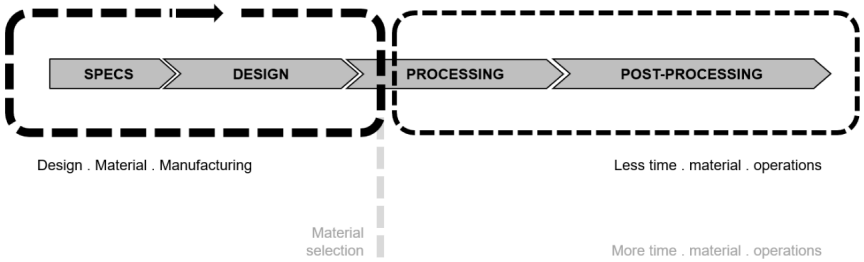

Fig. 1 Additive Manufacturing process: From Scratch versus Optimizing.

importance of Design for Additive Manufacturing (DfAM) in achieving maximum-effect in terms of time, material efficiency, manufacturing complexity, and sustainability, which contrasts the ability to have final products or just prototypes.

Design for Additive Manufacturing

Design for Additive Manufacturing (DfAM) focuses on maximizing the potential of AM technologies. It is a symbiosis between manufacturing, design, and material fields. By rethinking product design to leverage the geometric flexibility of AM, designers can optimize weight reduction, performance improvement, and cost efficiency. DfAM introduces design techniques such as generative design, topology optimization, and lattice structures. Studies suggest that generative design is effective in product development, allowing for the exploration of creative alternatives, the customization of designs and the integration of advanced manufacturing processes (Alcaide-Marzal et al., 2020; Khan and Awan, 2018). These approaches allow for part consolidation, eliminating the need for assembly by creating components as a single unit (Sampaio et al., 2023b). Also, the aim of DfAM is to help designers to adapt more easily to AM and fully exploit its possibilities (Djokikj and Kandikjan, 2020), which introduces the concept of parametric design.

When designing for AM, considerations include: (i) understanding the manufacturing process; (ii) part and build orientation; (iii) minimize post-processing operations (e.g. support material). Large masses of material should be avoided, which can lead to residual stresses and increase cost, optimize transitions (fillets reduce the weakness of the part and smooth transitions between surfaces). Furthermore, design for part consolidation, which con-

sists of converting an assembly of many smaller parts into one, is important, as well as file resolution for 3D models, which must be managed to ensure accurate and high-quality output.
AM also offers the ability to create hybrid products, where multiple manufacturing techniques and materials could be combined to achieve unique functionalities. These products are defined as a product resultant from the combination of distinct manufacturing processes, composed by two or more materials, or by integrating inserts. The method of incorporating outside components into an AM process is covered by this notion (Sampaio et al., 2020). To showcase AM's effectiveness for final products across different applications two case studies are presented with two different outcomes in terms of scale and use.

Case study 1: Hybrid products

The potential of hybrid manufacturing has been demonstrated extensively in the literature. Several studies have explored the integration of additive and subtractive processes to overcome the limitations of each method when used independently (Gong et al., 2022; Sebbe et al., 2022). Furthermore, research has also addressed the challenges and opportunities associated with the industrial adoption of hybrid manufacturing technologies (Dilberoglu et al., 2021; Sampaio et al., 2022; Kumari et al., 2023). The economic and production efficiency benefits of hybrid manufacturing are also noteworthy (Manogharan et al., 2016). The ability to combine different materials and integrate diverse processing techniques has expanded the potential for producing hybrid composites with enhanced properties (Nyamuchiwa et al., 2023; Pawlowski et al., 2017). Moreover, the mechanical performance of components produced through hybrid manufacturing can be significantly improved compared to those produced by AM alone. For instance, Silva et al., (2022) presented an example where hybrid manufacturing can be a profitable solution to repair damaged parts.
One method for manufacturing hybrid products involves embedding external systems, such as sensors or metallic elements, into the design during the AM process. The process of embedding external components in an AM build process involves: (i) designing a part with a specifically designed cavity to accept the external component; (ii) pausing the print in the "middle" of manufacturing process; (iii) inserting the external component into the designed cavity, and (iv) restarting the manufacturing over the inserted component (Figure 2).

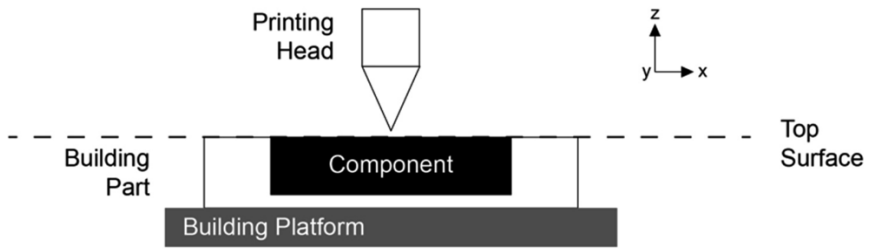

Fig. 2 Embedded process for AM (Sampaio et al., 2020).

An example of this hybrid manufacturing method is presented in Figure 3; a stool that combines 3D-printed components with wooden elements. The design includes cavities within the printed frame to house the wooden legs and top. The printing process is paused to insert the wooden parts, then resumed to secure them in place.

Fig. 3 An illustration of a hybrid stool produced using FDM technology and combined with wood, following the described methodology (Courtesy of DONE Lab - Advanced Manufacturing of Products and Tools, Guimarães, Portugal).

Another approach for the manufacturing of hybrid products consists of combining AM technologies with conventional injection moulding, by means of an overmoulding step, which allows for the customization of products while reducing lead times and the need for complex tooling. This manufacturing strategy brings new benefits to product fabrication and customization related to, for example, design possibilities, material combinations, embedded functionality, and so on.
A case study (Miranda, 2019) on a hybrid cup design was defined, based in an existing mould tool, through the combination of Fused Deposition Modelling (FDM) and injection moulding to create a functional, multi-material product (Figure 4). Defined building materials were ASA™ for the FDM

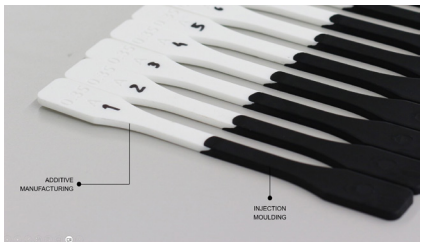

Fig. 4 Specimens produced for test analysis (left); Cup produced by FDM with ASATM overmoulded with PP (right) (Courtesy of DONE Lab - Advanced Manufacturing of Products and Tools, Guimarães, Portugal).

process and two commercial materials, ABS and PP for the overmoulding of the insert part. First, three main aspects were analysed for the insert part: (i) gap between 0 and 0.50mm below nominal dimension; (ii) compatibility with the injection moulding materials; (iii) temperature. Overmoulding tests for analysis of defects (e.g. flash, deformation of the insert part) were performed. Several joint designs were defined to improve adherence between materials. The joints aim to improve adhesion strength by increasing the contact area. Various insert parts with variable configurations and joint designs were produced and overmoulded successfully, allowing to obtain hybrid products with quality.

Through detailed analysis of gaps, material compatibility, and joint design, the study demonstrated how overmoulding can produce high-quality hybrid products, offering a blend of design flexibility and dimensional precision. This approach reduces time and cost while improving product performance and customization possibilities. Building on this hybrid method, the approach has been successfully applied to the development of functional and personalized hybrid products in various fields. An example of a coffee cup is presented on Figure 5, to illustrate the method's adaptability and its practical implementation in real-world scenarios.

Fig. 5 Coffee cup produced by means of an overmoulding step (Courtesy of DONE Lab - Advanced Manufacturing of Products and Tools, Guimarães, Portugal).

Case study 2: Parametric design

The second case study examines the design and manufacture of a public bench using parametric design principles. Parametric design is a method that uses algorithmic thinking to set parameters and define rules, which,

in turn, generate complex geometries and shapes. Figure 6 (left) illustrates an application of this approach, where a series of sectional profiles evolve along a controlled surface, resulting in a smooth, continuous form.
In this example, the parametric model allows for the generation of different cross-sectional profiles along a defined path. The profiles are connected to form a surface, and the varying sections can be easily edited to adapt to different requirements, such as structural performance, ergonomics, or aesthetic preferences (Figure 6, right).

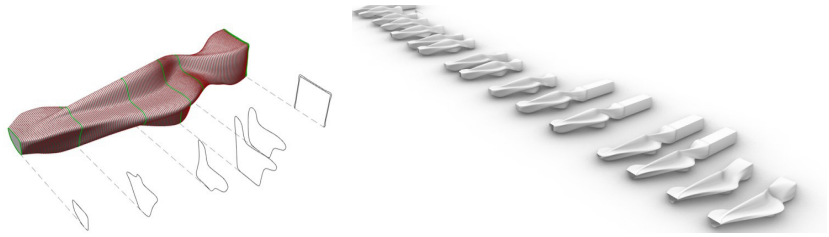

Fig. 6 Parametric design used for surface generation (Left); Exploration of different designs by means of parametric design (Right) (Courtesy of DONE Lab - Advanced Manufacturing of Products and Tools, Guimarães, Portugal).

By modifying the input parameters (such as curve dimensions, spacing, or control points), a range of outputs can be achieved without manually redrawing each profile. This bench was produced using large-scale robotic extrusion, a type of AM process that allows for the fabrication of oversized components, represented in Figure 7.
To overcome limitations regarding production, Parametric Modelling was also used to programme the robot. The robotic system follows toolpaths generated from the parametric model to extrude material layer by layer, forming the complex shape seen in the figure.
The integration of parametric design techniques with AM, particularly large-scale robotic extrusion, unlocks new possibilities in product development. This method allows to produce large, freeform structures with high accuracy and minimal material waste. AM technologies also enable the fabrication of these complex geometries with precision, pushing the boundaries of what can be produced using conventional manufacturing methods. This method of design ensures flexibility and optimization, allowing designers to rapidly explore multiple configurations. In summary, parametric design, in particular in this case-study, when combined with large-scale robotic extrusion, improve design flexibility and material efficiency.

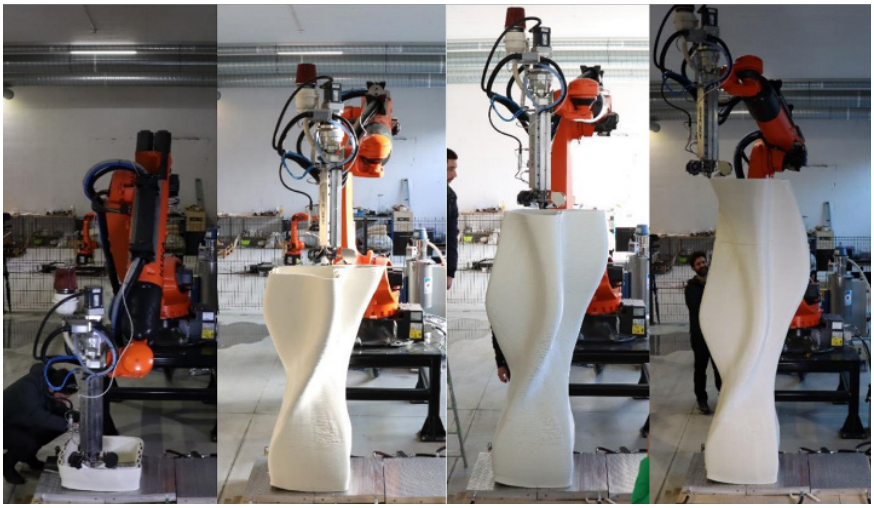

Fig. 7 Different production stages of the developed bench (Santos et al., 2024).

Conclusion

This work has demonstrated the capacity of AM to support product design beyond its initial perception as only a tool for prototyping. By integrating DfAM principles, AM can allow designers to take advantage of its unique capabilities such as geometric freedom, part consolidation and material optimisation. The two case studies presented, illustrate the use of AM in the creation of functional end-use products. These examples illustrate how AM, when combined with conventional techniques or parametric design strategies, can overcome traditional manufacturing limitations, offer improved customisation, reduce production times and offer new possibilities for social inclusion, accessibility and sustainability. Overall, this work highlights the importance of AM for future product innovation across multiple industries, establishing its relevance beyond prototyping and into mainstream manufacturing.

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Product and process personalisation for social inclusion and sustainability

Lara Pulcina

Product and process personalisation for social inclusion and sustainability

Lara Pulcina

The increasing attention on social inclusion and sustainability is profoundly shaping the design and production processes of goods and services. Personalizing products and processes is crucial for creating artefacts that are accessible, equitable, and environmentally friendly. This essay explores the pivotal role of personalization in creating enabling artefacts that promote social inclusion and sustainability, and analyses how production processes can be adapted to meet these needs.

Introduction

The consolidation of the role of design over time has produced an original and tangible contribution to the development of industries and local production systems, as well as to the important environmental and social issues that characterise our era (Marano, 2017). In the current global landscape, the increasing prominence of climate change and social inequalities have led to a growing emphasis on adapting products and production processes to humans. This adaptation is a proactive response to social inclusion and environmental sustainability challenges. Within this area of innovation, product personalisation[1] has emerged as a strategic attitude to address these challenges, enabling the meeting of consumers' needs while minimising environmental impact. There is a growing awareness among businesses, professionals, and consumers on the importance of adopting responsible practices that can enhance well-being holistically. A closer look at emerging technologies and innovative production methods reveals the potential for a development model that seamlessly integrates social and environmental considerations, transforming how products are designed and manufactured. Personalisation is a promising solution for

1 Both personalization and customization involve tailoring experiences or products to individuals' preferences, yet diverging in their methods and control mechanisms. Customisation denotes alterations or adaptations directly initiated by users to align with their needs or preferences. Conversely, personalisation constitutes a more intricate process that incorporates customer or potential customer behavior to effectively market suitable products to the right individual at the right time. By leveraging big data and robust algorithms, personalization is increasingly emerging as a potent tool, embraced by various companies with notable success.

creating enabling goods that can improve access to services for people with different abilities and needs while promoting more environmentally conscious production techniques. It is a powerful driving force for change, capable of harmonising economic, social, and environmental aspects to pursue sustainable developments. Personalisation is no longer just a differentiator or a method for increasing sales.

Personalisation and the issue of social inclusion

Social inclusion is a fundamental concept in contemporary development policies. It relates to the creation of environments and opportunities that facilitate full participation in social, economic, and political life for all individuals. From an economic perspective, this entails ensuring equal access to goods and services for people of all genders, ethnicities, ages, abilities, and socio-economic backgrounds. Therefore, it is essential to adapt products to meet the specific needs of individuals or groups who may otherwise face exclusion due to various barriers. Over time, the field of design has shifted from pure aesthetics to prioritising human values (Friedman and Kahn, 2007); this addresses ethical and environmental concerns. Various design approaches now stress the concept of considering more people to design for and their qualities to be translated into design practices. Thus, the Human Factors approach has evolved from the earlier concept of Ergonomics, a term coined by British psychologist Kenneth Frank Hywel Murrell. Since the mid-20th century, ergonomics has developed as a multidisciplinary set of concepts. As society has evolved, design solutions and innovative proposals have been developed to promote the well-being of individuals (Di Bucchianico, 2017). In the 1980s in San Diego, Don Norman drew attention to an aspect that had not yet been sufficiently explored: the psychological component of the human being. People[2] began to talk about user-centred system design (Norman and Draper, 1986), and then User Centred Design (UCD) was introduced. “Why do we need to know

2 In September 2023, the Deontological Code of Italian Psychologists decided to discontinue the use of the term “user”, which had been deemed inappropriate by many. The New Dictionary of Social Services provides a detailed explanation of the term, noting that it often refers to “a person who, despite having rights and legitimacy to make requests, lacks the possibility of choosing the interlocutor” (Campanini, 2013). The replacement of the term “user” with “person” emphasizes the “relational” and “social” dimensions of human beings, highlighting not only their autonomy, consciousness, and active role, but also the centrality of human relationships.

about the human mind? Because things are designed to be used by people, and without a deep understanding of people, the designs are apt to be faulty, difficult to use, difficult to understand". (Norman, 2013).
In recent times, the approach to product and service design has evolved to prioritize people's needs and preferences through participatory and co-design methods. This shift, known as Human Centered Design (HCD), was formalized by the international standard ISO 9241-210 in 2010, with a definition that assumed a person with standard characteristics. However, just a decade later, this perspective has been replaced; according to Giacomin (2014) HCD is "based on the use of techniques which communicate, interact, empathize and stimulate the people involved, obtaining an understanding of their needs, desires and experiences which often transcends that which the people themselves actually realized". Ensuring the involvement of end-users in the design phase is crucial to guaranteeing that products align with real individual needs. This approach creates solutions that not only are functional but also deeply attuned to users' expectations and experiences. Co-design reinforces the concept of personalisation, making the product an "extension" of the person's needs, wishes, and abilities. In cases where personal needs are highly diverse, personalisation offers an additional path to design new solution by creating artefacts that are both specific and adaptable, or entirely original, to meet individual needs. For instance, in the medical field, personalizing processes, services, and products is essential. Testing on patients with diverse clinical situations is necessary and mandated by regulations. Human-centred approaches and a focus on accessibility, inclusion, and social welfare are particularly effective as they allow for the identification of problems, needs, and opportunities by considering technical, performance, empathic, and experiential aspects (Langella and Pontillo, 2023).
"Enabling artefacts" are designed to promote the autonomy of individuals with disabilities or special needs. These encompass a range of technological devices, assistive tools, and ergonomic solutions designed to help people with physical or cognitive limitations to live independently, so that they can actively engage in society. Therefore, it is essential to personalize these devices to best to meet everyone's needs and enhance their quality of life. Advancements in technologies such as additive manufacturing have made personalisation more accessible, allowing for rapid and affordable productions of tailored solutions. It is also important to highlight the rapid emergence of a movement called Open-Source 3D printing, and how it fits into a general trend towards open-source innovation through collaborative online communities (de Jong and de Bruijn, 2013) (Figure 1). For these rea-

sons, the inclusive design process integrates a human-centred approach with a creative mindset. It encompasses empathy, co-design, and consideration of social determinants, along with activities such as questioning, visualization, prototyping, and storytelling. It is essential to observe, listen, ask questions, and gather valuable information. Workshops can be organized to encourage people's involvement and participation. This approach enables the generation of new ideas that address needs and the development of prototypes that illustrate how the product could function and be embraced (Ku and Lupton, 2022).

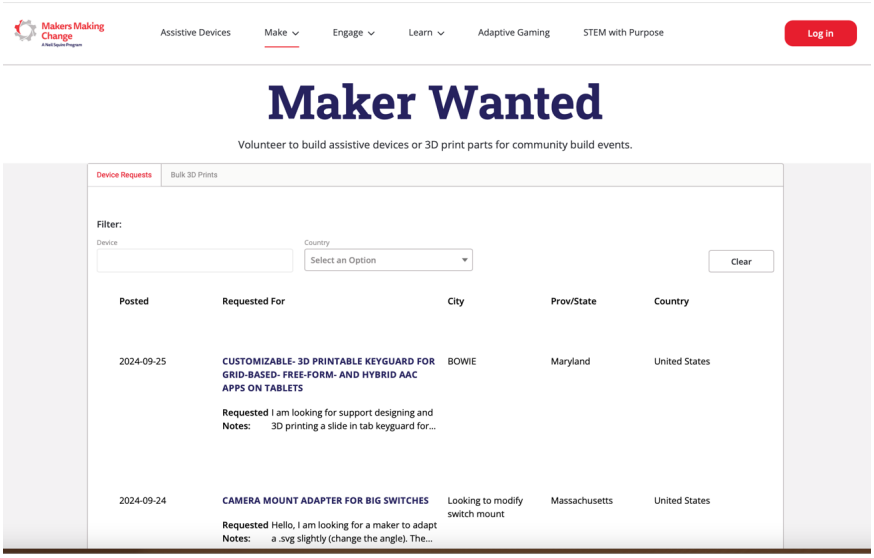

Fig. 1 The Makers Making Change website connects volunteer makers and people with disabilities who need for open access devices and assistive technologies (source: Makers making change. (n.d.). https://www.makersmakingchange.com/s/).

Personalisation as an enabler for sustainability

Today, sustainability in design is intrinsically related to the design of improved forms of well-being, which can also generate new forms of consumption, lifestyles, social education and collective behaviours, the so-called culture of sustainability (Manzini 2003). In the last three decades, the Design for Sustainability discipline increased its impact on the development of applications at all scales: from the design of eco-friendly produc-

tions (early studies in the late 1980s) to the design of complex solutions for system innovation (Rossi and Di Nicolantonio, 2020). The personalisation of products has the potential to foster social inclusion, yet it also carries substantial implications for environmental sustainability. The ramifications of mass production are evidenced in the inefficient utilization of resources, predominantly attributable to the standardization of goods which frequently results in surplus or superfluous products that fail to align with genuine market demands. The concept of Mass Personalization (MP) is increasingly pertinent in addressing the evolving and varied needs of customers. In contrary to the modular design in mass customisation, Design for MP (DfMP) proposes more profound changes in product and active user involvement in the design process, while maintaining mass efficiency (Ozdemir et al., 2022) (Figure 2). Greater flexibility is essential as it can impact all production stages, ranging from raw materials sourcing to final distribution. This adaptability allows for modifications in production processes to align with changes in demand and specific customer needs.

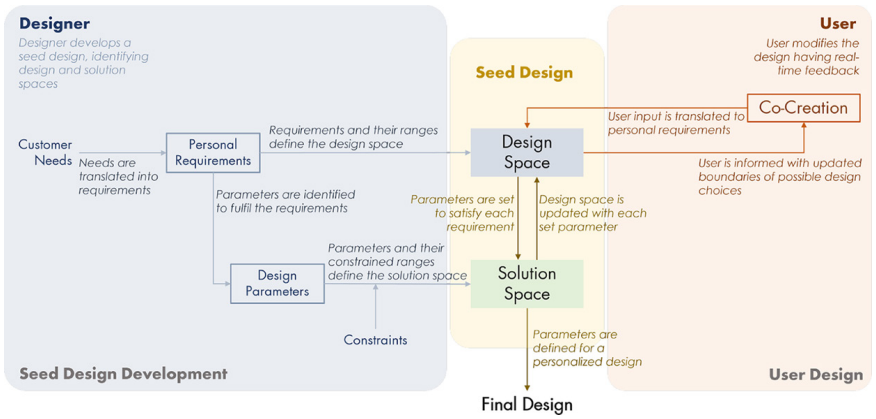

Fig. 2 Design for mass personalisation framework (Ozdemir et al., 2022).

This methodology is interesting for the process development of personalised designs and shows how to facilitate people's involvement in achieving a personalised design. It reduces both production time and enhances the ability to respond promptly and effectively to people's needs. Digital technologies have provided a higher level of personalization that would have been unimaginable just a few decades ago. Small-scale personalisation, facilitated by technologies such as digital manufacturing, enables decentralized production and bolsters local economies (Figure 3).

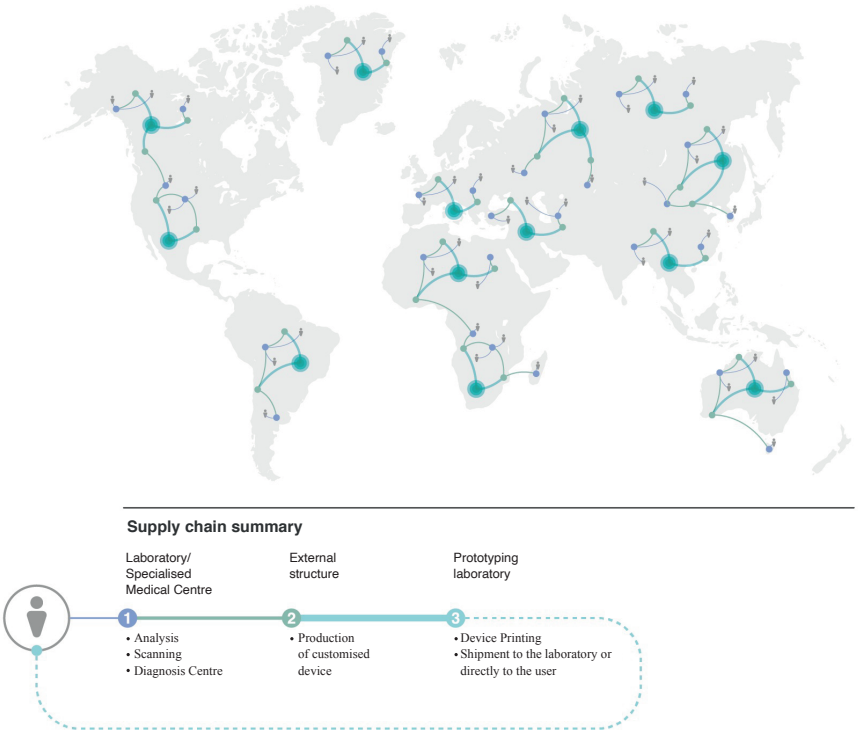

Fig. 3 An example of a possible local management approach through digital technologies applied to the medical device supply chain (Langella and Pontillo, 2023).

This production model diminishes the expenses and environmental impact associated with transporting goods, while concurrently fostering the advancement of local communities through the generation of employment opportunities and local innovation. Moreover, 3D Printing, or Additive Manufacturing (AM), allows for the creation of personalised prototypes or finished products, eliminating many of the constraints associated with traditional manufacturing. The main benefits of 3D Printing are design freedom, bulk customization, space-saving, and the capacity to build complicated assemblies, as well as rapid prototyping (Praveena et al., 2021). Artificial Intelligence (AI) and Machine Learning are also transforming personalised product design.

By analysing consumer data, companies can predict individual needs and preferences, and recommend products or adjustments that align with people's desires. Internet of Things (IoT) enables real-time connection and monitoring of machines and production facilities, leading to optimized

production and reduced waste. Using smart sensors and predictive analytics, companies can promptly tailor their production processes based on data, enhancing efficiency and minimizing downtime. In pursuit of enhanced sustainability, advancements in processes and products not only facilitate personalised and localized manufacturing, but also promote the utilization of sustainable, recyclable, reusable, and compostable materials. The establishment of closed-loop production systems, wherein discarded items are repurposed to create new artefacts, aligns seamlessly with the tenets of the circular economy. This model is designed to prolong the lifespan of products and mitigate environmental impact.

Conclusion

Personalisation is not just a passing market trend; it is a powerful means for addressing some of the most pressing social and environmental challenges of our time. One of its most exciting aspects is the potential to create synergies between the goals of social inclusion and environmental sustainability. The incorporation of advanced technologies into the personalisation process introduces new opportunities but requires careful management to ensure that social inclusion and sustainability remain at the heart of technological development. To reap the benefits of personalisation, companies need to embrace technologies and new design and production methods. Personalisation can enable companies to become more agile and responsive to market demands. Implementing this change may initially pose challenges, such as increased costs and management complexity, particularly for smaller companies, but it would represent a significant innovation in support of communities and the environment. By integrating digital technologies and adopting flexible production models, it will be possible to respond efficiently to fluctuations in demand, thereby improving the company's overall competitiveness. Only a comprehensive approach can improve accessibility and quality of life for people and the planet.
Personalisation should serve to meet individual needs and as a tool to promote positive and inclusive societal change.

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PART 2
CREATIVE DESIGN PRACTICES

Creative design practices for social inclusion and sustainability

Emilio Rossi

Creative design practices for social inclusion and sustainability

Emilio Rossi

In today's rapidly evolving world, modern design practices have transformed into cultural actions with ethical responsibilities. Designers are now pivotal agents of change, addressing global challenges like climate change and social inequality. This essay emphasizes the role of design education in fostering inclusivity and sustainability, highlighting the importance of experiential learning and international collaboration to empower future designers in creating innovative, socially responsible solutions.

Introduction

In an era like the one in which we live today, marked by rapid technological and economic advancement as well as profound societal shifts, modern creative design practices have evolved into informed cultural actions that encompass a more extensive range of ethical responsibilities. From simpler shapers of market goods, designers are emerging as pivotal agents of change (Thackara, 2005; Manzini, 2011). Through their unique backgrounds, which combine both cultural and technical competencies, they can effectively address pressing global challenges, including climate change, social inequality, and cultural fragmentation. Altogether, these issues highlight the imperative for a synergistic approach to confronting social inclusion and sustainability as a unified phenomenon, necessitating strategic responses and the development of a new generation of system-oriented solutions (UN DESA, 2016).

The concept of system-oriented solutions, which transcends the conventional product-centric approach and the quest for solutions that solve problems, points to new sets of opportunities for these agents of change. International mindsets and a resilient attitude are essential for acting as antennas that identify existing trends and define promising opportunities for strategic and positive change. As the world grapples with these challenges, the request for creative designs based on social inclusion and sustainability require future designers to adopt a holistic attitude by integrating creativity with critical and lateral thinking, as well as empathy and more structured ethical responsibilities (Sanders and Stappers, 2008; Buchanan, 2017). Design students, as emerging professionals, must demonstrate the

capacity to drive the development of innovative solutions that promote inclusivity and sustainability. It is vital to emphasize that inclusive design approaches can be significantly advanced through the education and engagement of students of Design programmes.
In this context, it is imperative that designers possess advanced theoretical and technical skills.

The role of Design schools and students in promoting innovative solutions

The role of Design schools in Europe is paramount for training the next generation of professionals (Vernon, 2013). By incorporating social inclusion and sustainability into their curricula, these institutions can trigger into students the necessary curiosity and commitment in addressing contemporary challenges by advanced training. Educational programs on Design studies that emphasize experiential learning, community engagement, and interdisciplinary collaboration can foster a sense of responsibility and empowerment among students. Participatory design, social innovation, and the creation of sustainable artefacts are seen as the pillars of novel offers that recognise the evolving market and societal scenarios while prioritizing the commitment of proposing advanced artefacts that contribute to promote social inclusion and sustainability (Rossi et al., 2022). From the integration of these elements, Design schools stand as unique institutions with the capacity to instil new values; they can cultivate students' abilities to tackle design challenges from a holistic standpoint, encompassing the socio-technical dimension that has direct impact on natural and anthropic ecosystems (Irwin et al., 2020).
Project-based learning, where students collaborate with local communities to identify pressing issues not only enhances practical skills but also fosters a deeper comprehension of social contexts. This ethical and cultural convergence provides students with the theoretical frameworks necessary to critically assess their design choices and their broader implications. From this perspective, international collaborations among higher education institutions are essential to reinforce a culture of informed creative design practices aiming at intercepting the needs for socially inclusive and sustainable solutions. These expedite the development of a fluid transnational culture that is required to synergistically address complex societal issues. Such collaborations enhance the educational experience for students (Bennett, 2006), resulting in a more shared acceptance of challenges

to be faced, a higher sense of ethical commitment when operating in the commercial design market, and in general it is seen as a positive stimulus to answer companies' requests for new solutions. Design programs that facilitate cross-cultural exchanges and collaborative projects – even those conducted in a blended format – can expose students to diverse perspectives and creative practices. Such collaborations can lead to innovative solutions that address global challenges while concurrently fostering a sense of global citizenship (see: Fischer, 2012). As Throsby (2008) notes, cultural and creative industries can contribute to economic development while enhancing social cohesion.

Conclusion

The intersection of social inclusion and sustainability in Design studies presents fertile ground for innovative solutions that address the needs of present and future communities while promoting environmental awareness (Woodcraft, 2012; Mirzoev et al., 2022). As future designers, current design students are uniquely positioned to bridge these domains by crafting innovative solutions.

The student projects featured in this section exemplify the potential of the Design discipline to address the dual imperatives of social inclusion and sustainability. This is accomplished through the presentation of projects created by students who attended the InDeSIS BIP 2023/2024 studio session at the "Gabriele d'Annunzio" University of Chieti-Pescara in Italy. Each project reflects a commitment to understanding the complexities of the Pescara municipality's communities with which they engaged, as well as a dedication to creating environmentally responsible and socially inclusive solutions.

Consistent with the will to offer students a common ground for fruitful experimentation covering both cultural and technical aspects, the eight projects shaped by these emerging designers pave the way for initial reflections on the embryonic but promising cultural trajectories for a future in which Design acts as a catalyst for positive change. Together, educators and students have planted an initial seed for a cultural discontinuity leading toward a more inclusive and sustainable future through the transformative power of design.

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Eight innovative solutions for Pescara's urban natural areas

Sarah Jane Cipressi
Lara Pulcina

Eight innovative solutions for Pescara's urban natural areas

Sarah Jane Cipressi, Lara Pulcina

Examining the connection between social inclusion and sustainability in Design is essential to highlight its significance for future urban and natural environments. Holistic and participatory design approaches that integrate local traditions and ecological considerations are essential to create harmonious solutions that foster community cohesion. The InDeSIS project exemplifies this approach. By sinthetically introducing the proposed for the studio session at at the University of Chieti-Pescara, and the eight innovative design proposals developed by teams of students, the essay emphasizes that the future of creative design practices should focus on meaningful user experiences and interpersonal connections, ensuring that cities and natural ecosystems can thrive together sustainably.

Introduction

The convergence of social inclusion and sustainability is essential in Design studies for the development of future cities, communities, and natural areas (Heitlinger and Comber, 2018). These are key forces capable of triggering innovative interventions that act at different scales, both urban and natural, tangible and intangible. In modern cities, the cultural and natural heritage represents not only an ecological and sociological asset but also a great source of inspiration capable of advancing contemporary design into innovative dimensions. This interplay between nature and human creativity has engendered progressive methodologies that elevate fundamental habitats into living environments to encourage a genuine sense of harmony with the ecosystem (Brischetto, A. et al, 2018). In an era characterised by the escalation of environmental and social challenges, this integration is not merely a preference, it is an urgent necessity.

Integrating social and environmental topics into creative design practices

The Design discipline should coherently integrate territories, communities, and cultural identities within a singular holistic narrative that promotes inclusivity and sustainability. Effective territorial design is deeply

informed by local traditions and natural environments, contributing to the development of civilizations that coexist harmoniously with the nuanced variations of nature while addressing the diverse practical needs of their inhabitants. In this context, a design philosophy that encourages such dialogue not only fosters functional spaces or solutions but also cultivates meaningful environments that enhance individuals' sense of belonging. Accordingly, a plurality of effects can be observed when good design is used to gather a variety of instances that are only seemingly disjoint.

A fundamental inquiry remains; how can we effectively integrate environmental considerations and social accountability into effective design practices? Then, how can designers propose effective solutions to meet the needs of all users while ensuring adequate environmental consciousness by using the right technological stances?

This necessitates a holistic and participatory approach goes beyond functionalism (Anelli, D., 2019). It instead calls for harmonised developments against the idea of conservation, ensuring that urban expansion and the respect of natural areas do not overshadow the intrinsic beauty of ecosystems. Furthermore, designing inclusive shared solutions for individuals of all ages and abilities promotes community cohesion and enhances resilience. A prolific convergence between social and environmental issues is apparent.

Urban spaces, whether cultural or natural, should do more than just beautify their surroundings; they need to serve as vibrant, multicultural, and intergenerational hubs that meet social needs while promoting healthy ecosystems. Realising this vision calls for a collaborative effort from designers, who are asked to bring together various fields of expertise: eco-design, inclusive design, service design, engineering design, human factors, etc. It is essential to foster open and constructive dialogues among professionals, policymakers, and community members to come up with innovative solutions that truly address local concerns. By effectively utilizing advanced technologies and the tenets of a circular economy, they can steer design practices toward a more flexible and sustainable future. Moreover, promoting environmental literacy is imperative for cultivating a culture of respect and management of cultural and natural heritage. Public spaces – encompassing squares, parks, gardens, and pedestrian zones – are not solely physical entities; they act as essential social arenas, cultural intersections, and incubators of collective memory. These locations contribute significantly to the rhythm of urban life, influencing well-being and enhancing communal identity.

The need to reimagine urban spaces with innovative and multidimension-

al solutions offers considerable challenges for environmental sociologists. This challenge is heightened by the rapid pace of urbanisation and the increasing complexity of social issues. Realizing this objective necessitates adopting participatory design models that promote collaborative decision-making among citizens, institutions, and experts. Such design frameworks must be adaptable, sustainable, and rooted in co-creation while honouring the distinctive characteristics of each territory. This practice allows for the accommodation of local needs while preserving environmental integrity. Furthermore, the integration of technological innovations and insights from research can facilitate the development and maintenance of public spaces that are not only inclusive and dynamic but also aligned with ecological sustainability.

In this scenario, the contribution of the Design discipline is apparent and extremely needed to converge all efforts provided by skilled professionals into cultural milieus that promote societal innovations (Pavan, V. M., 2006). The need to maintain high ecological standards while meeting the will of visitors to enjoy green spaces requires designers a fresh design approach for the design of innovative and lightweight solutions. Therefore, how can designers contribute to conceiving solutions so that all users can enjoy both anthropic activities and natural resources? How can these solutions be both socially inclusive and sustainable?

Seen under this lens, a possible future for inclusive and sustainable design interventions at the urban scale entails more than the mere construction of physical objects; it emphasizes the creation of meaningful user experiences, the cultivation of interpersonal connections, the exaltation of the relational power of artefacts when interacting with multiple users such as elderly and children, and the integration of resilience into the core of environments. This intricate interplay requires that each component work cohesively to shape a future in which both cities and natural ecosystems can adapt, flourish, and coexist harmoniously with the communities that reside within them.

Eight innovative projects

The studio session of the InDeSIS project was held in June 2024 at the Department of Architecture of the “Gabriele d’Annunzio” University of Chieti-Pescara in Italy. The five-day studio session involved four European universities, and more than thirty students have worked on the exploration of the role of design in transforming the public spaces and the natural

resources of the Pescara municipality into resilient and accessible ecosystems that are closely connected to a more inclusive and sustainable idea of heritage[1].

Pescara, a coastal city in Abruzzo, Italy, is facing the challenge of maintaining its urban natural areas amidst rapid urbanization and population growth. The city boasts a rich cultural heritage and a strong connection to its natural environment. In a few kilometres, citizens can access a wide range of green spaces, both wild (urban woods) and well-equipped (green parks). Moreover, Pescara's green areas are used by the local population in every season for sports activities (e.g., running), but are also the home of local fauna and autochthonous flora (i.e., maritime pine). However, such areas often are under pressure to accommodate an increasing number of visitors, while also providing habitats for local flora and fauna.

The primary aim of the InDeSIS studio session was to invite students to reflect on how to equilibrate human activities and the issue of natural preservation by proposing a set of designs to enhance the local territory and its cultural and environmental identity. The results of this design activity are eight innovative designs that explored several, but interrelated, topics referred to social inclusion and sustainability (Figure 1). A key aspect of the entire design experience was the incorporation of additive manufacturing, as outlined in the workshop brief. The process was particularly important due to the diversity of interpretations presented, as well as the need to balance design qualities such as aesthetics and technology. Each group of students applied these principles through distinct interpretative lenses shaped by their cultural and academic backgrounds. This rich exchange of perspectives resulted in a range of complementary yet diverse solutions that effectively addressed the specific needs of the Pescara area, and its natural ecosystems while providing replicable models for other contexts.

In terms of pedagogical and design methodology, the studio sessio comprised the following stages. In stage 1, students engaged with the local context and relevant literature to inform their understanding of the challenges and opportunities present in the design landscape. Stage 2 centered on the concept design phase; students were encouraged to generate innovative ideas that prioritize inclusivity and sustainability, ensuring that

1 By working in groups, students were asked to design a single and meaningful solution for the Pescara's urban natural areas (1. Pineta Dannunziana Natural Reserve, 2. Ex Caserma Di Cocco Park, 3. Villa De Riseis Park, 4. the Inclusive Ecological Beach, and 5. the Pescara Riverside). Creativity and empathy toward both social and environmental aspects were the backbones of joint design efforts, which have been mentored by academic staff throughout the studio sessions, and finally presented to the whole student cohort.

Fig. 1 InDeSIS studio activitieS: Research and exploration (top), design brief and concept design (middle), and technical design (bottom) (Students: Petr Dušek, Valeria Veccia, Jose Gonçalves, Micaela Verzulli).

their proposals address the needs of diverse user groups while minimizing environmental impact. The transition to technical design characterized the Stage 3, where students refined their concepts into detailed proposals by incorporating elements for additive manufacturing. Finally, Stage 4 culminated in a presentation to the whole academic audience.

One of the most compelling aspects of this teaching and learning activities was its focus on the combination of Design for social inclusion and Design for sustainability. This extended beyond basic physical accessibility; it required a comprehensive analysis and reinterpretation of public spaces in adaptive and modular ways to effectively accommodate the diverse needs of users while maintaining high the environmental qualities of places chosen for the experimentations. The objective was to develop a set of artefacts that embody the aspirations of local communities and foster the active engagement of individuals across various ages, abilities, and cultural backgrounds in addressing environmental issues.

The Pescara area has emerged as a significant melting pot for dialogues on innovation design, acknowledged for its dual function as both a tourist destination and a cultural hub that attracts students and stakeholders from various parts of the country. A central theme that arose during the five days was the need to reimagine the natural environments through inclusive design perspectives. It is known that usually, this design approach forces reflections that end with the analysis of users. This highlighted the critical role of co-design methodologies throughout the design process and their application for projects having higher magnitudes. Each proposal actively involved potential users and stakeholders to ensure that the solutions devised were functional, sustainable, and deeply connected to the local social context. This participatory approach sought to cultivate a sense of belonging and shared responsibility, thereby transforming public spaces into vibrant centres for socially inclusive interaction and multi-generation active engagement.

Eight proposals have been presented by students. The first project is called Reconfigura and is a modular and scalable system of 3D-printed elements that serve multiple functions; the goal is to enhance the usability and the ecological value of parks while expanding the concept of biomimicry to promote seamless integrations within the natural environment. In contrast, Petalia presents an innovative solution that promotes the coexistence of humans and wildlife by facilitating non-invasive interactions. Another interesting project is Symbiotic Path, an interactive set of components that enhance visitors' playful and interactive experiences with different natural ecosystems by promoting free combinations and aggre-

gations of its elements to create educational and recreational experiences for all users. Conversely, Momento introduces nest-inspired structures that enhance urban and natural spaces through sustainable aesthetics; these integrate seamlessly with the natural environment providing comfort and utility while releasing beneficial substances to enrich the surrounding area as they degrade over time. Among the various innovative projects developed, the Dannunziana Forest Crown draws attention to accessibility; it consists of an elevated pathway crossing the Pineta Dannunziana Park and connects several key areas while offering an immersive experience for users, including disabled ones. By expanding the concept of modularity and endless combination, Growing Space allows flexible and inclusive urban interventions to be seamlessly integrated with the natural landscape to offer shaded areas and private spaces. On the equilibrating connections between humans and the environment, Eco Embrace expands the notion of multi-sensory installation to cultivate a deeper connection between individuals, the flora, and the fauna, which are also considered fundamental parts of the design itself. Finally, Poly-Connect Reef embraces a circular economy model by converting plastic waste sourced from the community into modular and interactive urban structures.

Conclusion

The eight projects articulate a forward-thinking vision for the future of natural urban areas, particularly the ones of the Pescara municipality. They are designed to achieve a synergistic balance among ecological resilience, social inclusivity, and functional aesthetics. Reflections on additive manufacturing, rapid prototyping, new materials, co-design, and other aspects are also proposed. Although the proposals are tailored to a specific local context, they offer valuable insights to guide other designers into broader design strategies that have a significant cultural impact; consequently, they can serve as models for future projects. These projects also highlight the crucial role of design in addressing modern challenges, leading to solutions that not only improve the functionality of natural spaces but also promote a more thoughtful way of engaging with the city.

Acknowledgements

The various parts of the present essay are the result of a joint discussion

between authors. In particular, the section “Abstract”, “Introduction”, and “Integrating social and environmental topics into creative design practices” is attributed to Lara Pulcina, whilst the part “Eight Innovative Projects” and “Conclusion” are attributed to Sarah Jane Cipressi.

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Reconfigura

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Reconfigura

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Urban parks are essential elements for sustainable urban development, providing ecological benefits and enhancing the quality of life for city inhabitants. Despite their potential, many urban parks face significant challenges, including excessive heat, poor spatial organization, and limited accessibility. Reconfigura (Figure 1 and 2) addresses these issues by reimagining three key parks in Pescara: the Pineta Dannunziana Park, the Inclusive Ecological Beach, and the Ex Caserma Di Cocco Park. By leveraging the principles of sustainability and inclusivity, the project proposes innovative design interventions that improve the functionality and the user experience of green spaces.

The research process involved the visit to three urban parks to observe their unique characteristics and identify problems and opportunities. Key findings included excessive heat and lack of shaded areas, poor organization, and limited activity zones, insufficient equipment such as no tables and seating to enjoy free time.

Opportunities emerged to bring people together, to optimize park usability, and to enhance recreation areas while fostering closer interaction with nature. These observations were synthesized into four main requirements: (i) to provide effective sun protection, (ii) to facilitate various anthropic activities, (iii) to facilitate various activities with ease must encourage the free interaction with natural elements, and (iv) to prioritize safety by avoiding sharp edges.

To better understand user needs, the design team developed three personas: Anna, a child; Paolo, a student in his mid-20s; and Giulio, a senior citizen. Several scenarios were created to illustrate their experiences in the park, highlighting specific needs, activities, and potential challenges. These insights informed the design process and ensured the final solution addressed diverse user requirements (Figure 1).

The project's primary goal is to create a modular and replicable system of products that enhances the usability and ecological value of urban parks while addressing the identified challenges. Reconfigura is proposed as a set of four distinct modules intelligently designed to serve multiple functions so that they can be integrated seamlessly withing the natural environment (Figures 2 and 3).

Flexibility and playfulness with an attention toward ecological values and manufacturing are at the core of the design strategy. Specifically, the modules feature an organic yet visually striking design, ensuring safety through rounded edges that reduce the risk of injury. Their shapes encourage creative uses and personalisation, from sitting and relaxing to playing and socializing. They can be arranged near existing park structures, such as walls or equipment, to maximize shade and optimize the use of available space (Figures 4 and 5). Furthermore, they can also be stacked to create unique configurations. Finally, attention to maintenance is assured through the design of all components, which are simple and intuitive.

The design of Reconfigura accommodates a wide range of activities, including studying, reading, spending time with family, or simply enjoying the park's ambiance. To further promote inclusivity, the adaptability of modules ensures that they meet the needs of various user groups. Accordingly, Reconfigura suggests a natural coexistence of human-centred aspects and the environmental features.

The Reconfigura's modules are made from 3D-printed bioconcrete, a durable and carbon-negative material enriched with activated charcoal that reduces carbon dioxide. Its lightness and stable properties facilitate easy installation and maintenance. environmental compatibility and better natural integration are also guaranteed. The modules feature spaces for climbing plants, which provide natural shading and enhance their aesthetic integration with the landscape. These plants require minimal maintenance and contribute to a harmonious environment. The use of bioconcrete underscores the importance of sustainable practices in contemporary design, setting a precedent for future urban development initiatives.

Reconfigura redefines urban parks as multifunctional yet sustainable spaces that meet the diverse needs of their users.

By integrating advanced manufacturing techniques with a strong environmental attention, as well as innovative materials, ecological elements, and the opportunity to operate flexible configurations, Reconfigura addresses critical challenges while enhancing the aesthetic and functional value of the parks. This project also represents a significant step toward creating inclusive, sustainable urban environments that prioritize the well-being of both people and the flora.

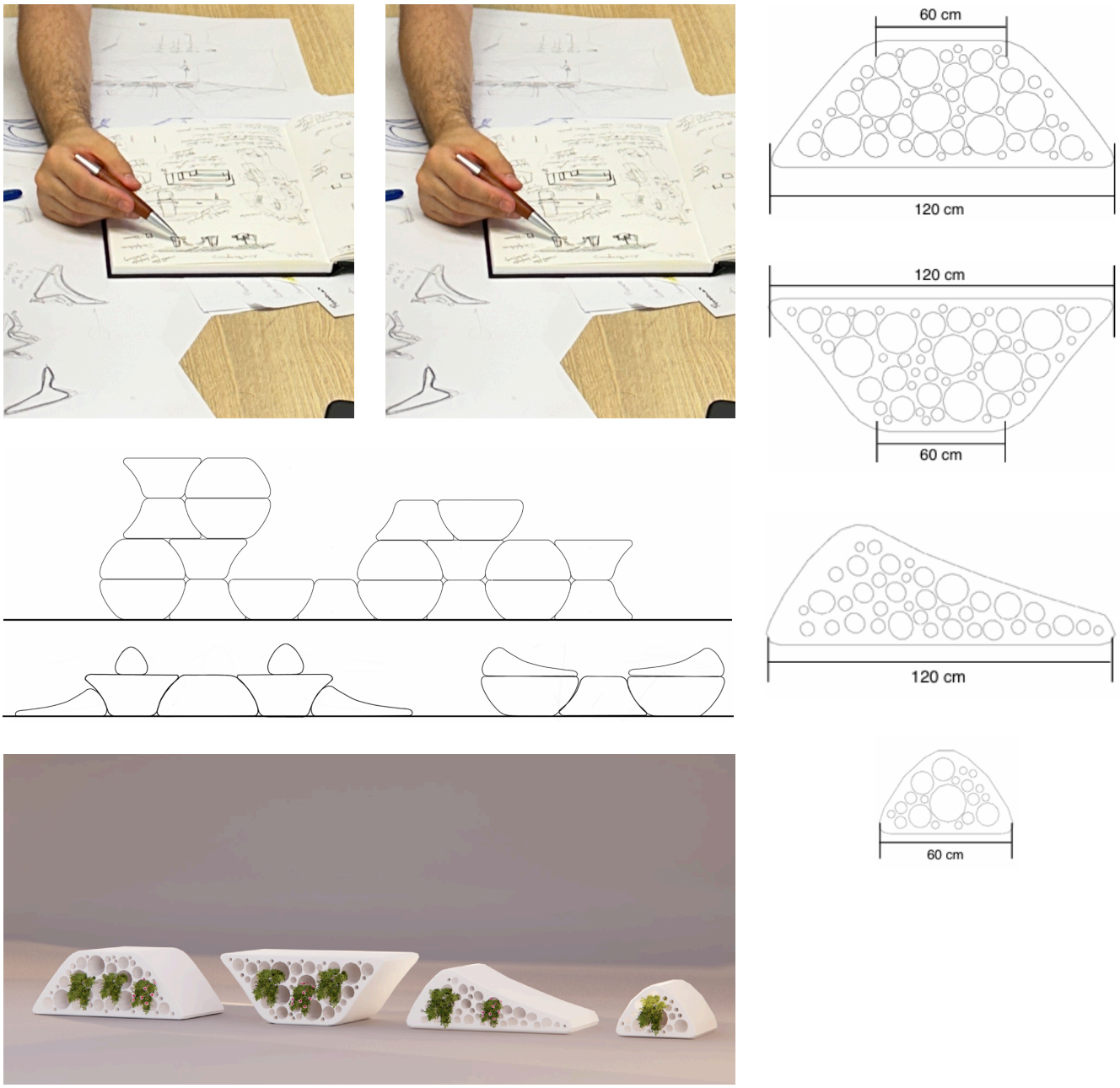

Fig. 1 The design research process of the Reconfigura project: Sketching and graphical iterations (top left), rapid prototyping (top right), possible configurations (middle), digital modelling (bottom), and technical optimization of components for 3D printing (right).

Fig. 2 Renderings and environmental simulations of the Reconfigura project in the Ex Caserma Di Cocco Park show the different configurations in relation to possible uses.

Petalia

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Petalia

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Urban parks are critical spaces for promoting biodiversity, social engagement, and environmental awareness. However, many parks lack essential features to support both human and animal interactions, leaving opportunities for ecological and social integration unrealized. The Petalia project (Figure 1 and 2) seeks to address these gaps by introducing a multifunctional and sustainable solution that enriches urban parks' ecosystem while promoting meaningful connections between humans and animals. Accordingly, both relational and environmental aspects are considered.

The contextual research conducted in urban parks such as the Pineta Dannunziana Park and the Ex Caserma Di Cocco in Pescara revealed several key challenges. These included the absence of adequate shelters for animals, limited opportunities for human-animal interaction, and insufficient elements for promoting social engagement among visitors and the enjoyment of local fauna. For instance, during the summer, wild ducks struggle to find shaded quiet areas, while stray cats and birds may not have sufficient access to food and fresh water. Additionally, visitors who are passionate about wildlife, find it difficult to interact with animals in a non-intrusive way. The findings laid the groundwork for an innovative design aimed at creating a symbiotic relationship between nature and urban parks' users, offering both practical and ecological benefits.

Petalia is made by a modular stackable system inspired by natural shapes – the Mediterranean leaves in this case – though the principle guiding the formal design can easily take inspiration from any natural context. The main goal of the design is the biocompatibility, to provide a shelter and the needed resources for animals while encouraging humans to interact with them in a non-intrusive manner. Structurally, Petalia includes spaces for shade, water distribution, and social interaction, contributing to the ecological equilibrium of urban parks by supporting the coexistence of their inhabitants, both human and animal.

Each Petalia's component is aimed at fulfilling three main scopes: (i) enhancing social interactions, (ii) providing shelter, and (iii) incorporating artistic elements. Additionally, the project has an educational aspect, enabling visitors to observe and interact with animals without disturbing them, promoting the sense of respect for urban biodiversity.

Two key scenarios illustrate the functionality of Petalia. In the first scenario, a wild duck in Pineta Dannunziana Park struggles to escape the summer heat and crowded paths. Thus, Petalia provides a shaded protected retreat addressing the duck's needs for rest and proximity to water. In the second scenario, a visitor uses Petalia to feed animals from a safe distance, allowing an interaction that is safe for both the visitor and the animals.

To better understand the users, three personas were created: the stray cat, the wild duck, and the urban bird. Each has unique needs, such as protection, consistent access to food and water, and preferences for quiet, shaded spaces. These personas guided the design to ensure it met the requirements of various animal species.

Artistic elements are incorporated using vibrant colours and inviting organic shapes, which make Petalia an installation to decorate parts of the park where it is placed.

The module is made from biodegradable, and heat-resistant materials, ensuring durability in outdoor environments. The use of 3D printing provided the needed flexibility of shapes. The materials, including a nonoilen filament enriched with natural fibres, are selected for their sustainability and biocompatibility with the natural ecosystem. Other components include recycled woodchip materials and metal screws surrounded by decomposable elements that minimize the environmental impact. The design also considers maintenance, allowing easy replacement of parts like sponges to prevent issues such as mould.

The installation process of the modules takes place through 3D printing, with components that are easy to transport and assemble. The modules are designed to collect rainwater and direct it to areas designated for animal use, ensuring an economic installation that can be easily replicated in various areas. Feedback from initial pilot installations will guide further refinements to the design and material choices, ensuring the system's adaptability to diverse urban contexts.

This project demonstrates how innovative design can bridge urban development and ecological preservation. Particularly, how original interpretations of both sustainable and socially inclusive subjects can drive toward the design of unconventional products that show higher quality. In a potential future, feedback from pilot installations could provide answer on the use of new materials, as well as its potential scalability in different contexts. Petalia represents a forward-thinking approach to urban park design, offering a replicable model for enhancing biodiversity and strengthening the connection between humans and nature.

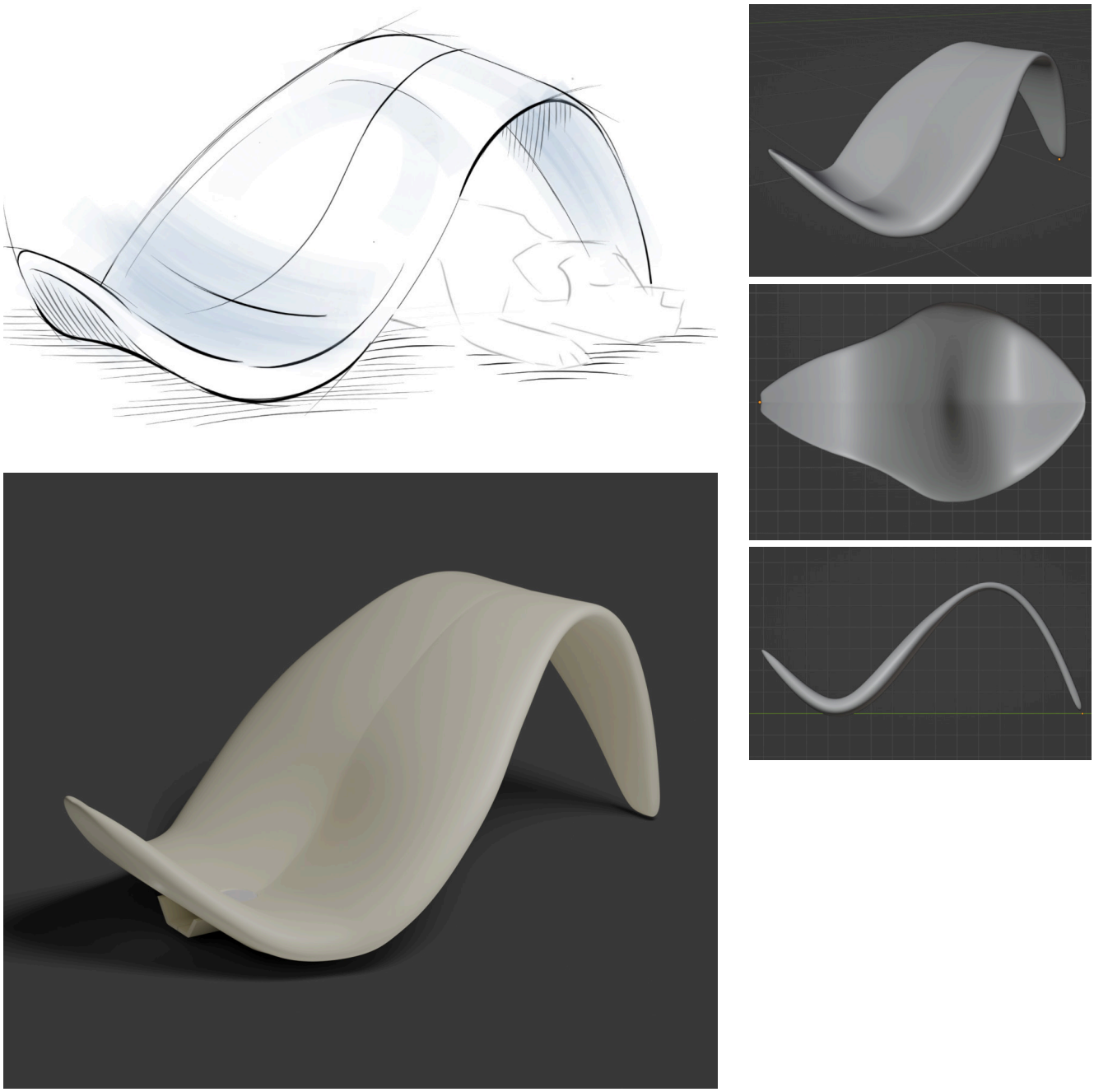

Fig. 1 Conceptual development of the Petalia project: General concept of nature-inspired shape (top), digital modelling (bottom), and optimization of shapes for 3D printing (right).

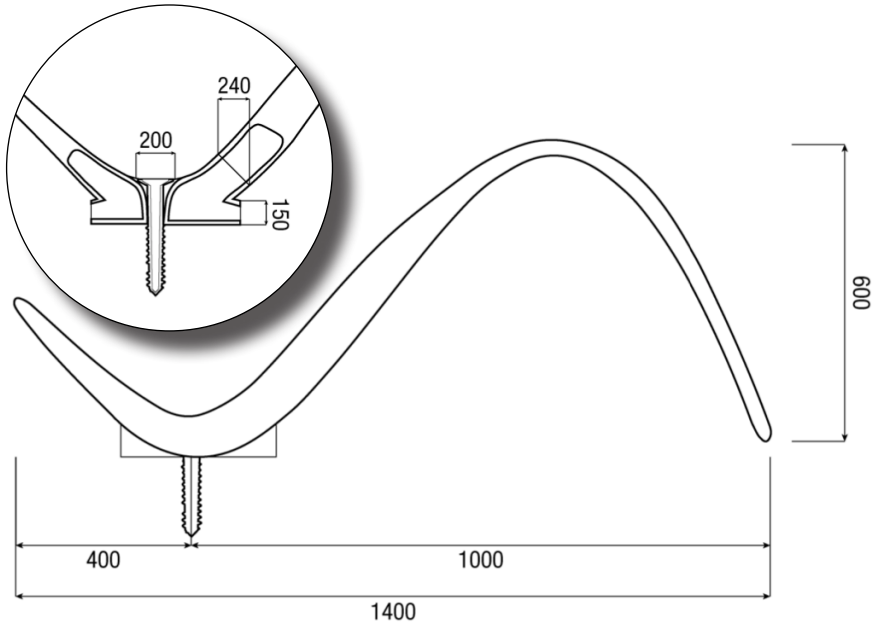

Fig. 2 Renderings of the Petalia project (top: shelter; left: dispenser of fresh water) and technical representation with a focus on the water container and the fastening system (bottom).

Symbiotic Path

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Symbiotic Path

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Urban parks play a crucial role in recreation, ecological preservation, and community engagement. However, many parks, due to their shape and natural condition, reveal issues like fragmentation, weak connections between people and nature, and lack of appeal for families and multi-generation users. Symbionic Path (Figure 1 and 2) aims to address these issues within the Pineta Dannunziana Park in Pescara by introducing an innovative and sustainable design that reinforces the relationships between people, nature, and the park's diverse spaces.

Research into social inclusion's key topics has revealed significant disconnections between different areas of the park, discouraging exploration, and limiting interactions with biodiversity – exclusion from and through nature. This fragmentation not only reduces users' visit experience in the natural environment but also contributes to lack of inclusive services, resulting in negative family experiences. Field studies have also revealed major challenges such as poor connectivity between park areas, insufficient interactive elements for families, and lack of engaging activities for different age groups.

To address these issues, a set of personas were identified: the Bianchi family is an active group that enjoys outdoor activities but struggles with the neglected state of inner paths as well as the lack of engaging features for children. Their needs include safe, accessible pathways, educational activities, and well-maintained facilities that support multi-generational experiences. Nature itself was also considered as a persona, representing the park's ecosystem and its vocation to be part of social activities, which suffers from pollution, habitat fragmentation, and unintentional harm from visitors. Symbiotic Path's aims to support biodiversity by promoting sustainable visitor interactions and enhancing habitat connectivity.

Symbiotic Path is conceived as a network of interactive components that enhance visitors' playful and interactive experiences with different park's ecosystem. These components, when combined, define an interactive installation that is themed around local tree species; this creates educational and recreational experiences that reflect the behaviours and characteristics of these species. This approach fosters empathy, encourages physical activity, and promotes learning through play.

To create a direct connection between visitors and biodiversity, the interactive elements composing the Symbiotic Path simulate animal behaviours into humans. Thus, a turtle-inspired installation suggests tunnel-like structures that are suitable for children exploration; a lizard-themed station incorporating climbing surfaces, evoking agility and movement. These installations not only provide engaging activities but also deepen appreciation for wildlife.

On the technical point of view, the design is based on an intelligent use of modular 3D-printed structures based on hexagonal geometry for stability and versatility in combination. These modules can be arranged into climbing frames, tunnels, or structures wrapping around trees, making them adaptable to different locations within the park. The flexibility of assembly and manufacturing also made it possible to adapt sustainable design criteria to social scopes, such as learning through play. The modular system allows for flexibility and customization, ensuring that the installations evolve to meet changing needs and conditions.

Overall, the modular structures encourage higher interaction while enhancing the exploration of parks in a new way. The interactive path guides visitors through various installations through hands-on experiences. Structurally, the hexagonal modules also ensure stability and adaptability, allowing for multiple configurations that suit diverse user needs.

These structures are designed for easy customization, allowing adjustments in texture and form to fit different themes. Safety is a priority made by secure connections; robust materials also ensure durability and stability for children and families.

The use of 3D printing enhances the efficiency and scalability of the entire system of components. If a module is damaged, it can be reprinted and replaced without the need of complex tools. This approach facilitates expansion beyond the context of the Pineta Dannunziana Park, making it possible to replicate and implement the project in any urban park worldwide.

Symbiotic Path redefines urban parks by transforming them into dynamic, engaging, and ecologically integrated spaces having a higher social purpose. The project fosters deeper engagement, environmental awareness, and inclusive recreational opportunities by prioritising connectivity between people and nature. Future developments could focus on refining the modular system based on user feedback and expanding its adaptability to various urban contexts. By balancing education, play, and sustainability, Symbiotic Path introduces a model for reimagining public parks as interactive, inclusive, and environmentally responsible spaces.

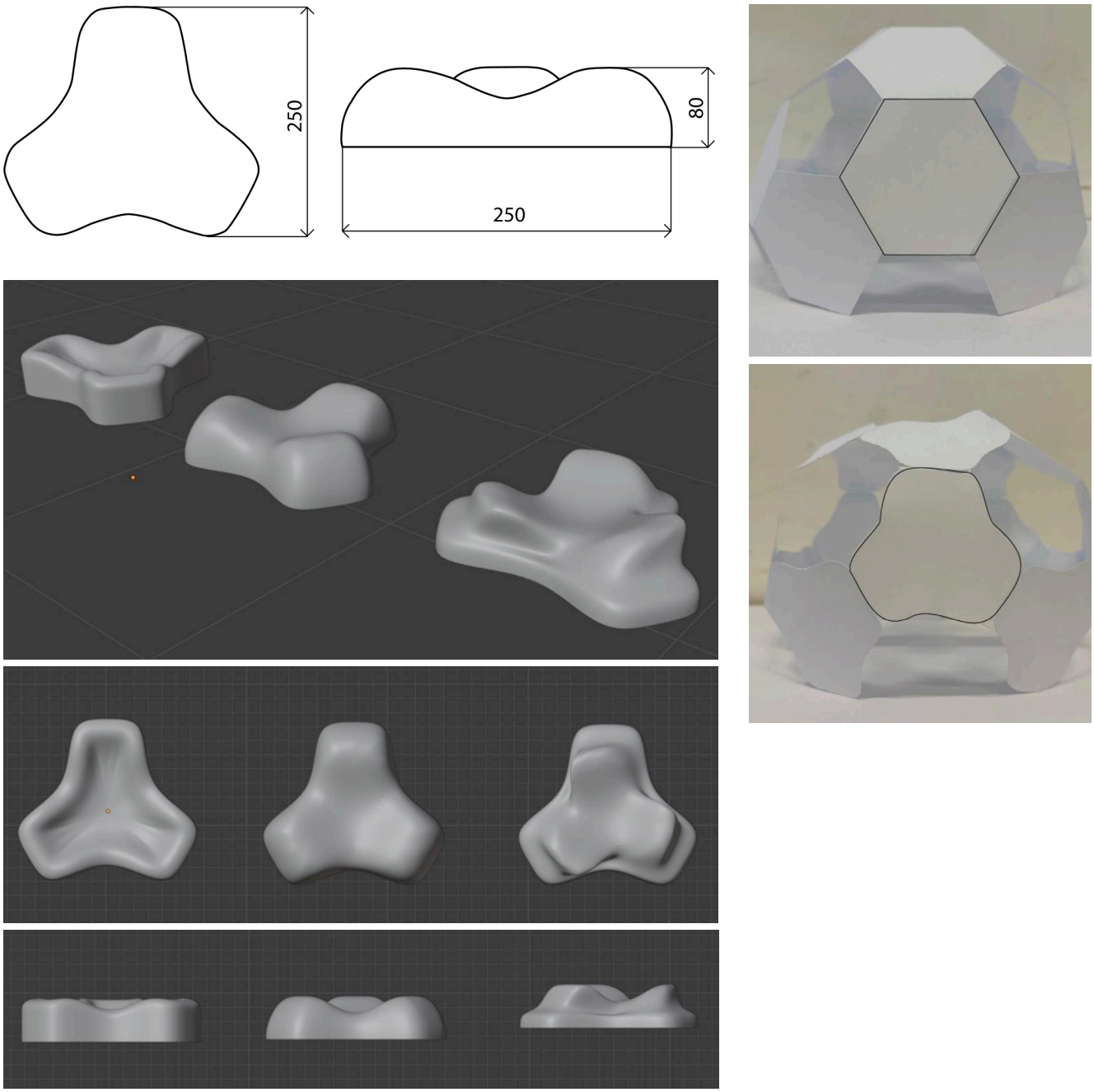

Fig. 1 The research process of the Symbiotic Path project: Technical design (top), design for 3D printing and assembly (middle and bottom), and study of spatial configurations (right).

Fig. 2 3D-printed prototypes used for the technical development (left) have been used in combination with renderings and full simulations (right) to assess the potyentialities of the project in promoting flexibility and higher biocompatibility.

Momento

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Momento

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Pescara's urban natural parks often lack adequate shaded areas, accessible seating, and well-maintained facilities. This limits park's usability for diverse activities to multiple users. The Momento project (Figure 1 and 2) addresses these challenges by proposing an innovative design for sustainable and inclusive structures. Inspired by nature and its biological behaviour (i.e., natural cycles), the project focuses on creating ephemeral and multifunctional seating solutions that serve human and ecological needs. The proposed solutions initially provide shade and seating for visitors and later degrade to promote highest biocompatibility with local ecosystems, blending functionality with environmental protection.

Contextual research performed through field explorations have allowed to identify some key issues across several locations in the Pescara area: the Inclusive Ecological Beach suffers from a lack of accessibility and shaded areas, The Ex Caserma Di Cocco Park has deteriorated tables, poorly designed seating, and no communal spaces, while the Pineta Dannunziana Park features underutilised spaces, lacks shade, and reveal numerous barriers. The recurring problem of insufficient shade significantly limits outdoor activities. The idea behind this project is to create sustainable and inclusive shaded areas through innovative design and manufacturing techniques.

Momento proposes a nest-inspired structure that enhances urban and natural spaces through improved sustainability (materials and manufacturing processes), aesthetics (shapes and semantics), and inclusivity (activities promoted). These integrate seamlessly with the natural environment, providing comfort and utility while releasing beneficial substances into the environment to enrich the surrounding area as they degrade over time.

The design strategy prioritises accessibility and inclusivity by ensuring that the solution accommodates diverse user needs. Openings of at least 80 cm allow wheelchair users and individuals with reduced mobility to interact and move comfortably. The solution also promotes community engagement by incorporating areas suitable for social gatherings, study sessions, and relaxation. By considering different user needs, including those of families, students, and individuals with limited mobility, Momento creates a welcoming and functional environment.

The materials selected for the project emphasise sustainability and environmental biocompatibility. The outer structure is designed using 3D printing with sand or limestone, materials that naturally degrade and enrich the environment once disintegrated. The internal frame can be made by concrete enriched with eco-friendly additives to ensure strength during use while contributing positively to the ecosystem once the structures reach the end of their lifespan.

One of the main aspects characterizing Momento is its ephemeral nature. The solution transforms over time, leaving behind frameworks that serve as shelters for the local fauna or contribute to soil enrichment. On beaches, the remains act as a natural herbicide for invasive species, while in parks, they improve the quality of soils, supporting the growth of the flora. This dual functionality aligns with the principles of circularity and ecological sustainability.

The modular nature of the structures allows for efficient manufacturing and installation. Advanced techniques such as robotic 3D printing may be used to enable on-site production, reducing transportation costs and environmental impact while supporting local manufacturing economies. This localized approach not only minimizes the carbon footprint associated with transporting materials but also fosters community involvement in the construction process, creating a sense of ownership and pride among residents.

The inclusion of colour indicators provides information to communicate the status of material degradation, ensuring user safety by showing when the integrity is becoming compromised. Momento highlights the potential of sustainable design to address critical urban and natural issues while fostering connections and inclusivity between people and nature. By focusing on the natural lifecycle of its components, the design ensures that they serve both immediate and long-term purposes, transitioning from human utility to ecological benefit. This approach reflects a deep commitment to environmental protection and innovative problem-solving.

Furthermore, the design encourages biodiversity by integrating native plant species into the surrounding areas, creating habitats for various wildlife. By prioritising sustainability, inclusivity, and functionality, Momento offers a visionary model for urban design that celebrates the interplay between human activity and the environment. This holistic approach not only enhances the aesthetic appeal of urban spaces but also promotes a deeper understanding of our relationship with nature, inspiring future generations to embrace sustainable practices.

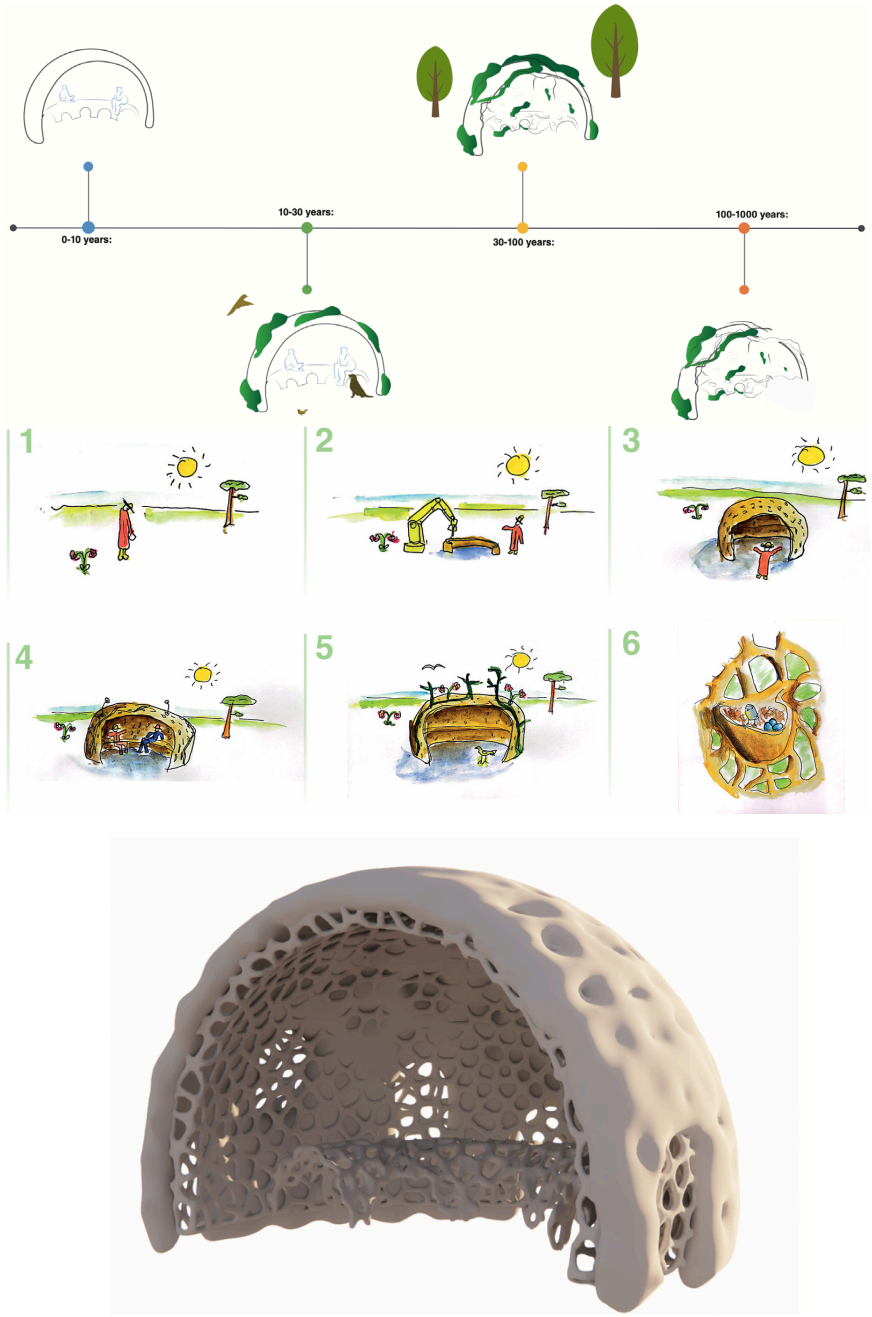

Fig. 1 Cocentualization of the Momento's lifecycle (top and middle), preliminary design of the nest-inspired structure (bottom), and evolution of the project over time (right).

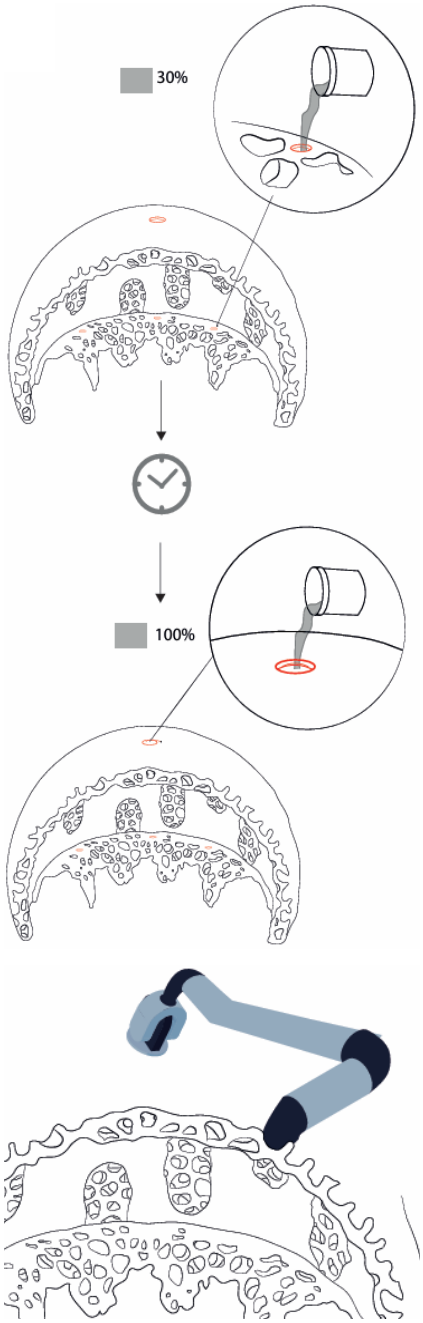

Fig. 2 Study on the manufacturing techniques used for the innovative 3D printing of the solution (left) generates a novel solution that fully itegrates in the natural environment (right).

Dannunziana Forrest Crown

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Dannunziana Forrest Crown

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Urban parks in Pescara, such as the Pineta Dannunziana Park and the Villa de Riseis Park hold great potential for ecological enhancement and recreational activities. However, challenges such as confusing trails, inadequate shade, accessibility issues, and deteriorated equipment limited their use. Dannunziana Forest Crown (Figure 1 and 2) aims to address these weaknesses by introducing an elevated sustainable pathway ideated to enhance accessibility, safety, and user experience for all users. This concept combines advanced sustainable materials and manufacturing technologies with inclusive design principles to foster a harmonious connection between humans and natural elements.

Contextual research performed across five locations in Pescara revealed common issues, including poor water supply, insufficient seating areas, lack of recycling systems, and inadequate information for tourists. Specific problems such as broken playgrounds, graffiti, inaccessible paths, and disorganised trails further emphasised the need for structured and inclusive interventions. The initial research also considered diverse user needs, and this was done through the creation of personas that allowed the identification of key user groups such as a wheelchair user, a student, and a retired individual. These profiles guided the design stages toward creating improved levels of accessibility, comfort, and engagement.

Therefore, the design attention was on the development of a modular, accessible, and environmentally integrated pathway – made by modular elements – to enhance functionality while preserving the natural landscape. Dannunziana Forest Crown consists of an elevated pathway crossing the Pineta Dannunziana Park. It connects several key areas within the park while offering an immersive experience for users, including disabled ones. Inspired by organic shapes, the structure employs modular 3D-printed concrete components supported by wooden pillars, which ensure both durability and a natural aesthetics. This elevated design reduces ground-level disruption while providing visitors with unique points to admire the park's biodiversity.

The pathway is designed to accommodate a wide range of users, including those using wheelchairs, and families with strollers. By offering a seamless, safe, and engaging experience, the pathway encourages exploration and

interaction with nature.
The design prioritises modularity and sustainability: each segment of the pathway is made of a 3D-printed module using High-Performance Concrete (HPC), which provides exceptional strength, design flexibility, and cost efficiency. The use of 3D-printed HPC also ensures precision and efficiency, reducing material waste while enabling complex geometries.
The modular components are linked with steel-made connection rings, allowing easier assembly and disassembly. Furthermore, modularity makes the pathway capable of adapting to a multitude of conditions. This flexibility ensures the pathway's long-term viability and scalability, making it a replicable model for other urban parks facing similar challenges. The ability to modify and expand the Dannunziana Forest Crown's shape allows for continuous improvement and better response to environmental conditions, as well as meeting user needs.
Recycled pine wood is used for the pillars, which also reinforce the pathway's ecological integration. Recycled wood elements align with circular economy principles, demonstrating how reflexive design can merge functionality with ecological responsibility. The honeycomb-like design chosen for the surface pattern of the modules enhances structural stability and creates an engaging interplay of light and shadow. This shape allows sunlight to filter through, mitigating damages caused by shade on the vegetation below.
Dannunziana Forest Crown defines strategically placed rest areas and viewing platforms that provide opportunities for visitors to pause, observe, and interact with natural ecosystems. These spaces include seatings made from recycled wood composites, offering comfort while maintaining environmental responsibility.
Dannunziana Forest Crown redefines urban parks as dynamic spaces by balancing human activity and ecological preservation. By addressing critical issues such as accessibility, sustainability, and user engagement, the project enhances both the functionality and the aesthetic value of parks. By elevating the visitor experience, it fosters a deeper appreciation for the natural environment while protecting sensitive ecosystems. Future developments could focus on refining the design through real-world implementation and user feedback. Research into advanced materials and construction techniques could further enhance sustainability and scalability in other areas showing similar issues. Accordingly, Dannunziana Forest Crown serves as a forward-thinking model for urban park design, demonstrating how innovative interventions can transform public natural areas into inclusive, engaging, and ecologically responsible environments.

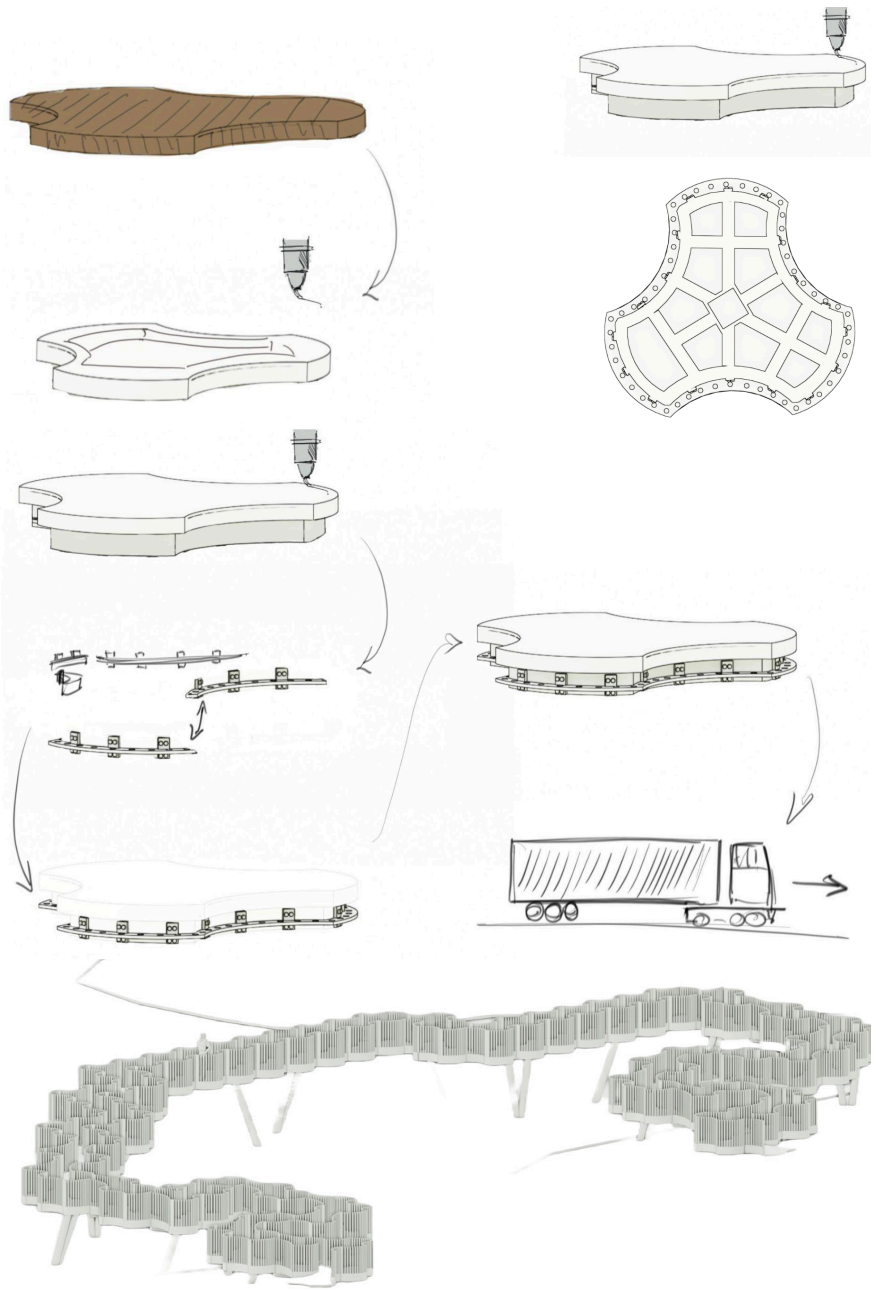
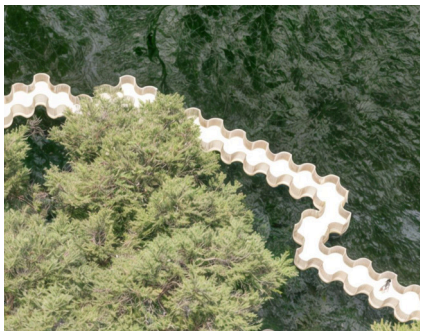


Fig. 1 Development stages suggested for the Dannunziana Forrest Crown project: Selection of materials and 3D printing techniques (top), post-assembly and delivery (middle), and final assembly of the structure to create accessible pathways.



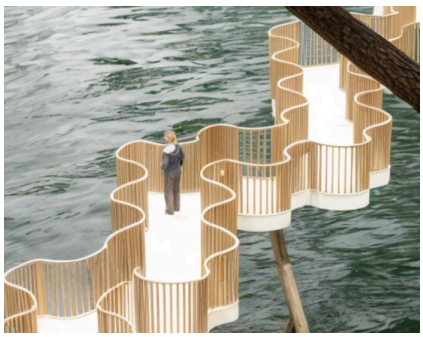


Fig. 2 Renderings and simulations of the project in the Pineta Dannunziana Park show the different configurations in relation to possible uses, both temporary and permanent.

Growing Space

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Growing Space

Rosa Morinelli, Natália Poláčková, Marta Filipa Veiga Esteves, Obbiageri Pia Böbs

Growing Space stands as an empathic project to the evolving needs of public spaces and is focused on the Pineta Dannunziana Park in Pescara (Figure 1 and 2). Recognised for its natural charm and power to host diverse activities as well as animal species, the Park also highlights a significant lack: the absence of comfortable, private, and shaded areas to accommodate users who want to enjoy of its flora and fauna.

This project redefines the urban park as a place for both community interaction and personal relax, addressing a variety of needs through innovative and sustainable design solutions. By integrating modular elements that are both functional and aesthetically pleasant, the project seeks to transform how individuals and groups experience public spaces inclusively and sustainably.

The main goals at the basis of the design scenario of Growing Space are clear. It aims to enhance inclusivity and personal well-being by introducing multipurpose and adaptable elements. The design promotes privacy, shade, and sustainability, bridging the gap between collective activities and individual needs. Finally, the use of advanced manufacturing processes is seen as a means for local innovation and better biocompatibility.

A user-centred approach guided the development of the design stages. By using personas to identify different park visitors, such as families, tourists, students, and elderly citizens, it was possible to identify clear user needs. Besides, the research considered the local flora and fauna. These personas helped refine the overall design to ensure it meets the diverse needs of users.

The design of Growing Space introduces modular elements that seamlessly integrate with the park's landscape, offering shaded areas and private spaces while maintaining versatility in their use. Each module measures 0.5 metres in height and 0.3 metres in width, with the ability to be extended up to 2.5 metres using sunshades. These elements are designed to be applied on different environments, including parks and beaches; accordingly, they can meet the needs of multiple users. The organic shape ensures a natural aesthetic that blends with the surrounding landscape.

To further enhance the functionality of its elements, the design incorporates additional features such as a water collection system that provides

a fresh source of water for animals. When arranged into a nest-shape, the system offers added comfort and creates an intimate space for relaxing. These enhancements shape Growing Space into a multifunctional system of components that extends beyond conventional solutions. It encourages interactive user experiences. The modular design allows visitors to engage with the space in a way that suits their needs, including study or group activities. Growing Space provides tactile and sensory elements to further enhance the connection between people and the surrounding environment.

Considerations on manufacturing and the use of ecological materials play a crucial role in the realisation of Growing Space. The proposed use of a Delta Clay 3D printer allows for the creation of durable and complex geometries while minimising the waste of materials. This method ensures higher scalability, allowing the modular units to be easily assembled, disassembled, and transported as needed. The adaptability of the design ensures its effectiveness across multiple contexts of uses, reinforcing its long-term sustainability. About materials, clay was chosen for its durability, thermal resistance, and natural aesthetics, allowing vegetation to grow along its rough texture. A waxed canvas, a breathable and water-resistant fabrics, were selected for the shading elements to provide UV protection and comfort under diverse weather conditions.

Growing Space exemplifies a forward-thinking approach to urban park design, addressing the multifaceted needs of contemporary society while fostering a deeper connection between individuals and their environment. By prioritizing inclusivity, comfort, and sustainability, this project not only enhances the user experience within the Pineta Dannunziana Park but also sets a precedent for future public space initiatives. The innovative use of modular elements and advanced manufacturing techniques reflects a commitment to ecological responsibility and local innovation, ensuring that the park remains a vibrant and adaptable space for future generations. As urban areas continue to evolve, Growing Space serve remarks the potential role of public spaces to be more than mere recreational areas. They can become sanctuaries of well-being, fostering social interaction, personal reflection, and a profound appreciation for nature. By championing a holistic approach to design that prioritizes the needs of all users, Growing Space inspires a broader movement towards creating inclusive, sustainable, and engaging public spaces worldwide.

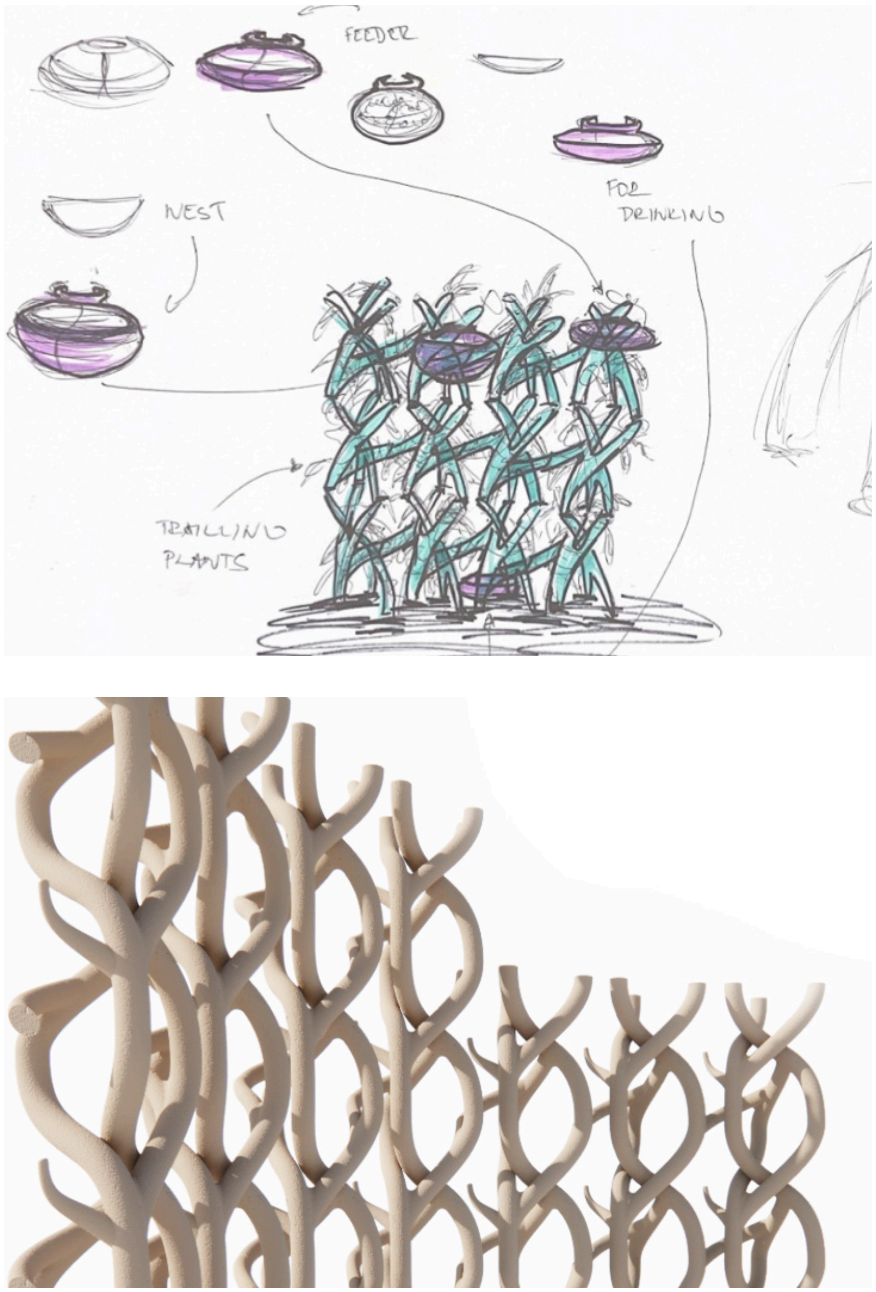

Fig. 1 The design research process of the Growing Space project: Sketching and conceptualization (top left), digital modelling (bottom left), storyboarding (top right), and technical optimization of components (bottom right).

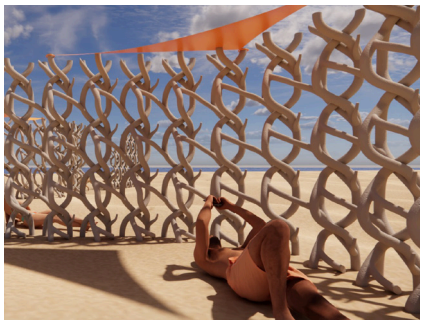

Fig. 2 Renderings of the solution and analysis of different contexts of uses: Relaxing area at beach (top left) and social space in a natural park (top and bottom right).

Eco Embrace

Giovanni Peluso
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Eco Embrace

Giovanni Peluso, Radka Knezovičová, Raquel Sofia Pereira Moreira, Maria Steidel

The Eco Embrace project (Figure 1 and 2) redefines the relationship between humans, animals, and the natural environment, focusing on the Pineta Dannunziana Park as its main testing ground. By recognising the park's inclusivity, with accessible paths and spaces, the project addresses ignored challenges such as the unhealthy state of the central lake and the limited opportunities for meaningful human-nature interaction. The aim was to create a multi-sensory, inclusive, and sustainable solution that transforms how visitors engage with the park while improving its ecological health. This vision is rooted in the integration of human and animal activities, inspired by natural shapes, and supported by environmentally friendly materials. At its core, Eco Embrace strives to blend functionality and aesthetic appeal to foster a sense of connection and inclusivity.

The project is a visually compelling frame-shaped solution that supports sensory explorations, social interaction, and ecological revitalisation. It seeks to create a holistic experience for all users where the park's natural beauty is enhanced and its functionality expanded for diverse audiences, including families, wheelchair users, children, and wildlife.

The main feature of Eco Embrace is a multi-level structure inspired by organic tree forms, designed to seamlessly integrate with the landscape of the Pineta Dannunziana Park. By bridging both land and water, the solution enhances the accessibility for visitors while concurrently serving as a habitat for local fauna. This approach fosters symbiotic relationships between humans and the surrounding ecosystem, promoting spontaneous coexistence and ecological sustainability.

A major environmental concern identified in the research phase was the poor health of the lake in the Pineta Dannunziana Park, which is characterized by excessive algae growth and worsening of water quality. To contrast this emergency, the Eco Embrace incorporates aquatic plants that naturally filter pollutants – this is indented to significantly contribute to improve the quality of the water over time. The use of specific plant species ensures that they contribute to the ecological balance when placed in the operative enviroment.

The interactive aspect of the project is a fundamental part of the whole design; it engages visitors on multiple sensory levels. Visitors can be pas-

sive observers or active actors of the action of preserving the park's ecosystem. Eco Embrace provides a space where individuals can engage with their surroundings through touch and sound, deepening their connection with the natural world. Sensory elements such as textured surfaces, water components, and interactive pathways allow visitors to experience the nature in a more intimate and immersive way. In this case, the structure acts as an educational tool, offering inclusive experiences through interactive panels that inform all visitors about the quality of the local ecosystem, as well as the importance of biodiversity, and the value of sustainable living practices.

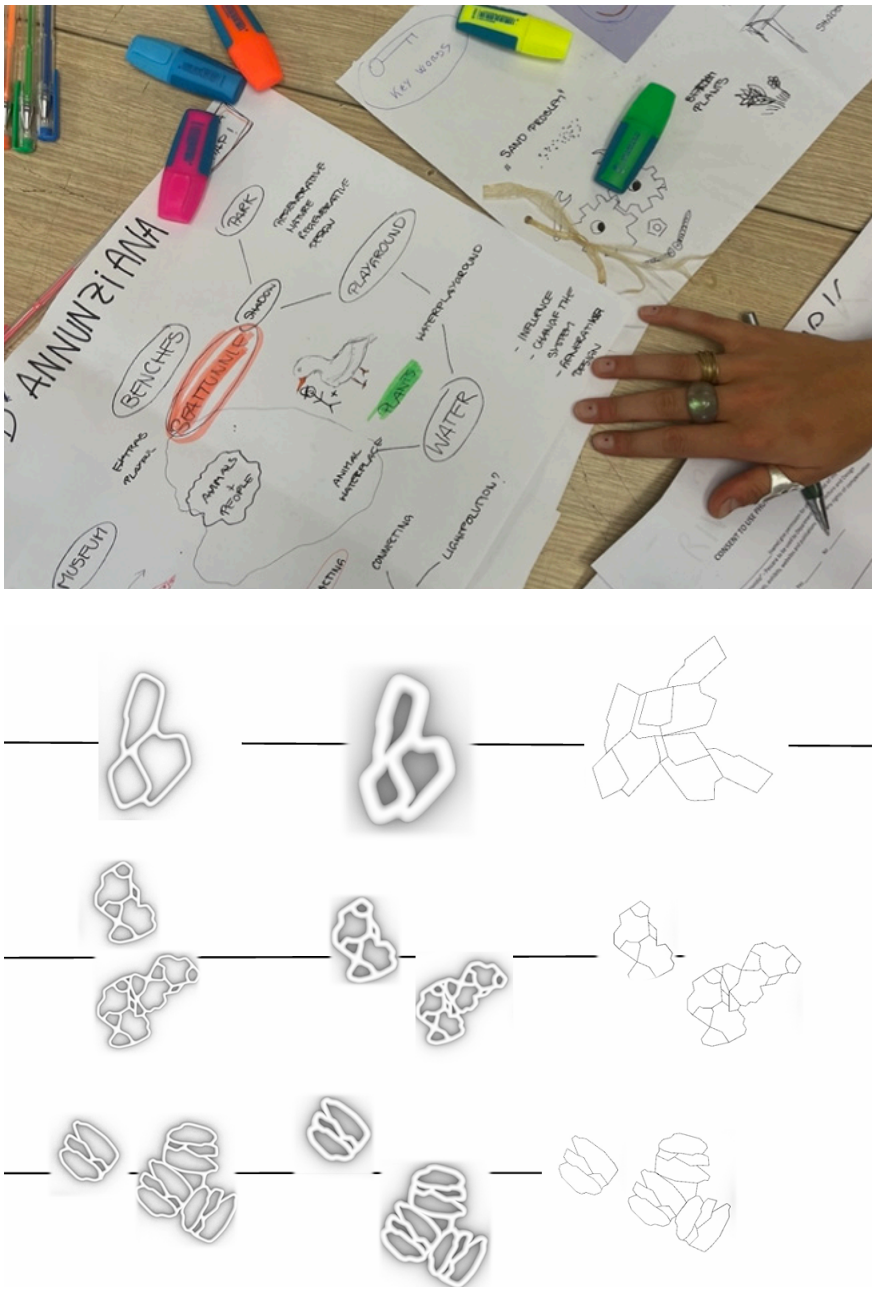
The interior features patterns derived from tree-inspired motifs, which cast a dappled light and create an immersive natural space. These provide a balance between shade and light, ensuring comfort and visual appeal. Various openings meet the needs of a diverse audience, including wheelchair users, children, and families; this creates accessibility for all. Additionally, smaller entrances and alcoves invite interaction with wildlife, reinforcing the project's commitment to biodiversity.

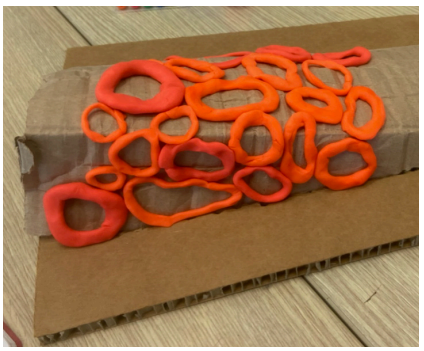
By integrating educational elements, Eco Embrace encourages environmental awareness and community involvement, inspiring future generations to embrace more sustainable habits.

Sustainability is the second key aspect of the project. Materials such as clay, eggshells, and coffee grounds were selected for their sustainable properties (i.e., biodegradability and durability), making them ideal for full integration with the natural environment. The use of 3D printing technology allows for the precise and efficient manufacturing, reducing material waste while enabling the realization of intricate details. This modular construction also facilitates future expansions and modifications, ensuring long-term adaptability; this ultimately produces evolutions in the environment rather than disrupting it.

A unique feature of Eco Embrace is its dynamic integration with local flora. Plants are embedded within the frames to grow sustainably. Over time, these plants enhance the design's visual and functional appeal, providing natural shade, improving air quality, and creating habitats for birds and insects.

By prioritising ecological restoration and human-centric design, Eco Embrace demonstrates how urban spaces can be transformed into sustainable, interactive, and inclusive environments. The project is a step forward the harmonisation of public spaces with natural environments, setting an example for future ecological and architectural developments in urban parks.





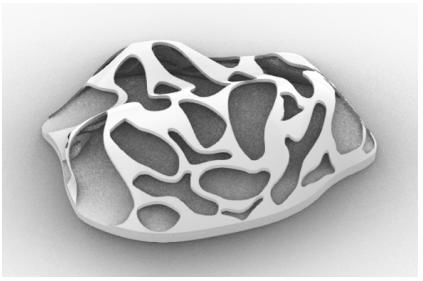


Fig. 1 The design research process of the Eco Embrace project: Research and analysis (top left), conceptualization of shapes (bottom right), sketching (top right), prototyping (middle right), and digital modelling of proposed solution (bottom right).

Fig. 2 The use of 3D-printed study prototypes (left) improved the refinement of shapes and the creation of realistic full simulations into natural environments (right).

Poly-Connect Reef

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Sara Filipa Oliveira Pereira
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Julius Ławnik

Poly-Connect Reef

Cecilia Molon, Dorota Krkošková, Sara Filipa Oliveira Pereira, Laura Krotky, Julius Ławnik

Public urban spaces in Pescara, such as the Ex Caserma Di Cocco Park, hold significant potential for ecological and social enhancement. However, challenges such as plastic waste accumulation, lack of engagement in recreational areas, and insufficient community participation hinder their full potential. Poly-Connect Reef (Figure 1 and 2) aims to address these issues by introducing a flexible installation made by modular elements that fosters environmental responsibility and social inclusion. Using recycled materials and interactivity in a system-oriented design vision, the project seeks to create dynamic and sustainable urban interventions.

Contextual research conducted across various locations in Pescara highlighted key issues like the absence of shaded areas, inadequate seating, and the lack of sustainable waste management systems. Observations have also revealed underutilised public spaces with limited community engagement. To address these challenges, the project incorporates a participatory approach where residents can contribute to the collection and the transformation of plastic waste. The design process also considered the needs of different user groups. Families can benefit from shaded areas where children can play safely, students can gain access to quiet and comfortable spaces for study, and teenagers could find engaging social hubs within the proposed installation. As a result, Poly-Connect Reef is developed as a modular, interactive, and environmentally integrated system having a strong social vocation that meet various needs, both social and ecological.

Poly-Connect Reef is designed as a flexible solution that utilises recycled plastic waste collected from local sources. The design incorporates a modular system of interlocking components, which can be arranged to create shade, play areas, and social hubs. These structures aim to revitalise public spaces by making them more inviting, interactive, and adaptable to various community needs.

The project encourages active participation through organised events where residents collect plastic waste from beaches, parks, and streets. The waste is processed into raw materials for 3D printing, ensuring that the final installation is entirely made from recycled plastic. This hands-on approach fosters environmental awareness and community engagement

while demonstrating innovative ways to repurpose waste within the cultural framework of sustainable behaviour.

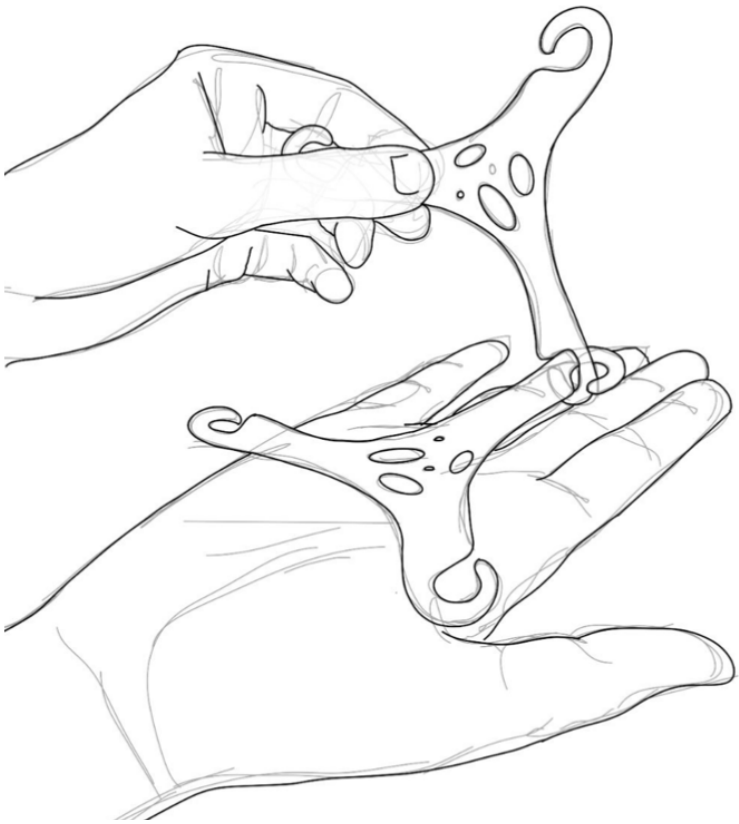
An essential feature of the project is its adaptability. The structure is made up of small modules, 10 cm x 10,5 cm thick each, that look like hangers.

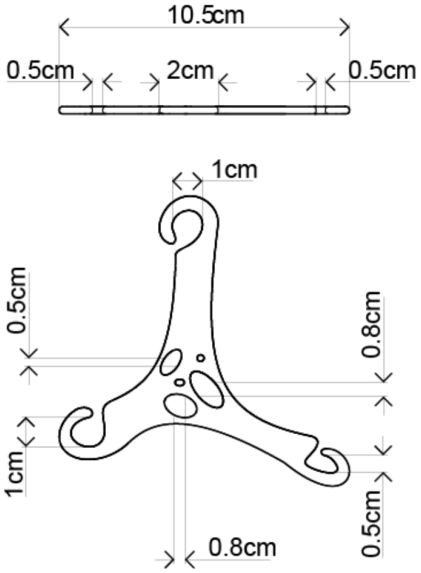
The modular elements allow users to propose and configure a variety of structures in many ways; this supports creativity and ensures that the result produced can evolve over time. This new quality of dynamism introduced by this project allow to accommodate different functions, such as shading rest areas, creating collaborative workspaces, or arranging interactive play zones. The lightweight yet durable nature of the elements allows for easy transportation and repositioning, ensuring long-term usability and flexibility. The modular system can be expanded endlessly, or rearranged to suit seasonal events in the form of pop-up exhibitions or community workshops, which further increases the project's relevance.

The selection of a suitable material for this project played a crucial role, especially when related to issues such as sustainability and functionality. The use of recycled plastic ensures that the project actively contributes to waste reduction, while 3D printing technology allows for precision and minimal waste of material. Thus, the elements are designed to be weather-resistant. Additionally, the incorporation of lattice-like patterns allows the natural light to filter through while providing structural stability.

Colour was use as a vibrant variable to enrich the aesthetic quality of the compositions and the combinations is therefore promoted. This later creates a visually stimulating and engaging experiences. Accordingly, improved appeal of parks' aesthetic is proposed. The interplay of light and shadow creates a dynamic environment that changes throughout the day, offering different experiences depending on the different conditions.

By merging recycled materials, modular adaptability, and community-driven participation, Poly-Connect Reef transforms urban spaces into sustainable, inclusive, and visually engaging environments. It stands as a proof to the power of design in fostering ecological responsibility, social engagement, and urban renewal by offering a replicable model for future sustainable city projects.





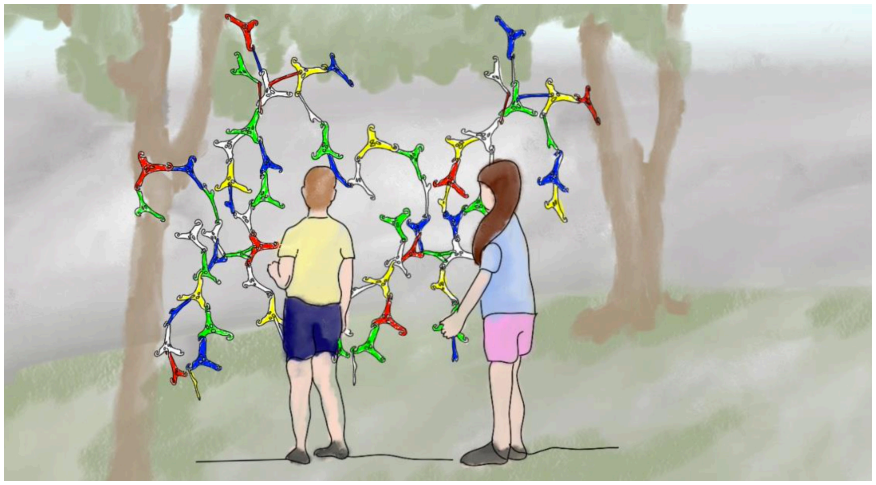


Fig. 1 The use of modular user-friendly elements (top left), based on a detailed technical design (top right), promotes the free creation of dynamic solutions (bottom left).

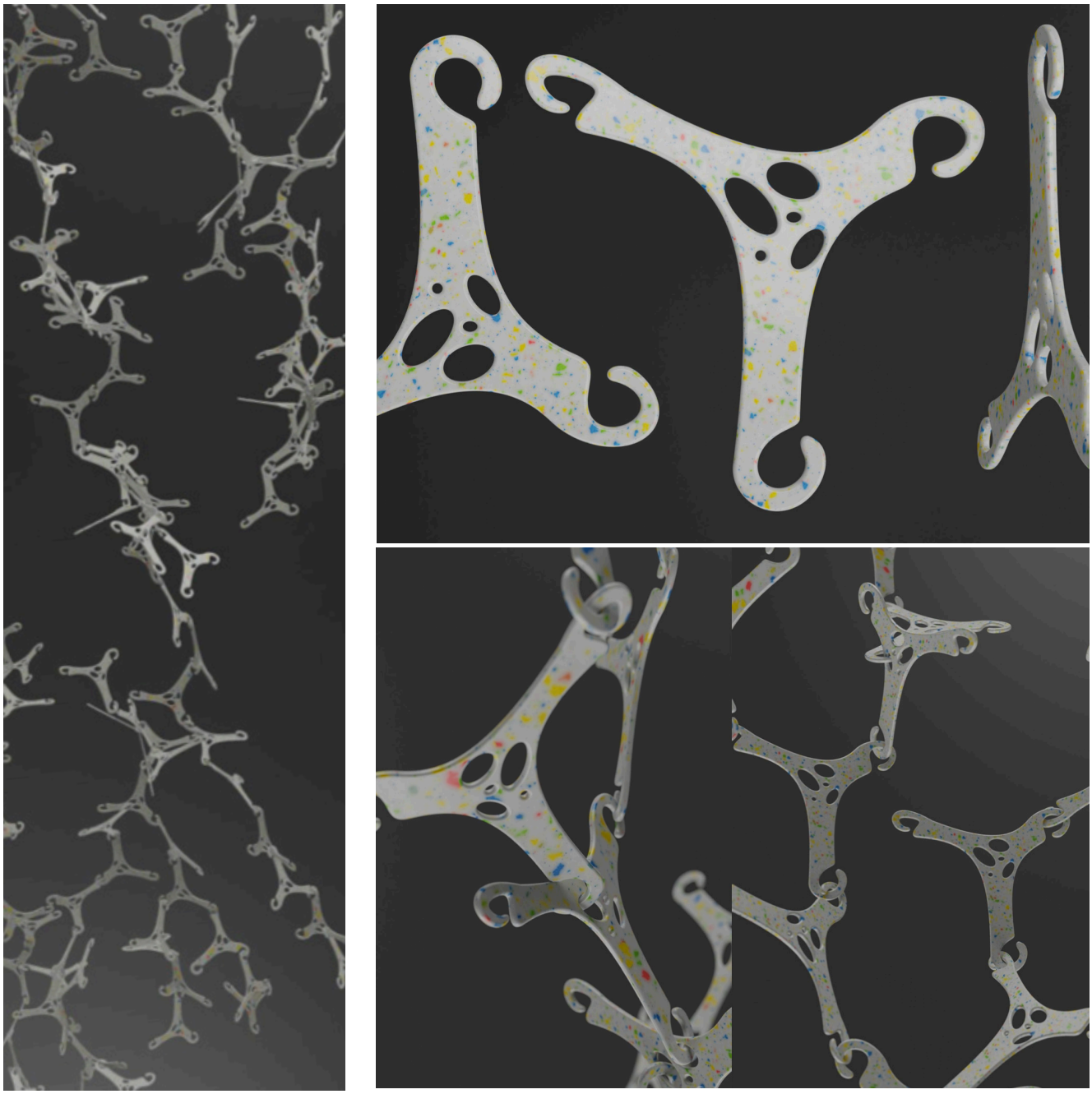


Fig. 2 Realistic renderings of Poly-Connect Reef to show the dynamic nature of the project, the spatial configurations, and the use of recycled materials for 3D printing.

PART 3
CONCLUSIVE COMMENTS FROM UNIVERSITIES

InDeSIS: The opportunity to do more and better

Massimo Di Nicolantonio
Alessio D'Onofrio

InDeSIS: The opportunity to do more and better

Massimo Di Nicolantonio, Alessio D'Onofrio

This article discusses the transformative impact of the Erasmus+ programme on higher education in Europe, particularly focusing on the "Gabriele d'Annunzio" University of Chieti-Pescara in Italy and the contribution of Blended Intensive Programmes (BIPs) in shaping better teaching and learning environments. The article highlights the InDeSIS initiative, which emphasizes social inclusion and sustainability in Design education.

Introduction

European international mobility projects in the field of higher education aim to train new generations of professionals to think responsively and with an international mindset, contributing to the formation of active, responsible, and supportive citizenship.
Since the 1980s, Erasmus+ has played a fundamental role as a key incubator for the entire education sector. The programme is characterized by an increasing need to develop educational methods and models that include study experiences abroad, which are essential for cultivating high-quality transversal skills and fostering open approaches to market readiness. Since the 1980s, the Erasmus+ programme has reinforced its structure from a systemic perspective by introducing and implementing new rules. The 2021-2027 European Framework Programme introduced new and challenging opportunities for students, one of which is the new formula of Erasmus+ Blended Intensive Programmes (BIPs). For higher education institutions, the participation in such mobility programmes provides access to a wide array of transnational and transdisciplinary activities. In this context, students can benefit from innovative teaching and learning models, which both directly and indirectly contribute to shaping a European-wide educational arena.
Promoting higher employment opportunities in Europe and beyond is a mission offered to all students through access to high-quality programmes abroad, fostering a spirit of fairness, social cohesion, and friendship. In Italy, many academic institutions benefit from this type of funding. The investments extend beyond schools to all institutions interested in training, including academic, professional, and vocational entities.
The main goal of this programme is to establish best practices for a more sustainable and inclusive society. All institutions are committed to

strengthening aspects that facilitate international mobility, including the creation of modern educational infrastructures such as libraries, reading rooms, digital spaces, and media libraries for foreign languages. The increasing opportunities for networking and new partnerships make these practices enriching and beneficial for various educational fields, as well as for research. Cultural enhancement fosters the sharing of best practices across multiple academic communities, ultimately improving and refining teaching curricula, pedagogical models, and providing grounds for international research and collaboration. Various stakeholders are involved, from teaching staff to administrative personnel, and from management roles to entry-level academics. All these conditions create a flourishing baseline to promote alliances beyond geographical boundaries and the professional realm of higher education.

Policy statement of the "Gabriele d'Annunzio" University of Chieti-Pescara on the Erasmus+ programme

Internationalization is an increasingly important focus for the Abruzzi Region in Italy. The key interventions can be summarized as follows: improved participation in mobility programmes, enhanced research and cooperation for projects involving international partners, the ability of institutions to attract students, teaching staff, and researchers, and a higher number of international professionals drawn to the Region.

The "Gabriele d'Annunzio" University of Chieti-Pescara is strongly committed to enhancing its level of internationalization. The overarching goal of the governance is to strengthen its relationships with international partners to provide growing opportunities for its academic community, which consists of approximately 25,000 students and over 2,000 academics and staff. Internationalization is a primary objective and a key component of the University's strategic plan.

This identity is based on a strategy aimed at training European citizens who understand the values and culture of their own country while also recognizing and appreciating other cultures and languages. The opportunities offered by the Erasmus+ programme enable students and staff to spend time abroad, hosted by European and non-European universities, companies, and political institutions, allowing them to learn about different customs, training, and work contexts. Participants in the Erasmus+ programme can deepen their knowledge of foreign languages and various educational and social systems, study European cultural heritage, and contribute to its dissemination.

The Erasmus+ programme represents an ecosystem capable of fostering long-term institutional and human relationships through participation in cooperation, research, and teaching projects. It promotes the introduction of innovative advances and enhances the quality of teaching, leading to the creation and dissemination of cohesive, advanced, and internationally recognized study paths. It also serves as an opportunity to break down social and cultural barriers, offering both students and staff the chance to create a better future for themselves, improving their prospects for success, broadening their academic, professional, linguistic, and cultural horizons.
Under the Erasmus+ programme, the University primarily pursues the Key Action 1 mobility. This initiative aims to internationalize the curriculum and enhance the skills of participants, with the goal of increasing the historical percentages of students who spend time abroad, particularly through the implementation of Erasmus+ mobility projects and consortia. The governance aims to boost outgoing mobility while also welcoming European students and trainees eager to learn about regional and national culture, the Italian education system, and to work with local companies. This aspect of the Erasmus+ programme is particularly active within the Departments. The delegated professors for individual study courses play a crucial role in coordinating directly with the teaching and student bodies. They assist proposing professors in managing and establishing new international relationships and support outgoing and incoming students in preparing for mobility by providing information on the educational offerings of partner universities.
The relationships established through these mobility programmes serve as a foundation for more complex cooperation projects, such as the Erasmus+ Mundus Joint Master's Degrees, The Ingenium European University (co-funded by the European Union), and other opportunities.

The Erasmus+ Blended Intensive Programme

Erasmus+ Key Action 1 has been renewed in the 2021-2027 framework programme with the introduction of the Blended Intensive Programmes (BIPs), which allow joint groups of students and academics from different countries to collaborate on specific tasks, collectively and simultaneously. BIPs incorporate challenge-based learning, where transnational and transdisciplinary teams work together to address challenges, such as those linked to the United Nations' Sustainable Development Goals or other societal issues identified by regions, cities, or companies. Accordingly, higher

education institutions can organize short blended intensive programmes to training for both students and staff.
BIPs offer added value compared to existing courses or training programmes provided by the participating higher education institutions and can be multiannual. By enabling flexible mobility formats that combine physical mobility with a virtual component, BIPs aim to reach all types of students from diverse backgrounds, study fields, and academic cycles.

InDeSIS: A starting point

For the "Gabriele d'Annunzio" University of Chieti-Pescara and the Design Group at the Department of Architecture, the InDeSIS represents an engaging and rewarding experience for both students and teaching staff. It provided a valuable opportunity to train new generations of designers to confidently face new challenges through an innovative teaching and learning pathway that emphasizes international sharing and cooperation, while addressing key issues. This is achieved through the adoption of a range of intellectual methods, instruments, abilities, processes, and outputs.
The first edition of InDeSIS was a collaborative initiative that provided a significant opportunity to strengthen existing international collaborations and to open new avenues for future partnerships. During this programme, students and staff worked side by side to develop innovative solutions for Pescara's urban parks, exploring and proposing original and sustainable solutions at various scales of intervention. It was also an excellent opportunity to introduce students to issues related to sustainable 3D printing processes, thanks to the contributions of external partnerships.
Finally, it is important to acknowledge the emotional and human value of the experience shared during this intensive week. We can take pride in being part of this initiative where both students and staff played a crucial role. It was a tremendous success.

Acknowledgments

The various parts of the present essay are the result of joint discussion between authors. The writing of "Introduction" and "Policy statement of the "Gabriele d'Annunzio" University of Chieti-Pescara" is attributed to Massimo Di Nicolantonio; "The Erasmus+ Blended Intesive Programme" and "InDeSIS: A starting point" are attributed to Alessio D'Onofrio.

InDeSIS: Learning by sharing

Pelin Celik
Sebastian Feucht
Dorian Hieronimus

InDeSIS: Learning by sharing

Pelin Celik, Sebastian Feucht, Dorian Hieronimus

The Erasmus BIP "InDeSIS" provided HTW Berlin students invaluable lessons in design through international collaboration. Engaging with peers from diverse universities enhanced their skills, fostered sustainability discussions, and highlighted the importance of adaptability. The experience underscored the value of cross-cultural exchange, allowing HTW students and staff the unique opportunity to reflect on their practices and identify areas for growth, ultimately enriching their approach to design and social inclusion.

Introduction

The Erasmus Blended Intensive Programme (BIP) provided a unique and enriching opportunity for students to engage in international collaboration while gaining practical insights into the diverse approaches of partner universities. Students and teaching staff from HTW Berlin joined the BIP online lectures and workshop at the University of Pescara, alongside peers from Bratislava and Minho. The in-person workshop, themed "Innovative Design for Social Inclusion and Sustainability: Design Cultures and Creative Practices for Urban Natural Heritage", offered a platform for participants to showcase their design expertise while collaboratively working on solutions to real-world challenges. Over the course of the five-day workshop, students engaged in cross-disciplinary groups, bringing diverse perspectives and creative problem-solving approaches to the table.

Preparations and collaborative learning experience

Prior to traveling to Italy, four introductory lectures were held online, each hosted by one of the participating universities. The lectures covered various aspects of design and methodology, offering students a strong foundation for the in-person workshop. One of these lectures form HTW Berlin, "Holistic Research with UX Methods for Social Inclusion and Sustainability", introduced students to valuable research methodologies that played a crucial role during the in-person workshop in Pescara. The online format allowed for thorough preparation and students had the opportunity to engage in discussions, ask questions and clarify the human-centred design process – a process that varied significantly based on the participants' ed-

ucational backgrounds and perspectives. This early interaction in lecturing and tutoring laid the groundwork for meaningful collaboration during the in-person phase in Pescara.

Exploring the "Gabriele d'Annunzio" University of Chieti-Pescara: Facilities, resources, and practical insights

Upon arriving in Pescara, students were introduced to the creative workspaces and facilities available at the host university. This experience provided insight into the infrastructure that supports the local design education process. Although the university has strong theoretical underpinnings, some students noted the limited access to practical workshops and hands-on spaces compared to their home institutions. Despite the focus on theory, the exchange of ideas and approaches highlighted the strengths of each institution. Pescara stood out for its emphasis on design development and the strong visual quality of its projects, while Minho impressed with its technical execution, Bratislava with the ideation and rendering skills and HTW Berlin's students excelled in research and conceptual thinking.

Collaborative group work and cross-cultural exchange

The group work in Pescara was one of the highlights of the program, as it allowed students to collaborate across cultural and academic backgrounds. Early on, the teams spent time getting to know one another on a personal level, discussing cultural differences and discovering common ground. Each group began by interpreting the task individually, then collaboratively refining their ideas in alignment with group members' strengths and skills. The dynamics of organizing and distributing responsibilities within the group became a key aspect of the experience. Some groups initially faced challenges in aligning their individual approaches – whether focused on technical precision, conceptual creativity, or practical execution. However, overcoming these hurdles was an essential part of the learning process.
As the groups worked through their respective projects, it became evident that the different design priorities among the students reflected their institutional backgrounds. Some focused on highly technical, detailed solutions, while others emphasized conceptual visualizations or innovative, yet practical ideas. This diversity of thought led to rich discussions, enabling students to broaden their perspectives and develop more holistic solutions. Although conflicts occasionally arose, they were often resolved through communication and guidance from faculty, ultimately leading to

stronger collaboration and shared ownership of the final outcomes.

Sustainability discussions and potential for future collaboration

An important topic of discussion throughout the workshop was sustainability, particularly how it is understood and implemented across different contexts. Students from Germany, for instance, highlighted the strong focus on sustainability initiatives in their country, whereas in Italy, there was an observation of limited use of solar panels despite the abundance of sunlight. This discrepancy sparked conversations about the role of policy and infrastructure in promoting sustainability. The workshop reinforced the importance of understanding how sustainability is approached differently across nations and how design can be used as a tool to promote more sustainable solutions at both local and global levels.

Cross-institutional strengths and takeaways

The workshop also allowed for an in-depth exchange of ideas between the participating institutions, not just among students, but also between the academic staff. Each university brought distinct strengths to the table: Pescara's emphasis on drawing and conceptual work, Minho's technical precision, Bratislava's skill in CAD representation and HTW Berlin's strong research and conceptual framework. This collaborative environment allowed the participants to reflect on their own processes and identify areas for growth and improvement. The shared insights revealed potential opportunities for strengthening curricula by incorporating the best practices observed at each institution.
For example, while the Italian students were highly skilled in theoretical analysis, some expressed a desire for more hands-on experience, which is a core component of the curriculum at HTW Berlin and Minho. This exchange of ideas not only benefitted the students but also offered valuable insights for faculty members, who could see potential for curriculum enhancements based on the program's findings.

Challenges, group dynamics and final presentations

The group dynamic was another key aspect of the workshop, as students had to navigate differences in work styles and communication. The organization and delegation of tasks were often influenced by individual strengths

and weaknesses and while this sometimes led to challenges in group cohesion, it ultimately fostered an environment of learning and growth. In some cases, hurdles were overcome through teamwork and mutual understanding, while in other instances, faculty guidance was necessary to help groups navigate more complex challenges. These experiences were particularly valuable, as they reflected real-world project dynamics where collaboration and negotiation are key.
By the end of the workshop, all groups successfully completed their projects, and the diversity of the final presentations reflected the richness of the exchange. Projects ranged from innovative urban solutions to conceptual designs addressing social inclusion and sustainability. The final presentations provided a platform for students to showcase their ideas and the feedback from faculty and peers helped refine their work even further.

Conclusion

In conclusion, the Erasmus Blended Intensive Programme offered invaluable opportunities for intercultural exchange, hands-on learning and the exploration of different design approaches. The program highlighted the importance of collaboration and adaptability, as well as the need for continued dialogue on sustainability and inclusivity in design. The discussions on common systems, such as the need for a unified approach to renewable energy across Europe, underscored the potential for design to play a key role in shaping the future.
Beyond the academic experience, the personal and cultural exchanges between students and academic staff fostered a sense of unity and strengthened the idea of a shared European identity. Many students have continued to stay in touch through social media, maintaining the connections they formed during the program. The academic staff discussed already other options for co-teaching or teaching exchange in short term projects etc. in Berlin.
The chance to participate in such a well-organized, collaborative program, along with the opportunity to contribute to a publication documenting the shared experiences, was an enriching experience for both students and faculty alike. The insights gained will no doubt influence future projects and collaborations, helping to ensure that design continues to evolve as a tool for positive social and environmental change in Europe.

InDeSIS: International inspiration

Martin Baláž

InDeSIS: International inspiration

Martin Baláž

This essay critically analyzes the InDeSiS project, which brought together students and educators from four European institutions, and its impact for the Slovak University of Technology in Bratislava to address inclusion and sustainability in product design. InDeSIS facilitated international collaboration, enabling diverse perspectives and innovative solutions, as well as The InDeSIS project highlighted the significance of dialogue, team dynamics, and an action-oriented approach in design education. The findings – the lesson learnt – support the integration of collaborative initiatives into curricula, emphasizing the pivotal role of the Slovak University of Technology in fostering cross-cultural exchange and equipping future designers to tackle global challenges effectively.

Introduction

Looking back at the InDeSiS project – "Innovative Design for Social Inclusion and Sustainability" – we realize that the main objective was to create a rich international community of designers, students, and educators at one place and at one time. The goal was to harness the immense potential of students and educators from four higher education institutions across four different countries in Europe, leveraging their diverse expertise and skills. This accumulated cultural and societal potential was used to address the challenges of inclusion and sustainability in product design, which, despite the diversity of the collaborating community, are equally important to all. Collaborative projects are essential in design education. Of course, we are familiar with those within the university environment or towards professional practice. These multidisciplinary and interdisciplinary collaborations form the majority of the content in design workshops at academic institutions, typically focusing on the technical and technological aspects of design. However, these are mostly local collaborations. To gain the broadest societal perspective on design, culture, and society itself, it is crucial to expand these local collaborations to an international level, as demonstrated in this BIP.

Synergistic strategy

The InDeSiS Erasmus+ BIP project is precisely the necessary stable international platform that connects product design students from four academic institutions and allows the integration of social aspects of Design, with core topics within this BIP – inclusion and sustainability – beyond the scope of the traditional semester. It is important to recognize that this project is real; it is not just an academic exercise. The fact that it brings together so many different approaches to design, perspectives on design, and cultural viewpoints in student teams, under the supervision of their educators who are advocating their views, makes it unpredictable. Unpredictable in the sense that it is certain that all teams will push their designs beyond the usual framework, out of their comfort zone. What matters is the strategy chosen by the students themselves in their communication, how effectively they will be able to work as individuals on specific tasks, but, most importantly, how much of their personal ambitions they can sacrifice for the sake of synergy within their teams.

International inspiration

The Slovak University of Technology in Bratislava has been collaborating with the “Gabriele d’Annunzio” University of Chieti-Pescara since 2019. Through various projects, we have had the opportunity to get to know and confront their methodological and visual demonstration approaches multiple times. For such inter-institutional cooperation to even emerge, the initial contact is essential. This contact can sometimes happen blindly, and it requires determined and understanding colleagues on both sides. In the vast shared European space, however, we can be certain that even though we may be separated by thousands of kilometres, cultural differences, and we may only meet in person on the day of a joint activity, we simply understand the common goal and meet each other halfway. A similar “leap into the unknown” marked the beginning of our collaboration with the University of Applied Sciences Berlin. I am very pleased that we have now completed such a significant project together and that we have met new colleagues at the University of Minho.
What we have gained from this project, as well as from the collaboration before it, can be called “international inspiration”. It is a unique opportunity for mutual inspiration and motivation for creative development, not only in pedagogical practice but also on a personal level. Such coopera-

tion undoubtedly brings immense benefits for the development of all participants. This project will certainly influence future collaborative projects, ensuring that design is perceived as a tool for positive social and cultural change within the European space. The project helped students better understand how inclusion and sustainability are approached in different countries and how powerful design is as a tool for supporting inclusion and sustainability in the context of each country. The workshop activity at the "Gabriele d'Annunzio" University in Chieti-Pescara provided students with the opportunity to build connections with peers and colleagues from abroad. These connections can assist them in the future, for example, by participating in other international projects or Erasmus+ mobilities.

Dialogue

Every successful collaboration must be based on dialogue – between institutions, within teams, and since this case involves more than just two sides, we can say that it should be a constructive democratic discussion. In this discussion, each participant brings their perspective on design and their views on the design process. InDeSIS began with such a dialogue/discussion in an online space. It provided students with a unique opportunity to engage in international cooperation and gain insights into the diverse approaches of the partner universities – "Gabriele D'Annunzio" University of Chieti-Pescara, University of Applied Sciences Berlin, and University of Minho – initially through online lectures from participating educators, followed by a week-long session at the "Gabriele d'Annunzio" University of Chieti-Pescara, in Italy. The participants exchanged educational experiences during the introductory online lectures, each led by an instructor from one of the participating institutions. The lectures introduced students to various methodological approaches to design. In addition to noting methodological differences, students also observed the emphasis each university placed on different aspects of the design process and demonstrating results.

Action-centric approach

The project placed a strong emphasis on the synergy between team members and the intensive timing of work. As a result, a more research-oriented visual approach prevailed over mere visualization. Nevertheless, the

strengths and weaknesses of each institution became evident. Such an environment of intensive collaboration allowed all participants to perceive their own design processes from a different perspective and identify opportunities for improvement. The Slovak University of Technology in Bratislava adopts an “Action Centric” non-linear approach to design, where visualization is integrated into the research process through image boards, and design sketching is used for rapid communication during the design phase. It was observed that not all institutions followed the same workflow, as some students preferred the Design Thinking methodology. Despite these methodological differences, students overcame challenges through direct confrontation, which proved to be an insightful process for educators. Team dynamics emerged as one of the most significant indicators of both methodological and cultural differences among students, which they might not typically encounter outside of such a project. They had to quickly adopt a strategy of communication with mutual understanding, as it was the only way to successfully manage and complete the project. The project concluded with team presentations, where all teams successfully finalized their work. The diversity of final presentations and proposals demonstrated their international creativity, addressing the themes of inclusion and sustainability with varying levels of innovation.

Conclusion

InDeSIS demonstrated the immense value of collaboration in Design education. Students proved their ability to continuously develop their creative skills and produce complex design solutions in an international setting. The diversity of perspectives on design facilitated a seamless exchange of expertise and skills within teams, serving as evidence of interdisciplinary and intercultural collaboration. Given the increasing importance of teamwork in today’s internationalized environment, the initiative equipped students with the mindset necessary for a professional design career. Initiatives like InDeSIS represent a unique component of design education that should become a stable part of the curriculum, ensuring that the largest possible number of students gain valuable international experience before entering professional practice. InDeSIS provided an exceptional opportunity for intercultural exchange and exposure to diverse design approaches. The project program highlighted the significance of collaboration and synergy in addressing critical topics such as inclusion and sustainability.

InDeSIS: Opportunities, value and benefits

Álvaro M. Sampaio

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Collaborative projects in design education are essential in preparing students for the evolving demands of the global design industry. The InDeSIS project (Erasmus+ BIP) brought together product design students from four Higher Education Institutions (HEIs) to explore Design for Inclusion and Design for Sustainability through a blended teaching strategy. This initiative fostered cross-institutional collaboration, exposing students to diverse cultural perspectives, problem-solving approaches, and emerging design technologies. Cooperation among HEIs enabled knowledge exchange, enhancing students' understanding of global design challenges while fostering professional networks. The findings underscore the value of interdisciplinary and intercultural collaboration in design education, demonstrating that such initiatives effectively equip students with the skills necessary for innovative and socially responsible design practices.

Introduction

Collaborative projects in design education have become increasingly important in recent years (Lane and Tegtmeyer, 2020). The evolving nature of the global design industry requires designers to work across geographical, cultural, and disciplinary boundaries. The InDeSIS project (Erasmus+ BIP) was organized, uniting product design students from four Higher Education Institutions (HEIs), centered on high-quality training on emerging design aspects, such as Design for Inclusion and Design for Sustainability and, implementing a blended teaching strategy. This project offered a unique opportunity to foster cross-institutional collaboration while providing insights into the pedagogical value of teamwork, creativity, and practical problem-solving.

In this text I try to examine the design opportunities that arose from the BIP project, the pedagogical value gained by students, and the overarching benefits of cooperation for the design field. By analyzing student feedback, project outcomes, and the dynamics of the cooperation, it was possible to realize that the InDeSIS was a powerful collaborative project that can effectively prepare students for future challenges in the design industry.

Design Opportunities

One of the key objectives of the BIP project was to leverage the diverse expertise and perspectives from students at the four HEIs. Product design is an inherently multidisciplinary field, requiring designers to engage with various aspects. In this project the focus was on design for inclusion and design for sustainability. In this collaborative environment, students were exposed to different approaches and problem-solving techniques, leading to several design opportunities. The first is the role that cultural differences play in innovation and in design. Bringing together students from different design backgrounds sparked innovation that would have been difficult to achieve individually. Since HEIs were from different countries, experiences were also different, which led to the development of unique product concepts that incorporated not only aesthetic and functional elements but also environmental and social considerations. Moreover, cultural diversity played a significant role in shaping the design outcomes. Students are always willing to incorporate cultural values and local design traditions into their projects, creating products that had global appeal while retaining cultural specificity. This opened opportunities to explore how design can bridge cultural divides and meet the needs of diverse user groups by innovative products. Second, the collaborative nature of the InDeSIS project enabled students to tackle complex design problems more effectively. By pooling their skills and knowledge, students were able to identify and solve issues that might have been overlooked in a more insular design process. Another opportunity that emerged from the InDeSIS project was the exchange of technological knowledge. Each institution had access to different tools, software, and technologies, therefore different capabilities were shared among the participants. This allowed students to experiment with new design technologies, materials, and production methods that they had not previously encountered, further enriching the creative process.

Pedagogical Value

The pedagogical impact of the InDeSIS project was profound, offering students valuable lessons that extended beyond the social or technical aspects of product design. The key pedagogical benefits observed in this project include the development of collaborative skills, real-world problem-solving experience, and a better understanding of the iterative nature

of design. Collaborative design projects provide students with hands-on experience that goes beyond theoretical classroom instruction. The InDeSIS project created a space where students were able to experiment, and iterate on their ideas in real-time, simulating the design process used in professional settings. This type of experiential learning helped students to develop a deeper understanding of the practical aspects of design. Working in teams across all HEIs required students to refine their communication and collaboration skills. Successful product design often hinges on the ability to communicate effectively across various stakeholders, including engineers, manufacturers, and clients (Eckert et al., 2005). The intensive one-week studio activity emphasized these soft skills, teaching students how to articulate their ideas, listen to others, and resolve conflicts in a constructive manner. The studio activity at the "Gabriele d'Annunzio" University of Chieti-Pescara required students to take on leadership roles within their teams. As the projects progressed, students learned to delegate tasks, manage time effectively, and take responsibility for the success of their team's project. These leadership opportunities are essential in preparing students for future roles in the design industry, where managing projects and teams is a crucial part of professional practice.

Cooperation in Design

Cooperation is a fundamental value in the field of product design, and the InDeSIS project underscored its importance at multiple levels. Beyond the technical and pedagogical benefits, cooperation fostered an environment of shared learning and mutual respect among the students. Cooperation between the four HEIs was crucial to the success of the InDeSIS project. Each institution brought its unique strengths, whether in faculty expertise, or student skill sets. The collaborative approach allowed these resources to be shared effectively, enhancing the learning experience for all participants. The collaboration extended beyond institutional boundaries, fostering a global perspective on design. Students learned to appreciate different design philosophies and methodologies, expanding their creative horizons. This cooperative exchange is vital for preparing designers to work in an increasingly globalized world, where products need to appeal to diverse markets and users. The one-week studio activity at "Gabriele d'Annunzio" University of Chieti-Pescara also provided students with the opportunity to build professional relationships with peers from the other institutions. These networks are valuable as students transition into their

careers, offering them access to potential collaborators, mentors, and job opportunities. By fostering a sense of community and cooperation, the project helped students build connections that will continue to benefit them in the future. Moreover, through collaborative discussions, students were able to explore the broader impact of their designs on society and the environment, encouraging a more responsible approach to product design.

Conclusion

The InDeSIS project demonstrated the immense value of cooperation in product design education. By working together, students were able to expand their creative capacities, learn from each other's experiences, and develop practical solutions to a complex design challenge. The design opportunities that emerged from the project were driven by the diversity of perspectives and expertise within each team, underscoring the benefits of interdisciplinary and intercultural collaboration. From a pedagogical standpoint, the project emphasized the importance of experiential learning, and teamwork, equipping students with the skills and mindset necessary for successful careers in the design industry. Moreover, the value of cooperation – whether between institutions, cultures, or individuals – was a central theme throughout the project, reflecting the collaborative nature of professional design practice. By promoting cooperation and shared learning, BIP projects such as this can play a crucial role in shaping the future of design education and fostering the next generation of innovative, socially responsible designers.

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In a rapidly evolving world, the Design discipline emerges as a powerful and interdisciplinary culture capable to address the social and environmental challenges of our time. In this scenario, the role of universities and their international collaboration is paramount to identify and address promising research avenues needed to generate liveable living conditions that are both inclusive and sustainable.
By proposing a collection of essays and projects made by students from four European universities, **"Innovation Design for Social Inclusion and Sustainability: Design Cultures and Creative Practices for Urban Natural Heritage"** explores the transformative role of design in social inclusion and sustainability, offering an innovative perspective on how design practices can contribute to a more equitable and environmentally respectful future. To overcome functionalism and the mere product-centred design cultures, this book outlines both cultural reflections that are today important for the Discipline and the results of a teaching and learning project funded by the Erasmus+ Blended Intensive Programme in the academic year 2023/2024.
This volume is structured into three main parts. The first part analyzes design cultures that promote social inclusion and sustainability, highlighting how design can serve as a reflective creative practice. In the second part, readers are guided through creative design practices, focusing on eight innovative solutions developed for the natural areas of Pescara. Finally, the book concludes with reflections from universities involved in the project, highlighting the importance of a collaborative and shared approach to design innovation.
Designed for scholars, professionals, and students alike, this volume offers a valuable resource for anyone seeking to explore the intersections of design, social inclusion, and sustainability, proposing an integrated and multidisciplinary approach to addressing the challenges of our time.

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