

3-2026

Proceedings of IASDR2025: Design Next

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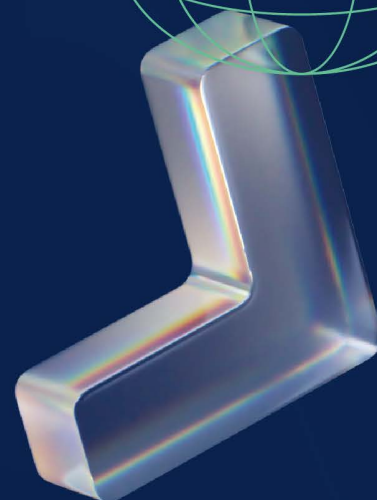
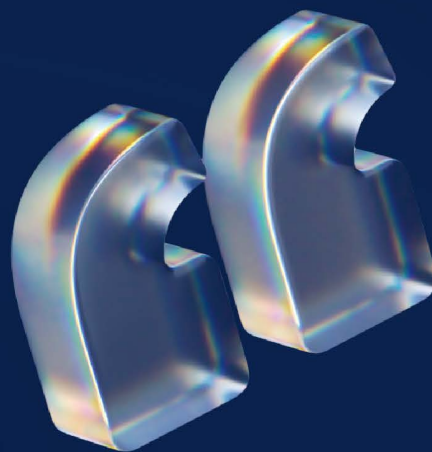
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Citation

Chang, C., Chen, C., and Hsu, Y. (eds.) (2026) *Proceedings of IASDR2025: Design Next*, 2–5 December 2025, Taipei, Taiwan, Design Research Society. <https://doi.org/10.21606/iasdr.2025.cv>

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IASDR
2025



Proceedings of

IASDR 2025

11th since 2005, 20th Anniversary

DESIGN NEXT

11th Congress of the International Association of
Societies of Design Research

December 2nd—5th, 2025
Taipei, Taiwan

PROCEEDINGS OF IASDR 2025

EDITORS :

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IASDR 2025

11th Congress of the
International Association of Societies of Design Research

DESIGN NEXT

December 02–05, 2025
Taipei, Taiwan

Proceedings of the 2025 IASDR Congress

Congress of the International Association of Societies of Design Research

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Taipei, Taiwan

<https://iasdr2025.org/>

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Publication Information

Title

Proceedings of IASDR 2025

Subtitle

Design Next

Conference

11th Congress of the International Association of Societies of Design Research (IASDR)

Dates

December 2–5, 2025

Location

Taipei, Taiwan

Editors

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Chien-Hsiung Chen, Chinese Institute of Design (CID)

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Date of Publication

2026 March

Published by

Design Research Society

85 Great Portland Street

London, W1W 7LT

United Kingdom

Conference Website

<https://iasdr2025.org/>

ISBN (Electronic)

ISBN 978-1-912294-64-0

DOI

doi.org/10.21606/iasdr.2025.cv

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Indexing & Availability

These proceedings are made available in electronic format through the IASDR 2025 conference website.

Submissions have been processed for potential indexing in academic databases including Scopus and Google Scholar.

Dec 2nd, 9:00 AM - Dec 5th, 5:00 PM

Empowering Sustainable Transitions: A Design-Led Capacity-Building Framework

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Gramegna, S.M., Bruno, C., D'Itria, E., Mattioli, F., Melazzini, M., and Pei, X. (2025) Empowering Sustainable Transitions: A Design-Led Capacity-Building Framework, in Chang, C.-Y., Chen, C.-H., & Hsu, Y. (eds.), *IASDR 2025: Design Next*, 02-05 December, Taipei, Taiwan. <https://doi.org/10.21606/iasdr.2025.836>

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iasdr
2025

International Association of Societies
of Design Research Congress 2025
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Empowering Sustainable Transitions: A Design-Led Capacity-Building Framework

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Contemporary emergencies—environmental, social, political, cultural, technological, and productive—call for a radical rethinking of development models, supporting non-linear, decentralized, sustainable, and open solutions. In this context, plural design plays a strategic role by envisioning alternative scenarios, encouraging interdisciplinarity, and activating discontinuous innovation. Design must move beyond serving a single growth model, embracing multiplicity, collaboration, and inclusivity through contextual and interactive solutions. This is the framework of ECODeCK—ECO-Design Circular Knowledge, a project addressing the sustainable transition of Italy's fashion and furniture sectors, which are tightly linked to both local and global socio-cultural systems. ECODeCK project adopts a design-driven approach that integrates systemic design and sustainability into business practices, supporting capacity-building that bridges theory and practice. The project introduces two tools: the Design for Sustainability (DfS) Framework and the Sustainable Transition Comp (ST Comp). DfS Framework maps the evolution from product-centered to ecosystemic design, across three levels: insular sustainability (technical solutions), responsible sustainability (circular business processes and stakeholder engagement), and ecosystemic sustainability (involving communities and policymakers in transformative strategies). ST Comp, meanwhile, offers a transdisciplinary training model built on four core competence areas: values for sustainability, systems thinking, design processes, and agency for change. It highlights design's potential as a driver of cultural, economic, and social transformation. Building on these foundations, a design-based training model is being developed to support individuals, organizations, and ecosystems in co-evolving toward sustainable futures. Ultimately, ECODeCK promotes open and interactive development models, positioning design as a relational practice with meaningful local and global impact.

Keywords: *Design for transition, Design-driven Innovation, Paradigmatic transformation, Design for Sustainability.*

1 Introduction

Tackling the complexity of sustainability through design demands a profound shift in perspective—one that calls for a rethinking of the epistemological foundations upon which design as a discipline is built. (D'Itria et al., 2024). The complexity of sustainability in design is deeply rooted in the historical



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trajectory of the discipline, which has evolved in tandem with major industrial transformations. From its origins in artisanal craftsmanship to its current role within globalized systems of mass production, design has long been shaped by—and responsive to—broader technological and economic shifts. In the early stages of industrialization, design was often seen as a means to restore the aesthetic and functional qualities that mechanized production had diminished, positioning it as a politically charged activity within capitalist economies (Capmourteres et al., 2019). Over time, however, as industrial development accelerated, design became increasingly aligned with consumerist imperatives, reinforcing patterns of unsustainable production and consumption (Schreiter, 2020). This historical entanglement calls for a critical reassessment of design's role in shaping the very systemic challenges it now seeks to address. Design has not only responded to market demands but has actively contributed to the normalization of overconsumption and resource depletion—particularly in sectors such as fashion and furniture, where aesthetic turnover and material intensity remain high (Epstein et al., 2015). Recognizing the anthropogenic roots of these issues is now seen as a crucial step toward enabling sustainable futures. In response, contemporary scholarship has begun to embrace "more-than-human" perspectives, urging designers to engage more fully with ecological interdependencies and non-human actors in their practices (Capmourteres et al., 2019; Ergene & Calás, 2023). Within this broader framework, the fashion and furniture industries stand out not only as major contributors to environmental degradation and unsustainable global supply chains, but also as promising sites for intervention and transformation (Mukerjee, 2015). Their visibility, cultural influence, and material impact make them both strategically and symbolically significant in the transition toward sustainability. Emerging practices in these sectors—such as recycling, upcycling, and material repurposing—demonstrate the potential for shifting away from linear models and toward more circular and regenerative approaches (Torres et al., 2022). Moreover, by embedding sustainability into brand narratives and core business strategies, companies can strengthen consumer trust and market differentiation while fostering broader responsibility within their sectors (Mukerjee, 2015). Thus, the path toward sustainable transformation in design begins with acknowledging its historical complicity and leveraging its capacity to redefine value systems, production paradigms, and stakeholder relationships. Consequently, the urgency of a sustainable transition in the manufacturing sector is widely recognized, as industrial processes heavily depend on natural resources and energy, generating waste and emissions that affect both societies and ecosystems (Vezzoli et al., 2018). Therefore, fostering sustainable transformations necessitates a comprehensive re-evaluation of organizational behaviours, mindsets, and competencies. Porter and Derry (2012) highlight that integrating sustainability into design practices involves adopting environmentally friendly strategies and fundamentally reassessing design's role in societal development, encouraging a life-cycle perspective and the application of circular economy principles. This cultural shift and targeted training programs are crucial for guiding collective behavior toward sustainability (Hosta & Žabkar, 2020). Additionally, establishing an effective organizational culture that supports sustainability principles emphasizes the need for continuous knowledge transformation and competency development within industries like furniture manufacturing. In fact, at the heart of this transformation lies the role of organizational culture and behavioural change, which can guide the workforce toward sustainable practices through targeted training programs and the development of specific knowledge. The integration of technology adoption and competency growth is vital for advancing sustainability initiatives within these sectors (Atkins et al., 2017). Such a holistic approach—incorporating technological advancements, strategic

methodologies, and an awareness of systemic challenges—is essential for catalysing a sustainable future through design.

Building on these premises, this paper introduces the ECODeCK project—ECO-Design Circular Knowledge—as a strategic response to the urgent need for sustainable transformation within the fashion and furniture manufacturing sectors. ECODeCK was conceived to address these complexities by positioning design not merely as a means of producing solutions, but as a strategic and cognitive lever capable of activating systemic change. The project aims to support a sustainability transition through design-driven capacity building, fostering the development of new competencies, behaviours, and organizational cultures aligned with circular economy principles and regenerative practices. By integrating theoretical knowledge with applied tools and frameworks, ECODeCK seeks to empower individuals, guide organizations, and engage ecosystems in co-evolving toward more inclusive, resilient, and future-oriented models of production.

1.1 ECODeCK Project's rationale

The conception of ECODeCK project emerges in response to the urgent and complex challenges posed by the sustainable transition of the manufacturing sector, particularly within the fashion and furniture industries—two domains deeply embedded in globalized production systems and socio-cultural practices. Rooted in the conviction that design practice, and research, can serve as transformative forces, ECODeCK is founded on the idea that design is not merely a discipline for shaping products or aesthetics, but a cognitive and strategic tool capable of connecting people, organizations, and ecosystems in meaningful, future-oriented ways. The project is grounded in a systemic vision of capacity building, where design becomes the driver of change across three interconnected levels. At the individual level, design-led learning fosters the development of sustainability competencies—knowledge, skills, and attitudes that enable professionals to act critically and creatively within uncertain and evolving contexts. At the organizational level, design supports the formulation of adaptive strategies that integrate sustainability into business models, decision-making processes, and innovation systems. At the ecosystem level, design contributes to shaping entrepreneurial ecosystems and policy frameworks that promote circularity, collaboration, and inclusivity. Within this landscape, the ECODeCK project addresses the theme of sustainable and circular transformation in the fashion/textile and furniture sectors—key areas of Made in Italy. It aims to develop design-driven strategies to support companies in transitioning toward more sustainable models through an integrated capacity-building approach. This involves not only disseminating theoretical knowledge but also fostering practical application and developing skills such as creativity, critical thinking, and sustainability values. The project seeks to create strategic impact by promoting collaborations between academia and industry, with the goal of encouraging the adoption of sustainable practices and generating long-term social, economic, and environmental benefits. ECODeCK emphasizes the importance of design as a driver of change, bridging the gap between academic knowledge and practical application to address the complex challenges of sustainability in an adaptive and transformative manner. ECODeCK aims to develop a capacity-building model to guide companies in the fashion and furniture sectors toward sustainable transformation by enhancing the skills and knowledge of their personnel.

2 Methods: ECODeCK tools

The project has created two tools for continuous training in the manufacturing sector: the Design for Sustainability (DfS) Framework and the Sustainable Transition Comp (ST Comp). These tools evolve gradually, combining research with practical interventions in industrial settings. The design-oriented approach is at the core of this innovation, redefining the required competencies and linking them to new concepts of sustainability—essential for supporting companies on a path toward responsible and sustainable transformation. The DfS Framework explores how design can reorganize production systems, stimulating innovation and new models of sustainable development, while ST Comp redefines the competencies required for sustainability, equipping professionals with the knowledge, skills, and attitudes necessary to implement sustainable practices in manufacturing contexts and make them truly applicable. This framework stands out from others on similar topics for having been specifically developed within the relevant manufacturing sectors. In the outlined context, the importance of design-driven tools becomes clear for guiding a sustainable transition through deliberate and structured action. The following sections delve deeper into these tools to provide a focused view of the resources and contributions that the ECODeCK project offers to the sustainable transition of the Made in Italy manufacturing sector.

2.1 Design for Sustainability Framework

The increasing urgency of sustainability challenges—spanning environmental degradation, social inequity, and unsustainable economic practices—has prompted a fundamental rethinking of how design contributes to production and consumption systems. As the literature suggests, design is not only implicated in the emergence of these challenges but is now positioned as a key agent in addressing them through systemic and transformative approaches. The DfS Framework responds to this shift by evolving from a product-centered perspective to one that engages with organizational and ecosystem-level dynamics. Drawing on a robust body of interdisciplinary literature and case-based analysis, the ECODeCK project has codified this transition into a conceptual and operational model tailored to the fashion and furniture sectors—industries historically at the center of globalized production and overconsumption. Rooted in design-led capacity-building and informed by ecosystemic perspectives, the DfS Framework synthesizes current practices and theoretical insights to outline a scalable, adaptable framework for guiding sustainable innovation. What follows is a detailed articulation of this framework, beginning with how it defines and organizes sustainable practices across environmental, economic, social, and cultural dimensions, and how it captures the progressive evolution of design approaches from insular technical fixes to broad systemic transformations.

The DfS Framework was developed through a design-driven, and iterative research process, grounded in both theoretical analysis and extensive empirical inquiry across the European fashion and furniture industries. The methodological journey was intentionally multi-phased, beginning with an in-depth systematic literature review aimed at mapping the evolution of Design for Sustainability approaches over the past two decades (Ceschin & Gaziulusoy, 2016; Ceschin & Gaziulusoy, 2024). This review served as the theoretical backbone, identifying emerging trajectories and revealing a shift from anthropocentric and product-oriented models to systemic and ecosystemic perspectives that align with more-than-human, regenerative futures.

The second phase involved the mapping and selection of 90 companies from over 20 European countries, of which 77 were selected as in-depth case studies: 44 in fashion and 33 in furniture (D'Itria et al., 2024). These companies were identified for their mature and innovative sustainable practices, with a particular focus on how design was used to embed sustainability into processes, materials, and strategies. The majority were SMEs, reflecting the structure of the European manufacturing sector and reinforcing the framework's relevance to this scale of enterprise.

Data collection included desk research, field observation at key industry events (e.g., Salone del Mobile, Milano Unica, MFW SS24), and interviews and workshops with scholars and stakeholders from design, production, and management in the fashion and furniture areas. The qualitative methodology employed case study analysis and content coding techniques, which enabled the research team to identify recurring patterns, typologies of interventions, and opportunities for systemic transformation. The coding framework included dimensions such as materials innovation, circular business models, lifecycle management, and stakeholder engagement.

Crucially, the development of the framework was not linear but iterative, involving feedback loops with academic experts, industry professionals, and policymakers. These interactions ensured that the resulting DfS model was not only conceptually robust but also operationally relevant and adaptable to the dynamic realities of industrial contexts. The model was refined across multiple workshops, where its applicability and clarity were tested against real-world challenges faced by companies navigating sustainability transitions.

Drawing on systemic design theory, organizational behaviour, and policy frameworks such as the European Commission's Strategy for Sustainable Products, the DfS Framework synthesizes three progressive levels of sustainability integration—product-centric, organization-centric, and organization ecosystem-centric—each aligned with increasing degrees of strategic and systemic complexity. This structure captures both the technical specificity of sustainability solutions and the cultural, economic, and institutional transformations they require.

Ultimately, the methodological approach to building the DfS Framework exemplifies a practice-based and theory-informed inquiry, positioning design not merely as a reactive discipline, but as a strategic enabler of sustainable transformation. By bridging theory and practice, and grounding the model in diverse, real-world experiences, the framework offers a robust tool for guiding capacity-building and innovation in manufacturing ecosystems that are striving to align with long-term sustainability goals.

The DfS Framework offers a conceptual structure for understanding sustainable practices within the fashion and furniture industries, illustrating how design interventions engage with the four core dimensions of sustainability: environmental, economic, social, and cultural (Sterling, 2010). It presents an evolutionary perspective, tracing the shift from isolated technical fixes toward more integrated, systemic, and ecosystem-level approaches to sustainability (D'Itria et al., 2024).

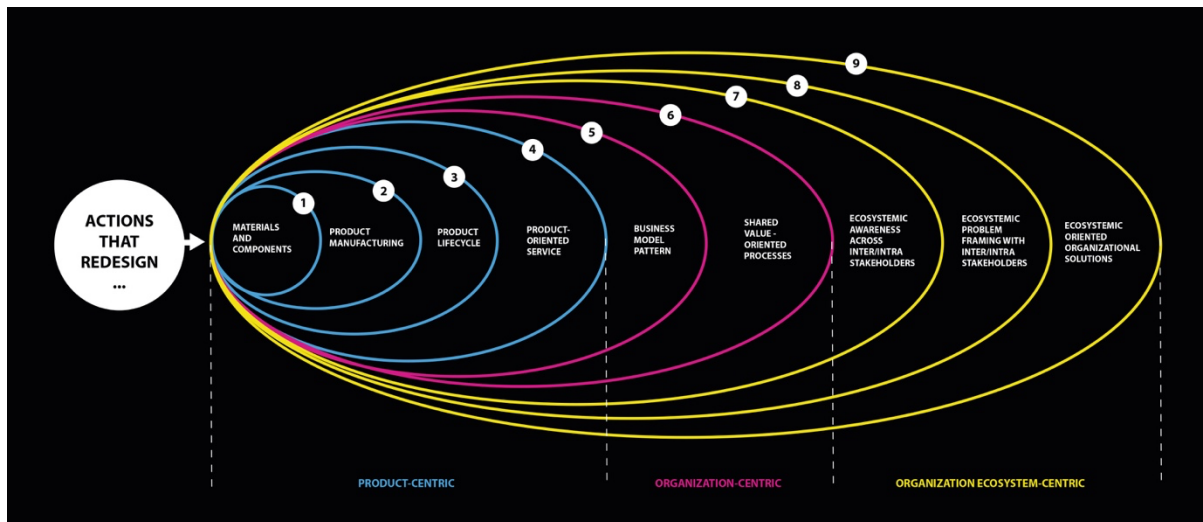


Figure 1. Visual representation of DfS Framework developed by the authors.

The initial level of the Design for Sustainability (DfS) Framework—insular sustainability—emphasizes technological innovation, treating sustainability primarily as an environmental issue. This limited view has evolved into what is termed responsible sustainability, which incorporates sustainability into the core of business operations by considering aspects such as production processes, corporate accountability, and stakeholder engagement. The most advanced phase, systemic and environmental sustainability, expands the scope of impact beyond the organizational boundaries, engaging suppliers, communities, and policy actors in efforts to transform entire socio-economic and ecological systems. The DfS Framework reflects the progressive evolution of sustainability thinking in design, building upon a historical development of methodologies and intervention levels. The earliest phase, product-centered design, gained prominence in the 1980s and 1990s through approaches like green design and eco-design, which focused on selecting sustainable materials, improving energy efficiency, and minimizing environmental harm (Battistoni et al., 2019). Eco-design introduced the life-cycle perspective, promoting sustainability across the entire product journey—from production to disposal (Ceschin & Gaziulusoy, 2016). In this stage, designers played a pivotal role in reconciling aesthetic, functional, and production constraints while embedding environmental criteria into product development. The second level, organization-centered design, shifts attention from individual products to broader corporate strategies. It encourages companies to adopt integrated Product-Service Systems (PSS), reducing dependence on physical goods and fostering sustainable business models (Calabretta et al., 2016). By embedding sustainability into strategic planning, companies can enhance their corporate social responsibility (CSR) efforts and secure competitive advantages through systemic innovation and deeper collaboration with stakeholders (Baldassarre et al., 2019; Thorisdottir & Johannsdottir, 2020). At the final stage, ecosystem-centered design embraces a more comprehensive vision, recognizing the interdependence of diverse actors and systems in the innovation process (Tsujimoto et al., 2018). This perspective views sustainability as a co-evolutionary effort, where companies, governments, civil society, and consumers collaboratively shape new models of production, governance, and exchange (Battistoni et al., 2019). In this context, design acts as a facilitator of alignment and cooperation across sectors, fostering collective responses to complex challenges and supporting durable, system-wide transformation. In essence, the DfS Framework serves as a strategic guide for industries seeking to transition from isolated technical interventions to more integrated, systemic, and ecosystemic approaches. By embedding sustainability progressively into design thinking, business strategy, and industrial networks, the framework underscores design's role as a key driver of inclusive and transformative change.

Sustainable Transition Comp (ST Comp)

The growing urgency of a sustainable transition in the manufacturing sector highlights the need for a radical rethinking of workforce development—one that embeds sustainability not only in operations but also in mindsets, behaviours, and competencies. In response, the Sustainable Transition Comp (ST Comp) was developed as part of the ECODeCK project to bridge the gap between high-level sustainability frameworks and the everyday realities of organizational learning. Rooted in a design-driven educational model and drawing on the principles of Transformative Learning theory (Mezirow, 2003; Taylor, 2000), the ST Comp represents a paradigm shift in sustainability training. Rather than focusing solely on the transmission of knowledge, this approach emphasizes the transformation of perspectives, encouraging learners to critically examine their existing assumptions, values, and behaviours in relation to sustainability. Within this competence framework, learning is understood as a deeply reflective and dialogical process—one that is triggered by real-world challenges and driven by the need to respond to complex, uncertain, and often ill-defined problems. The design-driven nature of ST Comp supports experiential and participatory learning, where learners are actively involved in framing problems, co-creating knowledge, and prototyping solutions that are grounded in both human and planetary needs. It mirrors the way designers operate—through cycles of exploration, ideation, testing, and iteration—and applies this mindset to educational practices aimed at fostering sustainability-oriented competencies. This means that training does not simply equip individuals with technical skills; it enables them to develop a systemic understanding of their organizational ecosystem, cultivate future-oriented thinking, and embrace agency for change. By anchoring sustainability education in critical reflection and hands-on practice, ST Comp empowers learners not only to adapt to new sustainability paradigms but to actively shape them—individually, collectively, and within their organizational environments. Furthermore, ST Comp is a competence framework specifically designed for sustainability training and skills development in the manufacturing sector. It adapts the Green Comp Competence Framework, originally developed by the European Joint Research Center (Bianchi et al., 2022), to meet the specific needs of Italian manufacturing companies. The development of ST Comp followed a three-stage process—comprising analysis, synthesis, and refinement—structured around two central lenses: organizational culture and design. In detail, the structured and iterative three-phase process—analysis, synthesis, and refinement—allowed the research team to gradually transition from a general reference model (the European GreenComp) to a context-specific, operational framework tailored to the needs of the manufacturing sector. In the analysis phase, the team engaged in a close, collaborative reading of the GreenComp framework to assess its relevance in organizational contexts. This involved both individual and collective reflection to explore how each competence translated into the real-world dynamics of manufacturing organizations. Special attention was given to how sustainability knowledge, skills, and attitudes are expressed and applied across different organizational levels. This phase enabled the team to identify overlaps, thematic patterns, and areas requiring contextual adaptation. The synthesis phase focused on reinterpreting and reorganizing the content gathered during the analysis. Key sustainability themes were extracted and mapped, and competencies were restructured into four new areas more suitable for a design-based educational model. This step was essential to reorganize the framework in a way that supports training interventions, enabling clear and practical guidance for developing sustainable capacities within companies. Finally, in the refinement phase, the team finalized the framework by carefully rewording the competencies, ensuring coherence, clarity, and usability across roles and settings. This included aligning the vocabulary with both organizational

language and design thinking principles, developing a glossary for clarity, and testing the framework's accessibility and effectiveness with domain experts. Concerning the two lenses abovementioned, they were applied during all the iterative three-phase process. In detail, the organizational culture lens played a pivotal role in contextualizing and adapting the competencies to real workplace settings. It drew on the theoretical foundations of Organizational Behaviour (OB) and Organizational Learning, which conceptualize organizations as dynamic systems shaped by individual behaviours, group interactions, and overarching structures. OB is articulated across three interconnected levels: the micro level, focusing on individual behaviours, motivations, and learning processes, the meso level, examining how individuals function collectively within teams or departments; and the macro level, which addresses the organization's overall structure, culture, and strategic orientation (Wagner & Hollenbeck, 2020). Acknowledging the interconnections among these levels was crucial to ensure the competencies remained applicable, inclusive, and practical for a wide range of roles within the organizational structure—from frontline staff to leadership positions. This viewpoint also enabled the research team to fine-tune the framework's language, striking a balance between clarity and the inherent complexity of sustainability-related issues. The language was tailored to resonate with professionals from different sectors, departments, and job functions, thus enhancing the framework's usability and integration into business processes. The design lens, on the other hand, was instrumental in shaping a transdisciplinary and future-oriented approach. It recognized that sustainability competencies should not be confined to specific fields but instead span across domains, encouraging collaborative, innovative, and systemic thinking. Drawing from design's inherent ability to navigate complexity and uncertainty, this lens emphasized constructive, hands-on learning and guided the structuring of the framework to support design-based educational interventions. The ECODeCK project, grounded in a design-driven training model, leverages experiential learning methodologies where participants engage in problem framing, critical reflection, and the co-creation of sustainable solutions. In this way, the design lens not only informed the structure and content of the ST Comp but also ensured that it could serve as a pedagogical tool—enabling professionals to develop the capacity to act, not just understand. This dual focus on organizational realities and transformative design practice gives the ST Comp its distinctive strength: it is both theoretically grounded and practically empowering, supporting meaningful and sustainable change across manufacturing organizations. These lenses have ensured the framework's relevance and applicability across diverse organizations. By incorporating the principles of design, ST Comp transcends traditional disciplinary boundaries, offering a holistic approach to tackle the complex challenges of sustainability.

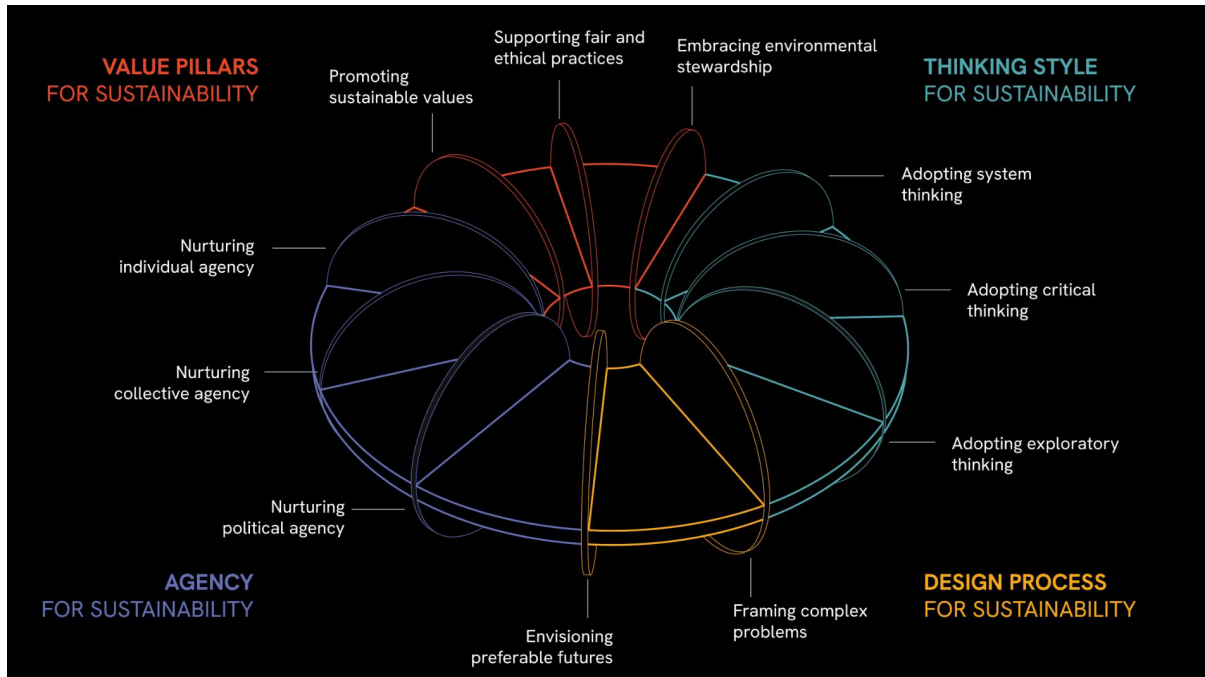


Figure 2. Visual representation of ST Comp developed by the authors.

ST Comp outlines 11 essential competencies, grouped into four core domains: Values Pillars for Sustainability, Thinking Style for Sustainability, Design Processes for Sustainability, and Agency for Sustainability. These competencies integrate critical knowledge, applied skills, and attitudinal dimensions that enable individuals to adopt sustainable practices and drive innovation. Designed as a design-oriented training framework, ST Comp serves as a foundation for developing educational programs that support employees in incorporating sustainability principles into their routine professional activities. In doing so, it contributes to the broader shift toward circular and regenerative business models within manufacturing. The framework addresses the needs of professionals across all organizational levels—from frontline workers to executive leadership—by providing practical and structured guidance to support ethical, responsible, and sustainability-driven decision-making. It also highlights the necessity of embedding ethical principles within sustainability efforts and translating these into concrete practices. Furthermore, it encourages the development of both analytical and creative capacities to navigate complex sustainability issues with forward-looking and innovation-oriented approaches (Redman & Wiek, 2021; Gonzales-Salamanca et al., 2020; Macagno et al., 2024).

The 11 competencies outlined in ST Comp are regarded as equally significant, interconnected, and mutually supportive. Their development should be approached in an integrated manner, reflecting the systemic nature of sustainability, which demands the convergence of knowledge, actions, values, and attitudes. To enhance accessibility and coherence, the competencies are grouped into four interrelated domains, each representing a specific facet of sustainable thinking and practice, while contributing to a unified and holistic competency model. These domains are detailed as follows:

1- Values Pillars for Sustainability: this domain encompasses the ethical and values-based capacities necessary for shaping responsible behaviours and decisions. It encourages environmental stewardship, intergenerational fairness, and the integration of sustainability into everyday routines and organizational identity. Detailed competencies are: Promoting Sustainable Values: encourages critical reflection on how organizational values evolve and align with sustainability principles. Individuals develop the ability to interpret sustainability narratives and assess consistency between

intentions, actions, and outcomes; Supporting Fair and Ethical Practices: emphasizes justice and equity in organizational operations by applying ethical frameworks and promoting inclusive decision-making; Embracing Environmental Stewardship: recognizes the organization as part of broader ecological systems, encouraging practices that regenerate natural ecosystems and reduce environmental harm.

2- Thinking Style for Sustainability: this area promotes a mindset capable of addressing sustainability's complexity through systems thinking, critical analysis, and exploratory approaches. It fosters long-term perspectives, challenges dominant paradigms, and supports the emergence of innovative, adaptive strategies. Detailed competencies are: Adopting Systems Thinking: encourages an understanding of sustainability as a network of interrelated factors. Competent individuals can evaluate systems dynamics and tensions to guide strategic interventions; Adopting Critical Thinking: supports the interrogation of assumptions and dominant narratives, including the identification of misleading claims (e.g., greenwashing), through evidence-based analysis; Adopting Exploratory Thinking: promotes experimentation and cross-disciplinary synthesis to identify novel, context-sensitive solutions, embracing uncertainty and iterative learning.

3- Design Processes for Sustainability: this domain frames design as a strategic, iterative process for addressing complex sustainability challenges and envisioning preferable futures. Detailed competencies are: Framing Complex Problems: involves the identification and structured articulation of multifaceted sustainability issues using inclusive, iterative, and context-aware approaches; Envisioning Preferable Futures: encourages the development of participatory strategies and long-term visions, supported by tools such as foresight and scenario planning, to guide transformation in alignment with sustainability goals.

4- Agency for Sustainability: this domain focuses on enabling individuals and collectives to drive change, both within and outside of their organizational context. It aims to strengthen the capacity to take initiative, collaborate, and influence broader governance systems. Detailed competencies are: Nurturing Individual Agency: reinforces personal responsibility and proactive engagement with sustainability, even amid uncertainty, aligning values with everyday behaviours; Nurturing Collective Agency: develops the ability to collaborate across roles and disciplines to co-create inclusive, transparent strategies for sustainability; Nurturing Political Agency: promotes active participation in policy dialogue and civic engagement, equipping individuals to shape governance processes and hold institutions accountable for sustainable outcomes.

Together, these domains provide a comprehensive foundation for sustainability-oriented capacity-building, fostering both individual and collective readiness for transformation.

3 Ongoing results: ECODeCK training model

The design-based training model hereby presented, represents the ongoing phase of the ECODeCK project, currently being defined and developed by the research team. As a central output of the project, the model is conceived as a dynamic framework to guide manufacturing companies through a process of sustainable transformation, grounded in design-led education and capacity building.

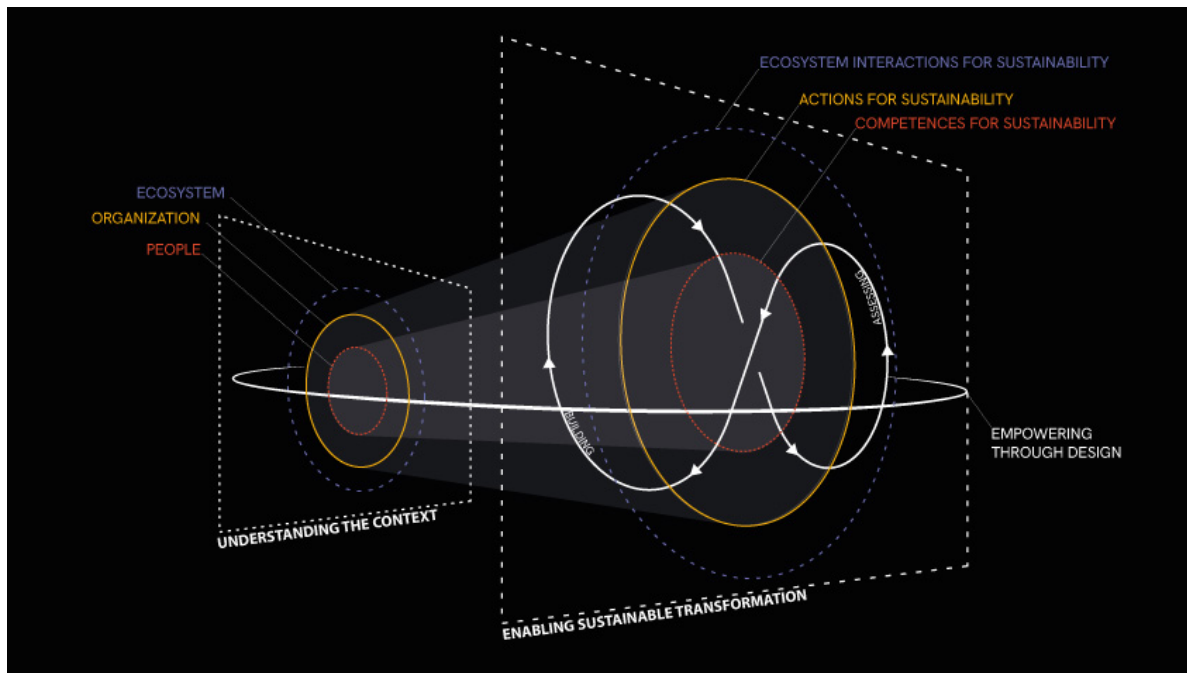


Figure 3. Visual representation of ECODeCK design-based training model.

The design-based training model encapsulates the core educational vision of the ECODeCK project, aimed at supporting Italian manufacturing companies—particularly in the fashion and furniture sectors—in navigating the complex transition toward sustainability. The model is structured across three interrelated levels: people, focusing on individual competencies; organization, targeting strategic and operational actions; and ecosystem, addressing broader interactions, collaborations, and policies. These levels correspond directly to the foundational components of ECODeCK’s two main tools: ST Comp and the DfS Framework.

The ST Comp informs the model by articulating the sustainability competencies needed to activate transformation at each level. It defines the knowledge, skills, and attitudes necessary for individuals to develop values-based decision-making, systems thinking, design literacy, and agency for change. These competencies are not static; they are developed through iterative, experience-based learning processes, which the training model supports through participatory methodologies, critical reflection, and collaborative problem-solving.

At the same time, the model draws on the DfS Framework, which provides the strategic scaffolding for integrating sustainability into design practices and organizational development. The DfS Framework delineates three progressive levels of design engagement—product-centered, organization-centered, and ecosystem-centered—that align closely with the training model’s layered structure. These levels help frame the transition from isolated technical fixes toward systemic innovation, involving internal stakeholders and external networks alike. The training model leverages this progression to guide participants through a developmental pathway—from understanding sustainability challenges, to designing interventions, to assessing impacts at broader systemic scales.

The learning process itself is mapped as an iterative loop of understanding the context, building through design, and assessing results, emphasizing the non-linear and adaptive nature of sustainability transformation. Through this dynamic cycle, trainees are empowered to connect individual

competence development with organizational strategy and ecosystem innovation, fostering coherence between values, actions, and long-term goals. The model's use of strategic design tools, such as scenario building, stakeholder mapping, and co-design sessions, supports this integration and helps translate complex challenges into actionable pathways for change.

Ultimately, this training model operationalizes ECODeCK's mission to foster systemic and project-based learning that goes beyond traditional training formats. It turns design into a method for empowering individuals, reorienting organizations, and contributing to the emergence of resilient, circular, and sustainable ecosystems. Grounded in both the competence framework of ST Comp and the evolutionary model of the DfS Framework, it offers a flexible and scalable foundation for capacity-building programs that aim to embed sustainability into the culture and strategy of the manufacturing sector.

4 Discussion and Conclusions

The ECODeCK project offers a comprehensive and future-oriented contribution to the evolving role of design in advancing sustainability transitions within the manufacturing sector. Faced with the convergence of environmental degradation, social inequalities, and unsustainable production systems, the project acknowledges the need for a paradigmatic shift—not only in what is designed, but in how design itself is conceptualized, practiced, and taught. In response, ECODeCK frames design as an ecosystemic and reflexive practice—capable of activating transformation across individual, organizational, and systemic levels. Throughout the project, design is repositioned from a tool of optimization within existing systems to a strategic agent of change—able to catalyse discontinuities, imagine alternative futures, and construct pathways toward circular and inclusive models of production and consumption. This epistemological shift aligns with more-than-human and post-anthropocentric perspectives, urging a move beyond object-centered interventions toward collaborative processes embedded in complex socio-technical ecosystems. ECODeCK responds to this shift with a dual-pronged approach: the development of the Design for Sustainability (DfS) Framework and the Sustainable Transition Comp (ST Comp), each designed to interlock theory and practice, and to enable capacity-building aligned with real industrial contexts. The DfS Framework, rooted in extensive literature review and the empirical analysis of over 70 European companies, maps a progressive trajectory from product-focused to ecosystemic sustainability, offering industries a structured lens to understand and guide their evolution (D'Itria et al., 2024). While the framework is still in its initial phase of practical application, feedback loops have been embedded in the research through expert interviews, stakeholder engagement, and co-design workshops. These activities have provided valuable preliminary insights, confirming the framework's resonance with real-world challenges and its adaptability across diverse organizational contexts. Further empirical data from pilot applications are being collected in the final phase of the project and will be the focus of forthcoming publications. These will offer measurable outcomes and user-centered evaluations of the framework's impact on organizational behaviour and sustainability strategies. Thus, DfS Framework makes visible the layered nature of transformation, emphasizing that sustainability must be addressed not only through material innovation and technical fixes, but also through organizational reconfiguration and engagement with external stakeholders—including policymakers and communities. Parallel to this, the ST Comp provides a competence-based foundation for sustainability learning,

translating abstract goals into situated knowledge, skills, and attitudes. It draws from transformative learning theory and design-based education, introducing four core competence domains—values, thinking styles, design processes, and agency—that together support the development of change-makers capable of navigating uncertainty and enacting meaningful impact within and beyond their professional roles. In particular, they enable the fashion and furniture sectors—industries emblematic of both material excess and creative potential—to move beyond traditional, product-centric models toward more resilient, circular, and inclusive futures.

Furthermore, while rooted in the Italian national context, and especially within the fashion and furniture manufacturing sectors in Italy—industries that are emblematic of both regional production cultures and global market dynamics, the DfS Framework and ST Comp were intentionally designed to be scalable and adaptable to a range of industrial settings. Their structure allows for application across different organizational scales, particularly within ecosystems characterized by small- and medium-sized enterprises (SMEs), decentralized supply chains, and strong place-based identities. Nonetheless, we recognize the importance of further validating their applicability in non-European contexts, especially those marked by distinct regulatory environments, labor dynamics, or cultural approaches to sustainability. Future research will aim to expand testing through international case studies and cross-sectoral collaborations, in order to better understand how these tools perform across varied socio-economic and institutional settings. Likewise, these tools converge in the design-based training model, which represents the project's most tangible ongoing result. Unlike conventional professional development models, this framework adopts an experiential, participatory, and iterative pedagogy. It encourages learners to actively engage in sensemaking, problem framing, co-design, and impact assessment. The model is structured across three interdependent scales—people, organization, and ecosystem—reflecting the belief that sustainable transformation must be cultivated across personal behaviours, organizational cultures, and broader systems of innovation. Through this layered structure, the model enables coherence between individual competencies and collective strategies, offering a roadmap for aligning internal capacity with external demands and opportunities. In fact, it is grounded in iterative cycles of context analysis, design application, and impact assessment, enabling learners to engage in real-world sustainability challenges through collaborative, project-based learning. The model activates design as a tool for sensemaking and empowerment, helping participants navigate uncertainty, envision preferable futures, and implement actions with systemic reach. It reinforces the idea that sustainable transformation is not linear, but emerges through the continuous interplay of reflection, experimentation, and adaptation across scales. What distinguishes the ECODeCK approach is its ability to reframe sustainability as a design challenge that requires deep engagement across multiple organizational dimensions. Rather than positioning design as a reactive discipline concerned with optimizing outputs, ECODeCK emphasizes design's proactive role in visioning, navigating complexity, and enabling transformation. This reorientation is crucial for building business models that are not only economically competitive but also socially responsible and ecologically restorative (Neuhoff et al., 2022). Moreover, ECODeCK positions design not as a service to predefined innovation agendas, but as a field of inquiry and agency capable of shaping those agendas, the project challenges hierarchical approaches to industrial change. Instead, it advocates for open, co-evolutionary processes that value plurality, reflexivity, and relationality. Thus, one of the project's most valuable insights is the recognition that achieving sustainable innovation demands a paradigmatic shift—not only in what we design but in how we think, collaborate, and learn. This shift calls for comprehensive cultural and organizational change, requiring professionals to move beyond isolated practices of sustainability and instead embrace a systemic redefinition of production and consumption models (Ceschin & Gaziulusoy, 2016; Ceschin & Gaziulusoy, 2024). Looking toward the future, the outcomes of ECODeCK project provide a foundation for the establishment of structured and institutionalized capacity-building pathways. These could take the form of industry-focused academies, university curricula,

vocational training programs, and in-house professional development schemes, all rooted in the four pillars outlined in ST Comp: values, thinking styles, design processes, and agency. Moreover, its tools and frameworks could serve as a benchmark for policy development, supporting public and private actors in defining sustainability standards, assessment criteria, and incentives that reward transformative practices.

Beyond education and training, the ECODeCK project aims to provide a foundation for building sustainability innovation ecosystems—networks that connect businesses, designers, researchers, and local communities around shared goals. By fostering collaborative learning environments, living labs, and experimentation hubs, these ecosystems can accelerate the dissemination and scaling of sustainable practices, particularly in regions with strong manufacturing clusters and a high concentration of SMEs. Ultimately, the ECODeCK project envisions that sustainability cannot be treated as a one-time initiative or isolated goal. It must be embedded within a continuous and adaptive learning process—one that evolves with changing environmental conditions, social dynamics, and technological opportunities. In this process, design emerges not merely as a functional or aesthetic tool, but as a catalyst for deep, systemic change. The future of the manufacturing sector will depend on its capacity to internalize this paradigm, using design not only to create better products, but to shape better futures—where equity, regeneration, and resilience are no longer aspirations, but embedded realities. In sum, the ECODeCK project proposes a response to the urgency of the current moment not with prescriptive models, but with open and adaptable frameworks that enable organizations to build the competencies, cultures, and networks required to transition toward sustainable futures. Through this project, achieving sustainability is not simply a matter of complying with regulations or adopting green technologies, but of nurturing long-term processes of learning, experimentation, and structural reconfiguration. As such, ECODeCK offers a replicable and scalable approach for other manufacturing contexts, while also contributing to the broader redefinition of design as a critical discipline for the Anthropocene—one that is capable of not only designing products, but of designing transitions themselves.

Funding

This research was funded by the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.3 - Call for tender No. 341 of 15/03/2022 of Italian Ministry of University and Research funded by the European Union – NextGenerationEU. Award Number: PE00000004, Concession Decree No. 1551 of 11/10/2022 adopted by the Italian Ministry of University and Research, CUP B83C22004890007. MICS (Made in Italy – Circular and Sustainable).

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