Designing the Transition

SEVEN DESIGN PERSPECTIVES TO BUILD CAPACITIES FOR PEOPLE, ORGANISATIONS AND ECOSYSTEMS

Paola Bertola, Carmen Bruno, Erminia D'Itria, Silvia Maria Gramegna, Francesca Mattioli, Michele Melazzini, and Xue Pei

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2. ECODeCK Project

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This chapter discusses the key outcomes of the ECODeCK project, with particular emphasis on the conceptual foundations that inform its capacity building model. It first introduces the Sustainable Transition Comp (ST Comp), a competence framework specifically developed to support sustainability training in the manufacturing sector. Adapted from the European Joint Research Center's Green Comp framework, ST Comp articulates the core competencies and skills required to enable sustainable transformation. The chapter then examines the Design for Sustainability (DfS) framework, which highlights the strategic role of design in advancing sustainability-oriented innovation within manufacturing systems. Together, these two frameworks constitute not only the practical foundation but also the theoretical scaffolding within which the ECODeCK capacity building model has been conceived and developed. Far from being a merely operational tool, the model represents a structured theoretical construct – an educational framework grounded in design-based and Transformative Learning principles. It seeks to equip individuals and organizations with the competencies, behaviours, and mindset

necessary to navigate the complexities of sustainable transitions and drive systemic change across the manufacturing ecosystem.

2.1 Introduction: From Vision to Research Actions

The ECODeCK project was conceived from the ambition to reposition design as a central transformative force capable of guiding sustainable transitions within manufacturing ecosystems. Its primary objective is to build capacity for sustainability by equipping professionals, organizations, and territorial systems with the competencies, strategies, and tools needed to navigate in addressing complex socio-environmental challenges. The project was developed by seven design researchers from the Department of Design at Politecnico di Milano, drawing upon their diverse design backgrounds and expertise. The project emerged through a collaborative process of identifying shared research interests and complementary areas of specialization, with the aim of contributing to knowledge generation of Spoke 2, Eco-Design strategies: from materials to Product Service Systems – PSS, of the national research initiative MICS – Made in Italy Circolare e Sostenibile. ECODeCK draws strength from the convergence of these diverse yet complementary design perspectives, which collectively build a foundation for contributing to the complex challenge of enabling a sustainable transition within manufacturing industries. The multidisciplinary approach of the ECODeCK project integrates design researchers with diverse backgrounds, from strategic and product design to co-design and participatory design, to design and creative methods for envisioning, as well as design education and sustainability studies for transformation. This diversity enriches the project's capacity to address the multifaceted nature of sustainable transition, creating a rich tapestry of perspectives that enhances its capacity to tackle sustainability in a holistic manner. ECODeCK combines theoretical inquiry with applied experimentation through a research-through-design methodology. The process unfolds across interlinked phases: mapping and analysis of the current state of sustainability in the Italian fashion and furniture sectors, development of

conceptual frameworks, co-design of training modules, and prototyping of educational interventions in collaboration with SMEs. This iterative and participatory process ensures that the project remains grounded in real-world contexts while advancing theoretical contributions to design for sustainability. Recognizing the urgent need to address complex socio-environmental challenges, ECODeCK aims to build capacity for sustainability by equipping professionals, organizations, and territorial systems with the necessary competencies, strategic frameworks, and practical tools (Peiró *et al*., 2021). The ultimate goal is to enable these actors to navigate the multifaceted challenges of sustainability transitions effectively and to lead meaningful change within their respective contexts. This ambition reflects a shift from perceiving design solely as a tool for product development toward understanding design as an agent of systemic transformation, capable of influencing socio-technical, organizational, and cultural dimensions within manufacturing industries (D'Itria, Pei & Bertola, 2024; Bertola & Colombi, 2024; Vezzoli & Macrì, 2024; Scoones *et al*., 2020; Ceschin & Gaziulusoy, 2019; Chick & Micklethwaite, 2011).

Design training and collaborative practices constitute another fundamental area, focusing on the development of human and organizational capabilities necessary to embed sustainability principles effectively. By fostering skills and cultivating collaborative mindsets, these practices help ensure that sustainability becomes an integral part of organizational culture and everyday decision-making processes (Mardikaningsih, 2024). Strategic design provides a critical link between design, business, and innovation management, aligning sustainability objectives with organizational goals, market strategies, and value creation. This approach facilitates embedding sustainability into the core business models and enhances the viability and competitiveness of companies pursuing sustainability transitions (Moore & Manring, 2009). Finally, service and systemic design broaden the scope of inquiry from isolated products to complex service ecosystems and interconnected industrial networks. This systemic lens acknowledges the interdependencies within value chains, policy environments, and societal infrastructures, highlighting the importance of multi-actor collaboration for scalable and lasting impact (Schwaninger, 2018). Co-design and co-creation emphasize participatory approaches

engaging multiple stakeholders to foster shared ownership and social legitimacy of sustainability initiatives (Hakio & Mattelmäki, 2019). Such methods ensure that solutions are socially embedded and contextually relevant, vital for the acceptance and success of sustainable transitions. Another important dimension is design for transformation, which positions design as a catalyst not only for incremental improvements but for deep, systemic change within organizations and broader societal structures (Gaziulusoy & Erdoğan Öztekin, 2019). This perspective underlines the potential of design to disrupt established patterns, reshape values, and promote long-term sustainability objectives beyond mere product innovation. Complementing this, design methods for envisioning support strategic foresight and future-oriented thinking, enabling organizations to anticipate emerging challenges and opportunities, and to creatively navigate uncertainty in transition pathways (Breuer, 2023). Within the fashion design for sustainability dimension, the project addresses a sector known for its significant environmental and social impacts, emphasizing material innovation, ethical production, and consumer behavior transformation as crucial levers for change (D'Itria, 2025; Bertola & Colombi, 2024). This rich diversity of disciplinary backgrounds and approaches significantly strengthens the ECODeCK project's ability to address the multifaceted and layered challenges inherent in sustainable transitions. The integration of these perspectives enables a comprehensive understanding of sustainability as an evolving process that requires coordinated interventions across product, organizational, and systemic levels. ECODeCK employs a research-through-design methodology that combines rigorous theoretical inquiry with applied experimentation. This approach allows the project to bridge academic knowledge and practical innovation effectively (Zimmerman *et al*., 2010). The research unfolds through a series of interlinked and iterative phases, beginning with the systematic mapping and analysis of the current state of sustainability practices within the Italian fashion and furniture manufacturing sectors. This empirical groundwork informs the development of conceptual frameworks that define the key competencies and strategic orientations necessary for sustainability-oriented transformation. These frameworks draw inspiration from existing European models, in particular the GreenComp – the European Sustain-

ability Competence Framework – promoted by the European Commission's Joint Research Centre[1]. By adapting and contextualizing GreenComp to the specific challenges of the manufacturing sector, the ECODeCK team has developed a competence-based foundation tailored to the realities of industrial transition. These conceptual frameworks serve as the foundation for the capacity building model developed by the ECODeCK team. Far beyond a traditional knowledge transfer approach, this model is designed to foster transformative learning processes that enable individuals and organizations to engage with sustainability transitions through critical awareness, systemic thinking, and strategic foresight. Its development follows a collaborative co-design approach, in which participants actively interact and support one another to build a shared understanding of their system. This means that the development process is not one-directional, where knowledge is simply transferred from experts to participants, but rather a dynamic and interactive process where all stakeholders, including small and medium-sized enterprises (SMEs), contribute actively to the co-creation of knowledge, continuously learning and adapting to the system and emerging challenges. This approach promotes self-organization and the evolution of the system itself. In this process, companies are not passive recipients but active participants who integrate and adapt the project's insights and resources in ways that align with their unique contexts. This allows each organization to preserve its operational autonomy while engaging in a dynamic system of mutual exchange. The ECODeCK team facilitates and mediates these interactions, ensuring that the co-design process supports organizational learning, contextual adaptation, and the emergence of shared, practice-based knowledge. Through reciprocal interactions among the organization's members and resources – facilitated and mediated by the ECODeCK team – companies are empowered to adapt and synthesize the training content in ways that resonate with their unique contexts and needs. This dynamic interplay ensures that the solutions are not externally imposed but emerge organically within the organization, fostering deeper engagement, ownership, and sustainable capacity building. This participatory and cyclical process guarantees that ECODeCK remains firmly grounded in tangible industrial and territorial contexts, while simultaneously contributing

Note 1. https://op.europa.eu/it/publication-detail/-/publication/bc83061d-74ec-11ec-9136-01aa75ed71a1

to theoretical advancements in the field of design for sustainability. Through this integrative and comprehensive approach, ECODeCK aims to empower professionals and organizations to become proactive agents of change, equipped to lead their industries toward a more sustainable and resilient future.

2.2 The Design for Sustainability (DfS) Framework

The Design for Sustainability (DfS) framework constitutes the first fundamental theoretical outcome of the ECODeCK project's conceptual apparatus. Its significance lies in offering a comprehensive and systematic approach to understanding how design can actively facilitate sustainability transitions within the manufacturing sector. Recognizing the complexity and multifaceted nature of sustainability challenges, the framework serves as a crucial tool to map the diverse ways design interventions can create value and promote sustainable innovation. By articulating progressive levels of engagement, the DfS framework not only guides practitioners and organizations in integrating sustainability into their design processes but also lays the theoretical foundation upon which the project's capacity building model is constructed. The first level, *Insular Sustainability*, focuses on technical solutions and product-level improvements, such as material efficiency and low-impact production. The second, *Responsible Sustainability*, incorporates broader business models and stakeholder perspectives, promoting ethical practices and inclusive innovation. The third and most advanced level, *Ecosystemic Sustainability*, emphasizes multi-actor collaboration, regenerative design principles, and contributions to policy and systemic change. The framework is theoretically grounded in systems thinking and transition design, and is visually represented to illustrate the layered, interdependent nature of sustainable design actions. Through this lens, the DfS framework identifies a spectrum of design actions: from optimizing product lifecycles and enabling user awareness to fostering inter-organizational collaboration and shaping sustainability – oriented narratives – offering a strategic compass for companies seeking to navigate their

sustainability journey through design. Within the ECODeCK project, the Design for Sustainability (DfS) framework was established as both an analytical structure and a practical tool to explore and support the multifaceted role of design in enabling sustainability-oriented transitions within the manufacturing sector. Rather than treating sustainability as a static outcome, the framework conceives it as a dynamic process that design can initiate, shape, and steer through diverse forms of intervention across scales and systems (Gaziulusoy & Brezet, 2015). The development of the framework was grounded in a robust qualitative research design. This process integrated a systematic review of existing literature with empirical mapping and analysis of sustainability-driven design practices across Europe. A total of 90 manufacturing companies were identified, the majority of which were micro-, small-, or medium-sized enterprises (SMEs), a segment recognized for its agility and innovative potential but often underrepresented in sustainability policy frameworks. From this sample, 77 cases – comprising 44 fashion companies and 33 furniture manufacturers – were selected for in-depth analysis. These organizations demonstrated noteworthy efforts in embedding sustainable design principles within their operational, strategic, and collaborative processes. The analysis uncovered distinct, recurring patterns in how design is leveraged to advance sustainability, culminating in a tripartite framework structure. This structure reflects different dimensions and levels of design engagement, which collectively provide a nuanced understanding of how design contributes to sustainable manufacturing transitions (D'Itria, Pei & Bertola, 2024). Specifically, this framework delineates three progressively integrated modes of design engagement – technological, strategic, and systemic – that focus on specific dimensions of design action and design thinking as applied to product, organization, and system levels (D'Itria, Pei & Bertola, 2024; Ceschin & Gaziulusoy, 2019). Rather than representing discrete categories, these modes form a continuum, illustrating varying degrees of maturity and ambition in sustainability-oriented design practice (D'Itria, 2025; D'Itria, Pei & Bertola, 2024; Gaziulusoy & Erdoğan Öztekin, 2019).

Product-Centric & Insular Sustainability: At the foundational level, design efforts concentrate on optimizing the technical characteris-

tics of products and processes. This includes selecting eco-friendly materials, redesigning for disassembly or recyclability, enhancing energy efficiency, and applying lifecycle thinking. Although these initiatives tend to be localized and product-focused, they constitute a critical entry point for embedding sustainability in design practices, especially within SMEs that often face resource constraints.

Organization-Centric & Responsible Sustainability: The second level moves beyond purely technical concerns, emphasizing a broader organizational focus. Here, design serves as a catalyst for redefining business models, frequently involving a shift from product manufacturing toward service provision or circular economy approaches. Firms operating at this stage harness design to align their internal operations with ethical principles, sustainability commitments, and stakeholder expectations. This level reflects an increasing recognition that sustainability necessitates not only material modifications but also cultural and structural transformations within organizations.

Ecosystemic-Centric & Environmental Sustainability: At the most advanced level, design is envisioned as a driver of systemic transformation. Organizations engage in collaborative processes that extend beyond their boundaries, co-creating solutions with a diverse array of stakeholders – including suppliers, customers, public institutions, and civil society groups. This systemic perspective acknowledges the complexity inherent in industrial ecosystems and underscores the importance of shared responsibility, long-term visioning, and regenerative design practices. Consequently, design becomes a strategic tool for fostering partnerships, facilitating dialogue, and stimulating innovation that can influence policy and promote large-scale sustainability transitions.

The DfS framework is grounded in theories of systems thinking and transition design and is further articulated through a visual model that illustrates the interconnected nature of these three modes. Rather than prescribing a linear pathway, the framework highlights multiple entry points and trajectories, acknowledging that organizations may operate simultaneously at different levels depending on context, resources, and strategic intent (Gaziulusoy & Brezet, 2015). The framework contributes not only to a deeper understanding of how design practices evolve in response to sustainability imperatives but

also offers a structured approach for reflecting on and guiding organizational development. It captures how design can move from isolated interventions to become a cohesive force for innovation, aligning technological, organizational, and societal goals. The resulting *design-driven sustainability continuum*, as conceptualized within the ECODeCK project, enables companies to situate themselves within a wider landscape of transition and to envision strategic pathways for deeper engagement. The framework forms a core component of the ECODeCK capacity-building model. It provides the conceptual grounding for developing educational interventions that empower professionals and organizations to understand, navigate, and lead sustainability transitions. By recognizing the evolving role of design – from technical optimization to systemic co-creation – the framework equips manufacturing actors with the vocabulary, structure, and strategic orientation needed to act intentionally and effectively in the face of complex sustainability challenges.

2.3 The Sustainable Transition Comp (ST Comp)

In parallel with the development of the Design for Sustainability framework, the ECODeCK project also elaborated a second key theoretical outcome: the Sustainable Transition Comp (ST Comp). While the former focuses on the transformative potential of design, the ST Comp addresses the human dimension of sustainability transitions, highlighting the behavioural, cognitive, and value-based shifts required to enable meaningful and systemic change within the manufacturing sector. Achieving more sustainable practices in the manufacturing context demands a fundamental shift in behaviour and mindset across all people and significant changes in the knowledge, skills and attitudes that workers should acquire (Rieckmann, 2012; Wiek *et al*., 2011 as cited by Bruno *et al*., 2025). Sustainability competence shift should impact all organisational levels, enabling people to embrace innovation and to adopt a holistic and ecosystemic approach that considers the entire lifecycle of products and the awareness of their impact on society. Therefore, one of the primary aims of the

project was to understand which competencies professionals should nurture to face the ongoing transformation, identifying the specific knowledge, skills, and attitudes required to drive sustainable practices within the manufacturing sector. From here, the urgency of defining a framework of competence for sustainable upskilling to be used in the specific context of manufacturing companies.The Sustainable Transition Comp (ST Comp) is the competence framework developed within the ECODeCK project to support capacity building for sustainability, specifically in the manufacturing context. It has been built starting from the Green Comp framework, developed by the European Commission (EC), whose aim is to foster a sustainability mindset and includes the competencies to responsibly think, plan and act with care for our planet and all life forms. However, in its form, GreenComp is of limited support in informing the development of capacity-building in the context of manufacturing companies. It requires an adaptation in the specific context it is applied. Therefore, the ST Comp has been design by readapting the Green Comp to respond to the distinct needs of manufacturing organizations and make it operational. It has been readapted by using two main lens I) the organizational culture lens that allowed reframing the competencies to the context of the training model and II) the design lens that allowed reframing the overall organization of the competence framework to suit the design-driven nature of the training model and its envisioned design-based approach. Those lenses allowed integrating both the internal cultural dynamics of companies and the strategic and transformational role of design thinking and practice. Its development followed an iterative process of analysis, synthesis, and refinement, combining theoretical grounding with empirical insights gathered from industry engagement and design research (Bruno *et al*., 2025). The resulted ST comp aims to support training and skills development in the context of manufacturing companies. It includes 11 sustainability competencies divided into four main areas of competence development. It includes the crucial competencies that, taken together, promote sustainable development for people operating in the context of the manufacturing field. It aims to be the reference framework for training and empowering professionals working at different levels of the organization, from managers to employees, offering them clear and precise guidance for

acting responsibly in their daily working practices with a sustainable mindset.

The four interconnected competence areas are:

- *Values Pillars for Sustainability*: Encompasses core competencies rooted in ethics and values that support responsible decision-making and practices. It involves recognising the importance of protecting the environment, respecting the rights of all species, supporting fair practices for future generations, and challenging the status quo through the promotion of sustainable values.
- *Thinking Style for Sustainability*: Focuses on adopting a systemic and holistic approach to problem-solving. Competencies here include critical thinking, systems thinking, and the ability to creatively analyse complex challenges from a sustainability perspective.
- *Design Processes for Sustainability*: emphasises the ability to approach problems and envision solutions using design methodologies that prioritise human and planetary needs in organisational decisions and actions.
- *Agency for Sustainability*: highlights empowerment, collaboration, and leadership. It refers to the capacity of individuals and organisations to take initiative and drive positive change toward sustainability goals.

Accordingly, the 11 competencies identified are equally important and all of them should be developed and encouraged. For each competence, the framework outlines the knowledge, skills and attitudes that should be empowered to enact and apply the competence in everyday work. This framework is designed to engage professionals working at different levels of the organization, from managers to employees, offering them guidance for integrating core principles of sustainability into their daily practices, developing the ability to understand the ethical pillars of sustainability and translate them into tangible actions, as well as being capable of analyzing and addressing sustainable challenges with innovative and forward-looking perspectives. It is designed to support capacity-building model training to promote transformation and circular sustainable innovation within companies through design-based programs. Fundamental is the ability to

understand the ethical pillars of sustainability and translate them into tangible actions, as well as the ability to analyze and address sustainable challenges with innovative and forward-looking perspectives. ST Comp not only provides a shared language to frame sustainability competencies but also acts as a pedagogical guide for structuring transformative educational experiences within manufacturing organisations. Indeed, the framework has become fundamental to structure and define the specific learning outcomes of the capacity-building training pathways.

2.4 The ECODeCK Capacity-Building Model

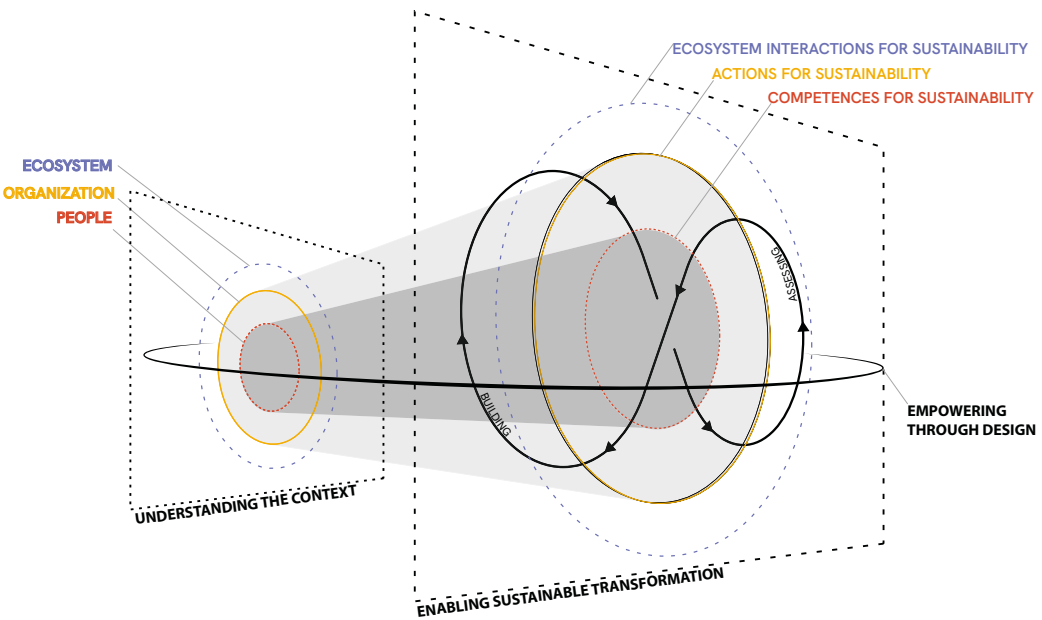

Figure 2.1. ECODeCK Capacity building model visualisation.

Completing the triad of theoretical outcomes developed within the ECODeCK project, the ECODeCK Capacity-Building Model translates the insights of the Design for Sustainability framework and the Sustainable Transition Comp into an integrated educational strategy. At the heart of the project, this model is grounded in Transformative Learning Theory (Mezirow, 2003), which emphasizes critical reflection, perspective shifts, and experiential engagement as catalysts for

deep and lasting change. Further elaborated in the following paragraphs, the model leverages design not merely as a creative practice, but as a method for empowerment and future-thinking – capable of equipping individuals and organizations to navigate the complexities of sustainability transitions and to drive systemic transformation. As such, it provides the first high-level and theoretical articulation of our educational approach, clearly defining the perspective from which our training operates: one that sees learning as a transformative, design-led process aimed at fostering critical agency and long-term cultural change within the manufacturing sector. Central to this approach is the recognition that training must operate across interconnected levels of impact. At the *individual* level, the model fosters awareness, competencies, and agency, enabling professionals to critically engage with sustainability and take informed action. At the *organizational* level, design-based learning supports strategic reorientation, encouraging companies to reframe their practices, cultures, and innovation processes around sustainability values. At the *ecosystem* level, the model promotes the development of collaborative networks, policy engagement, and territorial innovation clusters that sustain systemic transformation.

Thus, each level addresses a specific dimension of sustainable transformation, from developing individual competences to enabling organizational strategies and fostering systemic collaborations. In particular, at the *people level*, the focus is on developing *competences for sustainability* – the knowledge, skills, attitudes, and values that enable individuals to engage critically and constructively with sustainability challenges. This is operationalised through the Sustainable Transition Comp (ST Comp) framework, which emphasizes areas such as values-driven thinking, systems thinking, design processes, and agency for change. The goal is to move beyond compliance-based or purely technical training, empowering individuals to act with creativity, critical awareness, and collaborative intent in complex and evolving contexts. These competences form the essential foundation for initiating change. At the *organizational level*, these individual competences are translated into *actions for sustainability*. Here, design becomes a strategic lever to rethink and reshape business models, production systems, stakeholder engagement, and innovation strategies.

ECODeCK supports this process through the Design for Sustainability (DfS) framework, which guides companies in evolving from isolated technical improvements (insular sustainability) to more systemic and collaborative models (responsible and ecosystemic sustainability). This approach enables organizations to align operational practices with long-term sustainability objectives. Finally, at the *ecosystem level*, the focus shifts to *ecosystem interactions for sustainability*, emphasizing the role of territorial networks, policy frameworks, and cross-sectoral collaborations. In this dimension, companies connect with researchers, designers, institutions, and communities to co-create enabling environments for systemic change. ECODeCK fosters the emergence of sustainability innovation ecosystems through living labs, participatory workshops, and shared learning platforms that promote dialogue and diffusion of sustainable practices. Design, in this context, functions as a catalyst for orchestrating relationships, fostering alignment, and embedding sustainability into broader socio-economic systems. Thus, the model employs a combination of strategic design tools – such as scenario building, stakeholder mapping, and value proposition design – and participatory methodologies that engage individuals and groups in collaborative learning and decision-making. This dual approach allows companies to co-design actionable roadmaps that are both context-specific and future-oriented, aligning sustainability goals with concrete operational strategies. The inclusion of diverse actors – ranging from employees and managers to external stakeholders such as suppliers, policymakers, and local communities – ensures that the process is not only inclusive but also reflective of the complex ecosystems in which companies operate. Through structured dialogue, iterative prototyping, and collective sensemaking, the model fosters a deeper understanding of shared challenges and opportunities. It equips organizations to navigate uncertainty, adapt to evolving sustainability demands, and internalize a culture of continuous improvement. Ultimately, this process contributes to the emergence of systemic change, enabling companies to move beyond isolated innovations and toward integrated, regenerative models that create long-term value for both their sectors and the broader social and environmental context in which they are embedded. By integrating individual, organizational

and ecosystemic dimensions, the ECODeCK capacity-building model creates a multi-scalar, participatory, and action-oriented framework for embedding sustainability into the core of industrial and educational ecosystems.

2.5 The ECODeCK Training Model

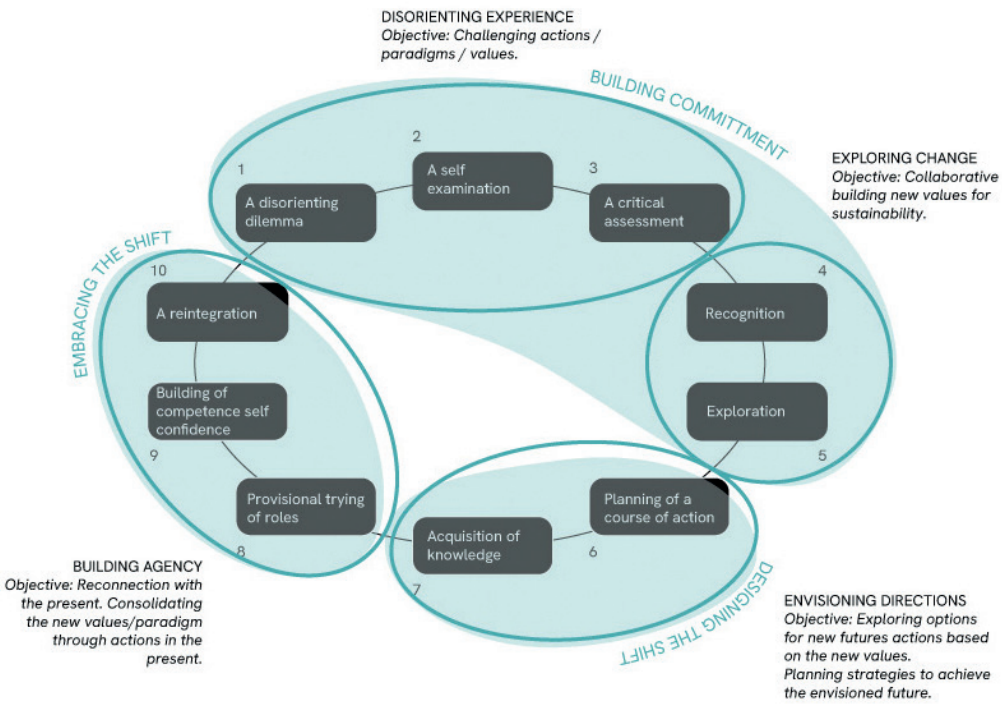

Figure 2.2. ECODeCK Training model visualization.

To fully understand the intent and direction of the ECODeCK training model, it is essential to frame it within the broader conceptual structure from which it emerges. Without this framing, the pedagogical choices and strategic orientation of the project risk appearing merely operational or disconnected from its deeper aims. The following section therefore sharpens the focus, presenting the theoretical *funnel* through which the ECODeCK educational model is shaped. At the core of this framework lies Jack Mezirow's Transformative Learning Theory (2003), which positions adult learning as a profound, iterative process driven by critical self-reflection. Mezirow outlines ten phases that of-

ten characterize this process, including self-examination, the recognition that others share similar transformations, the planning and testing of new roles, and ultimately the reintegration of a revised perspective into one's life. The outcome is not merely a change in what one knows, but a fundamental shift in *how* one knows – enabling more autonomous, reflective, and responsible action. At its core, this theory suggests that meaningful learning occurs not simply through the acquisition of new information, but through the transformation of previously held beliefs, assumptions, and frames of reference. This transformation is often initiated by a *disorienting dilemma* – an experience or realization that challenges the learner's existing worldview, prompting a period of introspection and reassessment. In the context of sustainability, such dilemmas may emerge from confronting the environmental and social impacts of one's industry or professional practices. As learners engage in critical dialogue, self-examination, and exploration of alternative perspectives, they begin to reconstruct their understanding of what is possible and necessary. This process culminates in a significant shift in mindset – one that enables individuals to adopt new values, embrace more systemic and future-oriented thinking, and take informed, purposeful action aligned with sustainability goals. This theoretical foundation is particularly relevant in the context of sustainability, where professionals are often called to question deeply ingrained assumptions and adopt new, more systemic perspectives. ECODeCK embraces this transformative potential by structuring its educational approach into three iterative and interrelated phases that guide learners through a journey of awareness, visioning, and action.

The first phase, **Building Commitment**, initiates the learning process by creating the conditions for deep self-examination and critical reflection. It begins with a *disorienting dilemma*, prompting participants to question taken-for-granted assumptions embedded in their professional practices, organizational cultures, and sectoral norms. This is followed by stages of *self-examination* and *critical assessment*, in which learners begin to confront their values and recognize the need for change. Aim of this phase is to foster recognition and exploration of alternative perspectives, to drive sustainable transition. The second phase, **Designing the Shift**, focuses on envisioning new directions based on the insights gained. Learners engage in the *ac-*

quisition of knowledge and the *planning of a course of action* – building strategic understanding of how sustainability goals can be translated into concrete organizational change. Scenario-building, storytelling, and collaborative foresight methods are used to co-design desirable futures. This phase supports the formulation of clear and context-sensitive pathways, encouraging alignment between sustainability values and future-oriented strategies.

The third phase, **Embracing the Shift**, emphasizes active experimentation and the internalization of new paradigms. Participants engage in the *provisional trying of roles*, applying what they've learned in real-world settings. This is followed by the *building of competence and self-confidence* as learners refine their approaches and begin to integrate sustainability into their everyday professional identities. The process culminates in *reintegration* – a consolidation of new roles, values, and perspectives. At this stage, emphasis is placed on dissemination, peer learning, and the activation of agency, ensuring that individual transformation contributes to broader organizational and ecosystemic change.

Within this model, design is not treated solely as disciplinary content but as a transformative pedagogy. It is used as a method of inquiry and empowerment that fosters creativity, collective intelligence, and systemic awareness. By engaging with design as a way of thinking and acting, participants develop not only technical knowledge but also the agency to initiate and sustain meaningful change. Ultimately, the ECODeCK training model aims to produce more than isolated learning outcomes – it seeks to generate actionable roadmaps, strengthened individual and collective agency, and the activation of sustainability-driven innovation ecosystems. These outcomes position participants not just as learners, but as changemakers and agents of change capable of influencing their organizations and broader industrial contexts through informed, collaborative, and design-led action.

2.6 From Frameworks to Practices: Feedback from International Experts

ECODeCK capacity-building model has been tested with experts from the two selected Made-in-Italy manufacturing industries: fashion and

furniture. This dual purpose was to both validate the model and explore suitable approaches for its practical application and implementation with companies. ECODeCK offers a transformative and generative learning path, moving beyond conventional training formats. Its focus lies in developing real capacities and shifting mindsets. Rather than simply transferring knowledge, the model encourages reflection and dialogue around value creation and redefinition at different levels, and exmphasizes the importance of learning as a true engine for sustainable growth. Though the model shows promising potential, it also encounters the real-world complexities faced by companies, particularly SMEs in these sectors. The proposed training model promotes an evolutionary transformation that takes time to develop. However, many Italian firms struggle with limited time and resources, which restricts their ability to invest in meaningful change. This is followed by a difficulty in clearly assessing the potential benefits, making it hard to justify efforts or gain internal support. Finally, there is a need for a strategic vision to overcome the barriers by aligning innovation with long-term goals, going beyond immediate returns and demonstrating the broader impact of change at the systemic level. The ECODeCK project has also been tested in international academic contexts, including three important international research universities in Europe: Delft University of Technology, ETH Zurich, and Chalmers University of Technology. During the two and a half years of development of the ECODeCK project, two researchers have visited the three universities with a total of six months to test and validate the developed frameworks and training models. Particularly, during the year 2024, the visiting research activities focused on engaging scholars and experts on design methodology and project-based learning from Delft University of Technology and ETH Zurich, in developing and validating a training and capacity-building model to enhance manufacturing companies' sustainability and circularity competencies. Afterwards, in the year 2025, the visiting research activities further developed the project by collaborating with scholars and experts on strategic design, design for sustainable innovation, and design for sustainable products from Delft University of Technology and Chalmers University of Technology, to refine and test the training model and design methods that support manufacturing companies in developing and implementing

sustainable solutions through co-creating with stakeholders across the supply chain. The ECODeCK project has also been tested within leading international academic environments, specifically through collaborations with three important European research universities: Delft University of Technology, ETH Zurich, and Chalmers University of Technology. Over a period of two and a half years, two researchers conducted a series of visiting research activities of six months in total, aimed at testing and validating the design for sustainability frameworks and the design-based capacity-building model. In 2024, the research visits focused on engaging scholars and experts in design methodology and project-based learning at Delft University of Technology and ETH Zurich. These collaborations supported the development and preliminary validation of a training model intended to strengthen sustainability and circularity competencies in manufacturing companies. Building on this foundation, the 2025 phase of the project expanded its scope through collaboration with researchers specializing in strategic design, sustainable product development, and innovation for sustainability at both Delft University of Technology and Chalmers University of Technology. These engagements contributed to refining and validating the design-based training model and design methods, with a particular emphasis on co-creation practices that support manufacturing firms in designing and implementing sustainable solutions across the entire supply chain. In this landscape of converging urgencies and opportunities, ECODeCK emerges not only as a response to external pressures but as the expression of a research-driven vision for transformative design. At the heart of the project lies a shared commitment among its researchers to reframe sustainability as a systemic and cultural process – one that goes beyond technical compliance to actively reshape practices, mindsets, and relationships within and across industries. The following sections present the conceptual foundations and methodological approaches developed by the ECODeCK research team, highlighting how their interdisciplinary perspectives and design-led inquiry aim to catalyze sustainable transitions within the fashion and furniture sectors and, more broadly, within the *Made in Italy* paradigm.

References

Bertola, P., & Colombi, C. (2024). Can fashion be sustainable? Trajectories of change in organizational, products and processes, and socio-cultural contexts. *Sustainability: Science, Practice and Policy*, *20*(1), 2312682.

Breuer, J. L. (2023). Revisiting early fiscal centralisation in the European Coal and Steel Community in light of the EU's transfer budget. *Politics and Governance*, *11*(4), 28-39.

Bruno *et al*. (2025). The Sustainable Transition Comp. A competence framework to drive sustainability through the lenses of design and organizational culture. *Convergences-Journal of Research and Arts Education*, *18*(36).

Ceschin, F., & Gaziulusoy, İ. (2019). *Design for sustainability: a multi-level framework from products to socio-technical systems*. Routledge.

Chick, A., & Micklethwaite, P. (2011). *Design for sustainable change: how design and designers can drive the sustainability agenda* (Vol. 38). AVA publishing.

D'Itria, E., Pei, X., & Bertola, P. (2024). Designing sustainability today: an analytical framework for a design for sustainability model in european fashion and furniture industries. *Sustainability*, *16*(8), 3240.

Gaziulusoy, I., & Brezet, H. (2015). Design for system innovations and transitions: A conceptual framework integrating insights from sustainablity science and theories of system innovations and transitions. *Journal of Cleaner Production*, *108*, 558-568.

Gaziulusoy, İ., & Erdoğan Öztekin, E. (2019). Design for sustainability transitions: Origins, attitudes and future directions. *Sustainability*, *11*(13), 3601.

Hakio, K., & Mattelmäki, T. (2019). Future skills of design for sustainability: An awareness-based co-creation approach. *Sustainability*, *11*(19), 5247.

Mardikaningsih, R. (2024). Organizational effectiveness and green human resources management. *Bulletin of Science, Technology and Society*, *3*(1), 6-13.

Mezirow, J. (2003). Transformative learning as discourse. *Journal of Transformative Education*, *1*(1), 58-63.

Moore, S. B., & Manring, S. L. (2009). Strategy development in small and medium sized enterprises for sustainability and increased value creation. *Journal of Cleaner Production*, *17*(2), 276-282.

Peiró, J. M., Martínez-Tur, V., Nagorny-Koring, N., & Auch, C. (2021). A framework of professional transferable competences for system innovation: Enabling leadership and agency for sustainable development. *Sustainability*, *13*(4), 1737.

Rieckmann, M. (2012). Future-oriented higher education: Which key competencies should be fostered through university teaching and learning? *Futures*, *44*(2), 127-135.

Scoones, I., Stirling, A., Abrol, D., Atela, J., Charli-Joseph, L., Eakin, H., Yang, L. (2020). Transformations to sustainability: combining structural, systemic and enabling approaches. *Current Opinion in Environmental Sustainability*, *42*, 65-75.

Schwaninger, M. (2018). Systemic design for sustainability. *Sustainability science*, *13*(5), 1225-1234.

Vezzoli, C., & Macrì, L. (2024). The Design of Sustainable Product-Service Systems to Foster Circular Economy for All. *A Systemic Transition to Circular Economy: Business and Technology Perspectives* (pp. 39-64). Cham: Springer International Publishing.

Wiek, A., Withycombe, L., & Redman, C. L. (2011). Key competencies in sustainability: a reference framework for academic program development. *Sustainability science*, *6*(2), 203-218.