Jun 23rd, 9:00 AM - Jun 28th, 5:00 PM

Is There a Design-based Capacity-building Model for Achieving Sustainability and Circularity

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Citation

Pei, X., Mattioli, F., Bruno, C., D'Itria, E., Gramegna, S., Melazzini, M., and Bertola, P. (2024) Is There a Design-based Capacity-building Model for Achieving Sustainability and Circularity, in Gray, C., Hekkert, P., Forlano, L., Ciuccarelli, P. (eds.), *DRS2024: Boston*, 23–28 June, Boston, USA. https://doi.org/10.21606/drs.2024.1533

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Conversation:
Is there a design-based capacity-building model for achieving sustainability and circularity?

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doi.org/10.21606/drs.2024.1533

Abstract: Transferring the design research value into guiding sustainable strategy creation and bridging design research and sustainable development practices is necessary. In the conversation, we proposed a design-based capacity-building approach as a mechanism to take this action. We presented the ECODeCK project as the ground to invite audiences and participants to exchange their stories and experiences regarding the contributions of design communities towards sustainable development actions. This will be carried out by mapping and integrating different design-based approaches to develop capacity-building practices for sustainability and circularity. Ultimately, we will reflect on how these approaches and practices could reframe design research and design education, aiming at extending the impact across academia, the environment, industry, government, and society.

Keywords: design for sustainability; capacity building; design-based training; design research; design practice

1. Introducing the conversation: Context and scope

Translating the values of design research into the formulation of sustainable strategies, and bridging the gap between design research and sustainable practices, is essential for enabling an effective transformation of our development paradigms (Baldassarre et al., 2024; Bertola & Colombi, 2024). Today, design research holds significant potential to influence and guide sustainable strategy creation through its unique methodologies and insights (Bender-Salazar, 2023). However, this potential often remains untapped due to a disconnect between academic research and practical applications outside academia (Dwivedi et al., 2024).

Design researchers and educators are increasingly becoming aware of their responsibility to drive the transition toward sustainability and circularity. By identifying and implementing

practical approaches, they can ensure that their research findings are learned, recognized and utilized effectively within and beyond academic settings. This involves a conscious effort to translate academic insights into actionable strategies that can be transferred to build capacity in various organizations and sectors, thereby contributing to broader sustainable development goals (D'Itria & Vacca, 2021).

Accordingly, we propose a design-based capacity-building approach as a key mechanism to facilitate such a transition. Capacity-building activities are crucial as they empower other sectors to understand and integrate design principles into their sustainable development plans and actions (Ahamad et al., 2023; Miquelajauregui et al., 2022; Shiel et al., 2016; Virji, 2012). This approach enables a two-way exchange of knowledge and expertise: while design research provides valuable insights to other sectors, the feedback and collaboration with these sectors can drive design researchers and educators to rethink and refine their research methodologies (Fukuda-Parr & Lopes, 2012).

Engaging in discussions and collaborations with various sectors can foster a deeper understanding of the challenges faced and emerging opportunities for organizations to transform their practices into more sustainable ones. This interaction can prompt design researchers and educators to evolve and reshape their approaches, methods, and tools, aligning them more closely with the needs of sustainable transitions. Such a reflective process is essential for ensuring that design research would be relevant and impactful in addressing sustainability's complex and evolving demands (Barth et al., 2023; Norström et al., 2020; Annan-Diab & Molinari, 2017). Adopting a design-based capacity-building approach could significantly amplify the impact of design research. Such an approach could emphasize the pragmatic nature of design to address sustainable transition issues, hence providing hands-on methods and tools for non-designers to frame sustainability issues and envision possible alternative practices to mitigate their negative effects. Also, given the holistic approach that designerly ways of thinking promote, design could possibly become a crucial lens to understand the comprehensive nature of sustainable transition issues. Therefore, envisioning and understanding how to frame design-based capacity-building about sustainability could become a key for design researchers, educators and practitioners to effectively generate synergy between academia, industry, government, and society can drive more effective and comprehensive sustainable strategies, fostering a collaborative effort toward achieving global sustainability goals (D'Itria & Colombi, 2023). In this context, the approach adopted in the conversation addresses the complexity of the sustainable transition with a holistic view, emphasizing the importance of interdisciplinarity in coping with the topic.

The conversation is based on the insights developed within the research project ECODeck, which is part of MICS (Made in Italy Circolare e Sostenibile), a comprehensive partnership that includes universities, research centers, and enterprises funded by the Italian Ministry of University and Research through the NextGenerationEU program. The primary goal of ECODeCK project is to create a design-based capacity-building framework to support the

transition of Italian manufacturing companies in the fashion and furniture sectors towards sustainability and circularity.

The seven design researchers who constitute the project's working team have been engaged as conveners to conceptualize, design, and lead this conversation around the question, "How might we develop design-based capacity-building models for achieving sustainability?". Coming from diverse design research backgrounds, the research team collaboratively initiated the ECODeCK project to facilitate sustainable transformation within the Italian manufacturing industry. Addressing this complex and multifaceted issue, the team identified and defined a crucial shared asset: the unique ability to build capacity through design research and design-based training. These distinctive approaches form the foundation of our conversation.

The scope of the conversation was to disclose and explore a range of narratives and experiences that demonstrate the role of design research in capacity building to meet the pressing need for a sustainable transition, across various societal sectors, including academia, industry, government, and civil society. This dialogue aimed to enhance comprehension of the influence of design research on these sectors and encourage a collaborative process to enrich the methodologies and capabilities within the design research field itself.

In the following section, the development of the conversation structure and the results will be presented in detail. This includes an illustration of how the conversation was specifically designed and organized, outlining the framework and processes used to facilitate effective dialogue and engagement among participants. This structured approach was aimed at maximizing the impact and relevance of the discussion, ensuring that it would have met the objectives of enhancing understanding, promoting knowledge sharing, and driving advancements in the field.

2. Designing and organizing the conversation

The core question driving the conversation was, "How might we develop a design-based capacity-building model for achieving sustainability?". The question emerges from a longstanding discourse on design for sustainability, a topic of scholarly exploration for over 50 years, dating back to the publication of Victor Papanek's seminal work "Design for the Real World" (1971). Various theories, frameworks, and approaches have been developed within the design research community to address Design for Sustainability (e.g., Manzini & Vezzoli, 2003; Ceschin & Gaziulusoy, 2019). Despite this extensive body of knowledge, its recognition and application across other disciplines, sectors, and actors remain limited.

As design researchers and educators, one of the primary methods for transferring and implementing knowledge on design for sustainability is through capacity-building activities (Eade, 1997). This approach emphasizes not only the dissemination of theoretical insights but also the practical application and integration of these insights into various organizational and societal contexts. Oftentimes, people in academic settings employ terms such as

"academia and the outside world" or "academia and the real world" to describe the division between scholarly pursuits and outside-academia applications. Within the conversation, the aim of the team was to challenge this wording and its underpinning belief to recognize the positioning and role of academia as part of society. Hence, we have deliberately opted to use the term capacity-building instead of more conventional terms like education and training; this shift in terminology aims to reflect a nuanced understanding of our role as design researchers and educators and underscores several important considerations. Capacity-building encompasses a broad and systemic approach that aims to enhance the overall capabilities of individuals, organizations, and communities. It involves creating enabling environments, fostering collaboration, and developing sustainable practices that extend beyond academia. Moreover, the term capacity-building allows us to acknowledge the interconnectedness of academia with other societal sectors: academics are not isolated from the broader societal landscape but are integral to contributing to developing new capacities of other people within it. By focusing on capacity building, we emphasize the role of academics in bridging the gap between academic knowledge and its application in other organizational and social scenarios, thus facilitating meaningful and impactful changes.

The shift to capacity-building also reflects our commitment to supporting sustainable transitions, as the latter requires the empowerment of stakeholders to adopt and implement sustainable practices. This approach aligns with the need for comprehensive and adaptive solutions to complex sustainability challenges, emphasizing practical implementation and long-term impact.

The conveners started by providing an overview of the project's process in developing research strategies and structures, accompanied by an exposition of the project's understanding of design-based capacity building for sustainability and circularity. This concept encapsulates our perspectives and visions on how design research and researchers can pragmatically guide capacity-building initiatives within organizations to achieve sustainability and circularity. Then, the conversation followed a structured path that was designed ad hoc to present, share, and discuss the aforementioned understanding with the participants in our conversation (Table 1).

Table 1. Conversation structure

Time (min)	Activities	Contents
10'	Welcome and introduction	Background definitions and literature summary
5'	ICE_BREAKING	Let's know each other
10'	Setting the ground: from our shared experience in the ECODeCK project to the participant's experiences	Convenors will set the ground by sharing their experience in the ECODeCK project.

50'	INSIDE-OUT: how design-based learning experiences in academia can inform capacity building for sustainability practices in industry, government and civil society.	Participants and convenors will share practices from their academic experience effectively adopted to build capacity beyond academia.
15'	OUTSIDE-IN: Dynamic wrap-up	Wrap-up of the session, information for follow-up and closing remarks

During the conference, the strategy was to prioritize face-to-face interactions, recognizing the value of fostering immediate and meaningful exchanges among participants. This approach facilitated deeper engagement and richer discussions, setting the stage for continued dialogue throughout the conference. Simultaneously, we extended the conversation to the online audience by streaming the sessions, ensuring broader accessibility and inclusion.

Both in-person and virtual attendees were actively involved through a polling platform (i.e., Wooclap). This dual engagement strategy allowed us to integrate diverse perspectives and enhance the interactive nature of the discussions. By blending in-person and online participation, we achieved a comprehensive and inclusive dialogue, effectively bridging the gap between different modes of engagement and enriching the overall conversation experience.

The conversation started with an initial moment of setting the ground that summarized ECODeCK project perspective on emphasizing capacity building over traditional terms like education and training. We highlighted the essential role of design researchers and educators in facilitating sustainability (Figure 1). This approach underscores our commitment to creating systemic and lasting impacts, fostering collaborations, and integrating academic knowledge with practical applications to drive meaningful progress toward sustainable transitions.

Figure 1. Setting the ground on design for sustainability and capacity building. Screenshot from the online session.

Accordingly, two critical and heuristic questions guided our inquiry and provided a starting point for participants to engage in the conversation:

- Have you ever organized or participated in capacity-building initiatives for sustainability?
- Could you tell us about the various design approaches and models used to implement capacity-building activities for sustainable transitions? Which have been effective for sustainable transitions, and which ones have not?

The conversation invited participants to share their perspectives and experiences, aiming to explore how design-based capacity building can contribute to sustainability and circularity, enhance the impact of design research, and facilitate meaningful interactions between academic and societal stakeholders. The conversation includes participants from diverse research fields, both within the design discipline and from other related areas (see Figure 2). By gathering diverse participants' viewpoints from both academia and industry, and from diverse disciplines such as design, engineering, and economics, the discussion sought to deepen the understanding of effective strategies for achieving sustainability goals and advancing collaborative efforts between research and practice. Convenors also provided unique insights and perspectives based on their backgrounds and approaches. They highlighted how their involvement in research on building capacities for sustainable transitions has influenced their academic studies and research practices. This exchange allowed the convenors to illustrate the practical implications of their work and demonstrate how it advances the field of design research.

Figure 2. The research areas of the participants of the conversation. Results from the pooling platform Wooclap.

Finally, we recorded the conversation and utilized an online board for real-time notetaking. This approach allowed us to capture and compile the shared experiences of participants, creating a comprehensive overview of how the capacity-building approach bridges design research and sustainable development practices. These collected experiences will also contribute to the ongoing development of our ECODeCK project. This initiative provides an opportunity to engage with design scholars, practitioners, and research centres focused on

capacity building for sustainable transitions. We will also use the results of this conversation to explore the potential for developing practical workshops at future conferences, further advancing the field.

The following sections present the two knowledge blocks addressed by the conversation's core questions: i) participants' experiences in capacity-building initiatives for sustainability and ii) design approaches used in capacity-building activities for sustainable transitions. These inquiries were conceived to elicit detailed insights and experiences, which are critical for understanding and advancing the role of design in sustainability efforts.

2.1 Experience in capacity-building initiatives for sustainability

The first segment of the conversation focused on sharing and analyzing practical experiences related to capacity-building initiatives aimed at sustainability. During the conversation, 17 participants reported their experience in organizing or participating in a design-based capacity-building program related to sustainability (see Figure 3). There was adiscussion of various case studies, best practices, and lessons learned from implementing capacity-building strategies in different contexts. The goal was to provide insights into what has been effective, what challenges have been encountered, and how these experiences could inform future efforts. This question sought to make the experiences emerge from participants who have been directly involved in capacity-building initiatives focused on sustainability. Understanding their involvement helped identify applications and outcomes of such initiatives within the academic setting. It allowed for the collection of diverse perspectives on how design research has contributed to these efforts in various contexts. Participants' experiences sharing aimed at revealing valuable lessons, highlighting best practices, and providing evidence of the impact of these initiatives on achieving sustainability goals.

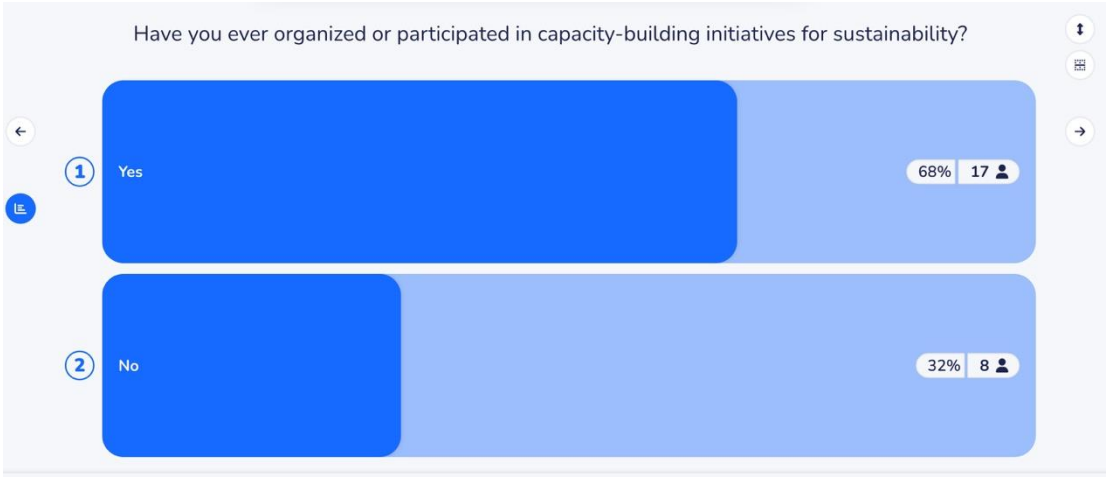

Figure 3. The participants' experiences in organizing or participating in capacity-building initiatives for sustainability. Results from the pooling platform Wooclap.

2.2 Design approaches and models used in capacity-building activities for sustainable transitions

The second section aimed at exploring the design approaches and models that had been employed in capacity-building activities to support sustainable transitions. It was dedicated to participants' conversations around different design methodologies, frameworks, and tools that have been utilized to facilitate capacity-building for sustainability, how they contributed to achieving sustainable outcomes and how they could be adapted or improved for broader applications. This inquiry helped to understand how design practice and research had been operationalized and provided a set of different approaches. This section was useful for assessing which models and approaches proved effective according to participants' experience. By identifying which methods have succeeded and which have failed, the conversation aimed to offer critical insights into the strengths and limitations of different design-based capacity-building strategies, contributing to a more nuanced understanding of how design can influence and drive effective change in sustainability practices.

3. Reflections on the design-based capacity-building model for sustainability

During the conversation, we explored how design-based capacity-building models can contribute to achieving the goal of sustainability, mainly in the business and industrial domains. The aim was to find answers to the questions mentioned above as well as share the current research results from the ECODeCK project, to nurture the conversation by including concerns and difficulties experienced by the research team and collect feedback and suggestions to integrate into the final development of the ECODeCK capacity-building model. We have summarized the main ideas from the conversation (see Figure 4) around design-based capacity-building approaches for sustainability into three categories: i) the unique characteristics, ii) implementation challenges, and iii) elements to maximize the impact of the design-based capacity-building approaches and make them more successful. During the conversation, participants actively shared their experiences, reflections, and suggestions both in person, via online video call (i.e., Zoom), and through the live polling platform (i.e., Wooclap).

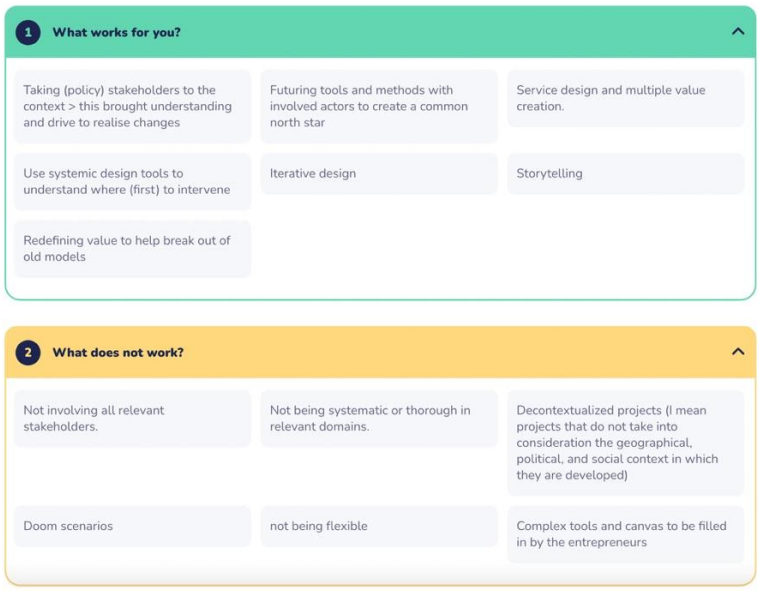

Figure 4. Participants shared their experiences, reflections, and suggestions through the pooling platform. Results from the pooling platform Wooclap.

3.1 Characteristics of design-based approaches that foster effective capacity-building for sustainability

One of the main focuses of the conversation was to discuss and reflect on the distinct features of a design-led approach to support organizations in building capacities related to sustainable development and innovation. Most participants stated that, according to their experience, the design-based approach effectively gave the design orientation toward wicked problems and, consequently, the disciplinary proficiency to deal with uncertain and complex situations.

According to some participants, the designerly way (Cross, 1982) to address sustainability challenges often provided practical methods and tools that were easy to carry out to analyze sustainability issues and possible solutions; designers have the ability to make simple tools to deal with complexity. The human-centred feature of the design starts with individual human beings, who are the core elements in implementing the change. Moreover, it emerged that design-based approaches could nurture capacity-building both at the individual and organizational levels to align objectives, motivations, and plans within non-design organizations between decision-makers and other stakeholders.

Distinguishing itself from more traditional ex-cathedra approaches to training, the hands-on nature of design-based approaches to capacity-building activities provides organizations and industrial sectors with a novel paradigm for future envisioning. Indeed, design focuses on potential opportunities and proposes defining new values to break out old and traditional patterns. The conversation highlighted the significance of creativity in collaboratively designing a shared and desirable future toward sustainability. According to participants, design researchers and practitioners, in particular, bring diverse and alternative perspectives to planning and achieving sustainability objectives, in contrast to roles and actors from other

backgrounds. This approach not only reduces uncertainty and perceived risk, but also enables the creation of innovative and tailored pathways for companies to follow.

An essential characteristic of design-based approaches is their emphasis on methods that enhance visualization and communication. Participants noted the crucial role of service design and systemic design methods in facilitating an understanding of the varying levels of complexity and uncertainty associated with the sustainability transition, particularly within the industrial sector. These methods also contribute to guiding organizations in defining strategically and holistically where to start the change and interventions. Discussions during the conversation also highlighted that design disciplines embrace all stakeholders in the exploration process by using engaging storytelling and easy-to-understand tools to create a shared understanding and commitment to change.

The iterative nature of a design-based approach presents significant advantages in developing capacity-building activities. Achieving sustainability needs more than a one-size-fits-all solution, as the appropriate strategies depend on various factors, including the company's strategy, culture, context, and industry. The outcomes are inherently uncertain. This aligns with the type of problems that design and designers address: complex, open-ended and ill-defined. Therefore, the design-based approach makes the results successful by iterative testing, rapid experimentation, feedback collection, and continuous refinement.

3.2 Challenges of implementing a design-based capacity building model for sustainability

While a design-based approach to capacity building offers significant advantages for achieving a sustainable transition, it also encounters various challenges and difficulties. During the discussion, participants shared their personal experiences, highlighting key considerations that should be carefully addressed when developing and implementing capacity-building activities within the industrial sector.

A design-based capacity-building model must consider integrating existing processes and demonstrate the positive changes it brings. Although a given training activity offers a promising narrative and pathway toward a sustainable future, it should be developed in collaboration with the established industrial processes and systems, which can be complex and resistant to change. Consequently, capacity-building activities must also align with the company's business objectives, strategies, and key performance indicators (KPIs), primarily used to evaluate and assess the company's performance. One of the challenges of applying a design-based approach in organizations is the difficulty of translating design results into quantifiable outcomes, especially in the short term. Companies in the industrial sectors often make their decisions based on numbers and charts, focusing on quantitative parameters. However, design researchers and design practitioners are often not used to include a quantitative perspective to guide and evaluate their activities. This can be a challenge when demonstrating the results and returning with a shared "language", mainly quantitative, to a range of stakeholders.

Also, the design methods must be informed by and aligned with recognized regulations, policies, and compliance issues related to sustainable development and transition. When addressing the second question in the conversation, participants, mainly from business, policy, and management backgrounds, emphasized the importance of integrating capacity-building models and activities with forthcoming mandatory regulations. Notable examples include the Digital Product Passport and Extended Producer Responsibility initiatives from the European Commission. Industries and companies are under increasing pressure to develop solutions and implement changes in compliance with these regulations and policies. This presents a significant opportunity to promote design-based capacity-building, which can aid industries in not only meeting current regulatory requirements but also in anticipating future demands, thereby enhancing their preparedness for forthcoming challenges.

Thirdly, the timescales are crucial when developing and implementing capacity-building activities aimed at achieving sustainability. Although design can offer alternative scenarios for a more promising future, design activities often lack a focus on long-term outcomes and perspectives. However, building the capacity to facilitate a sustainable transition necessitates planning for timeframes extending beyond 10 to 20 years. To address this challenge, design-based training should aim to bridge the gap between short-term, results-focused design practices and long-term sustainable goals by integrating current practices into this intermediary space. This approach allows us to identify the necessary practices that are currently missing, which are essential and contextualized for progressing from the present state to a sustainable future. It is essential to recognize that the capacity-building model must cultivate greater attention and sensitivity to long-term perspectives. By doing so, we can ensure that design-based capacity-building is effectively aligned with the demands of sustainable development.

3.3 Elements to maximize the impact of the design-based capacity-building approach

The one-and-a-half-hour discussion provided numerous insightful suggestions and reflections, offering valuable advice to the ECODeCK research team for the further development of the capacity-building model for Italian manufacturing companies.

The capacity-building model should emphasize the promotion of a "design-based" approach and its unique characteristics to achieve sustainability. It is essential to effectively translate and link these design features with the specific capacities needed to facilitate a sustainable transition. This entails maximizing the contributions of design in understanding and addressing complex problems, as well as in managing uncertainty. By doing so, we can ensure that design methodologies are effectively integrated into the development of capabilities that are critical for navigating and driving sustainable transition.

Addressing the complex problem of sustainability involves a wide array of practices beyond those offered by design alone, highlighting the essential need for interdisciplinary and collaborative actions. Design and designers must learn from other disciplines to enhance their roles within an interdisciplinary context, facilitate collaboration among various

stakeholders, and bridge existing gaps. Effective collaboration necessitates bringing together individuals from diverse roles within and beyond organizations and fostering cooperation among them. Integrating transdisciplinary methods and competencies, along with a shift in mindset, into the design-based capacity-building methodology is also crucial. Furthermore, to build capacities and guide industries toward achieving sustainability, it is imperative to consider systemic-level and long-term strategies. These approaches will better equip us to develop comprehensive and sustainable solutions.

4. Conclusions

Sustainable transition is a complex and long process. Thus, the exploration of design-based capacity-building as a means to bridge the gap between design research and sustainable development practices is a step towards realizing a more sustainable future. In this framework, the ECODeCK project and the conversation, managed by the ECODeCK research team, have provided a valuable platform for engaging diverse stakeholders in a dialogue that emphasizes the transformative potential of design in contributing to the sustainable transition. The exchanges and insights gained from this conversation highlight the significance of design as a relevant and impactful approach for developing the capacities required to maintain these solutions throughout time rather than only as a tool for generating sustainable solutions. The human-centred, iterative design process enables the creation of flexible and robust solutions that can address the changing demands of sustainability. Furthermore, the emphasis on capacity building instead of conventional education and training reflects a more comprehensive and systemic strategy that attempts to provide communities, organizations, and individuals the tools they need to take charge of their own sustainable futures. Nevertheless, there are certain difficulties in putting design-based capacity-building paths into practice. Indeed, the conversation highlighted that it would possibly take significant thought and teamwork to integrate design techniques into current industrial processes and connect them with regulatory frameworks. One important obstacle that needs to be overcome is the requirement to show the concrete advantages of design interventions, especially in language that is understandable to stakeholders in business and policy. Additionally, the long-term nature of sustainability goals poses a challenge to design practices, which are often geared towards more immediate outcomes. Bridging this gap will require a shift in both mindset and practice, with a greater emphasis on long-term planning and the integration of current practices into a broader, future-oriented framework. Looking forward, the continued development of the ECODeCK project and similar initiatives will be crucial in refining and enhancing the design-based capacity-building model.

To achieve this, it will be necessary to strengthen interdisciplinary partnerships, include transdisciplinary approaches, and cultivate an attitude that prioritizes long-term, systemic transformation. By bringing together diverse perspectives and expertise, design researchers can assume a crucial function in moulding approaches that are not only imaginative but also feasible and adaptable to various situations. The insights and feedback generated through

this project, and particularly this conversation, highlight the need for ongoing dialogue and collaboration between design researchers, practitioners, and stakeholders from various sectors. This collaborative approach will be key to advancing the field of design research and ensuring its relevance and impact in the broader effort to achieve global sustainability goals. The success of design-based capacity-building efforts will ultimately depend on our ability to translate theoretical insights into practical, actionable strategies that can be adopted and sustained across different sectors. In summary, by focusing on capacity building as a mechanism for sustainable transitions, this research not only contributes to understanding the role of design in sustainability, but also provides a framework for action. As we continue to refine and expand this model, we move closer to realizing the full potential of design research in guiding sustainable development and driving meaningful, long-term change.

Acknowledgements: We want to thank all the participants of our conversation at the DRS2024 conference for their active engagement and precious contributions. This conversation is developed as part of the research project funded by the National Recovery and Resilience Plan (NRRP), Mission 4 Component 2 Investment 1.3—Call for tender No. 341 of 15 March 2022 of Italian Ministry of University and Research funded by the European Union—NextGenerationEU. Award Number: PE00000004, Concession Decree No. 1551 of 11 October 2022 adopted by the Italian Ministry of University and Research, CUP B83C22004890007. MICS (Made in Italy—Circular and Sustainable).

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