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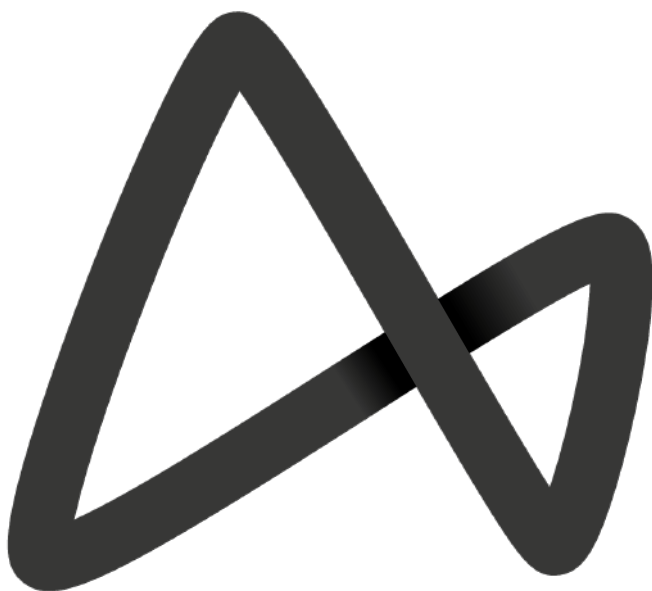
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Re-Waste. Designing Futures from Textile Scraps

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Abstract

This paper presents the outcomes of RE-WASTE, a design-led research project initiated in 2023 by the University of Florence, in collaboration with academic and industrial partners. The project explores how design can reframe preconsumer textile waste, not as a problem to be hidden or outsourced, but as a material and cultural opportunity. Through a transdisciplinary and practice-based approach, RE-WASTE combined design education, material experimentation, and co-design with startups and local enterprises. The project adopted a situated methodology involving workshops, prototyping, and the creation of hybrid semi-finished materials. Results highlight the potential of design to act as a catalyst for systemic change, shifting perceptions of waste, generating new aesthetic and symbolic values, and fostering relational infra-structures across the fashion system. By adopting the paradigm of “prosperity by design”, the project positions waste as a critical entry point for rethinking production, value, and collaboration. Ultimately, RE-WASTE advocates for a regenerative and context-sensitive design culture, where waste becomes the starting point for imagining more inclusive and sustainable futures.

Keywords

Textile Waste

Circular Design

Systemic Innovation

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INTRODUCTION

In the current context of climate crisis and resource depletion, the fashion industry stands out as one of the most environmentally, and socially, challenging sectors. Among its many critical issues, the production of textile waste—both post-consumer and, often overlooked, preconsumer — emerges as a symptom of a predominantly linear and fragmented system, still misaligned with sustainability goals. Preconsumer textile waste, generated during design, sampling, and manufacturing phases, accounts for a significant portion of industrial waste within the fashion sector and raises not only environmental concerns but also cultural, economic, and systemic questions. Traditionally considered a by-product to be discarded or concealed, textile waste is now being reconsidered through design approaches that recognize its latent value. In this perspective, design is no longer merely a phase within the supply chain but becomes a strategic driver for systemic transitions—capable of transforming waste into resources and redefining the boundaries of production, consumption, and value creation. Increasingly, research shows that up to 80% of a product's environmental impact is determined during its design phase (Goldsworthy et al., 2018), highlighting the critical role of the designer in enabling circular processes and envisioning sustainable production models. Design practice, however, does more than optimize form and function. It intervenes in material culture, aesthetic imaginaries, and organizational logics. Reframing waste as “vibrant matter” (Bennett, 2010) or as a “creative agent” entails a radical shift in perspective, in which refuse is no longer the leftover of a system but becomes the starting point for new forms of value, meaning, and collaboration. This shift is particularly significant in the Italian context, where the fashion industry is structured around a highly fragmented network of micro and small enterprises—often excluded from dominant innovation narratives, yet positioned at the core of potential transformations.

This paper aims to explore the role of design and the designer in regenerating preconsumer textile waste, drawing on the outcomes of the RE-WASTE project, initiated in 2023 by the University of Florence. Through workshops, cross-sectoral collaborations, and material experimentation, RE-WASTE approached waste not merely as a technical issue but as a cultural, social, and aesthetic phenomenon. The project demonstrated how design practices aligned with circular principles—such as zero-waste pattern making, pattern hacking, and the transformation of scraps into new semi-finished materials—can contribute to redefining the very notion of value within the fashion system. The analysis is situated within the theoretical framework of “prosperity by design,” a vision that integrates system thinking, transition design, and futuring. This perspective frames design not just as a tool for problem-solving, but as a transformative device capable of steering production processes toward a more just, sustainable, and situated future. Within this framework, waste is no longer an obstacle to be eliminated but a resource to be activated through design intelligence, imagination, and cooperation.

FRAMEWORK

DESIGN, SYSTEMS, AND WASTE: UNDERSTANDING COMPLEXITY TO TRANSFORM IT

The transformation of textile waste from discard to resource cannot be understood — nor effectively addressed — without a fundamental rethinking of the role of design within complex systems. Preconsumer textile waste is not an isolated anomaly but rather a symptom of broader systemic dysfunctions within the fashion industry: a fragmented supply chain, a linear growth model, hyper-efficient yet poorly coordinated production logics, and a structural separation between design, manufacturing, distribution, and end-of-life phases (OECD, 2020). To tackle these types of challenges — often classified in the literature as “wicked problems” (Coyne, 2004; Murphy, 2012) — a systemic approach is required, one that can recognize and map the multitude of variables at play, their entanglements, and the interdependencies between actors, infrastructures, technologies, and cultural practices. In this direction, system thinking offers a theoretical and epistemological lens through which to read complexity and identify advantage points for transformation (Howard et al., 2022). It reveals how visible manifestations — such as the accumulation of textile waste — are not isolated problems but systemic consequences of entrenched industrial paradigms, consumer culture, and infrastructural gaps. Such a systemic vision also allows for moving beyond partial or decontextualized responses, which often dominate sustainability agendas in the fashion sector. Advanced recycling technologies, regulatory policies, and innovative materials are important contributions, but insufficient if not embedded within a broader transformation of relational, productive, and cultural models. In this context, design plays a critical role—not merely as a technical practice, but as a strategic agent capable of activating coevolutionary processes among materials, stakeholders, and territories. In particular, the concept of transition design (Irwin, 2015; 2020) expands the traditional scope of design by shifting the focus from the production of objects to the design of socio-technical transitions. Design becomes a tool to orient systemic change through practices that engage multiple stakeholders, valorize local knowledge, and generate collective imaginaries of the future. Within this framework, the designer is no longer solely a creator but acts as a facilitator of transformative processes—a mediator between knowledge systems, actors, and temporalities. A key concept within transition design is futuring (Fry, 2014), understood as the design-driven capacity to imagine and prefigure desirable scenarios that guide present-day decisions. Futuring is not a neutral forecasting exercise, but a profoundly ethical and political act of constructing alternatives capable of disrupting unsustainable trajectories. Applied to the fashion industry, this means interrogating the entire production system—from material sourcing to waste management—to generate regenerative and circular models that redefine the very notion of “value.”

RECONFIGURING VALUE: FROM WASTE TO VIBRANT MATTER

One of the most significant contributions of contemporary design to sustainability discourse lies in the cultural reconfiguration of waste. In many production sectors, waste is seen as a useless by-product or a material lacking

value. Yet, radical design perspectives can subvert this view by generating new meanings and forms of desirability through aesthetic, narrative, and functional reimagining of matter. Philosopher Jane Bennett (2010), through the concept of vibrant matter, challenged the traditional dichotomy between subject and object, proposing a posthumanist vision in which materials, waste, and residues are endowed with agency and transformative potential. This approach has influenced recent research in textile design, where waste is increasingly recognized as an active agent in the design process, catalyzing new relationships between nature, technology, and culture (Smelik, 2021). In fashion, the concept of textile hacking (von Busch, 2014) exemplifies this semantic shift. Independent designers and emerging brands have adopted practices of appropriation, sabotage, and reinvention of discarded materials—including scraps bearing logos or recognizable prints—transforming them into distinctive elements of their identity. Cases such as Avavav or the pioneering work of Dapper Dan (Franzo & Salomè, 2025), illustrate how waste can become a carrier of symbolic, cultural, and political meaning, a medium through which to challenge the hierarchies of the luxury industry and propose alternative aesthetics. Within the industrial sphere, there is a growing number of initiatives aiming to reincorporate waste into production cycles. However, these often adopt a purely functionalist approach. In contrast, the design practices emerging from the RE-WASTE project seek to transform not only the use of waste but also its perception, acting simultaneously on educational and operational levels. Student workshops focused on zero-waste design, along with experimentation using regenerated materials—such as pressed panels made from textile and leather scraps in collaboration with Zerow—demonstrate how design can foster a culture of care and regeneration that transcends technical efficiency. This approach also implies a relational understanding of value, one that extends beyond the final product to include processes, relationships, skills, and territories involved. The notion of prosperity by design (Franzo, 2024) encapsulates this idea—not as economic growth, but as distributed, generative, and situated prosperity. It recognizes that sustainability cannot be imposed from above, but must emerge from contextual practices, through the integration of diverse actors and the activation of existing infrastructures. Finally, the regeneration of waste through design raises a fundamental question: who holds the power to define what is valuable and what is waste? In a system dominated by extractive and standardized economic logics, design can open up spaces for autonomy, imagination, and dissent. Designers can challenge the dominant culture of waste and contribute to building a new production paradigm based on regeneration, relationality, and responsibility through speculative practices, hybrid collaborations, and creative reappropriation.

THE RE-WASTE PROJECT: FROM MATERIAL RECOVERY TO SYSTEMIC TRANSFORMATION

Launched in 2023 by the University of Florence in transdisciplinary collaboration with Politecnico di Milano and the Universities of Bologna and Palermo—and funded within the framework of Italy's National Recovery and Resilience Plan (PNRR)—RE-WASTE is a situated and concrete example of how design can intervene in redefining preconsumer textile waste. Born from the urgency to address the environmental and material impact of waste generated even before products reach the market, the project combined

research, education, and co-design activities involving students, companies, startups, and academic institutions. The Italian context—marked by high production fragmentation, specialized industrial districts, and a predominance of micro and small enterprises—highlighted the need for systemic yet context-sensitive actions. RE-WASTE responded to this challenge by proposing a model that repositions waste as a cultural and design resource, through a twofold approach: rethinking material imaginaries associated with waste, and practically experimenting with circular design solutions in both educational and industrial settings.

OBJECTIVES AND METHODOLOGICAL APPROACH

The project's objectives were articulated on two levels:

- Cultural and symbolic: transforming the perception of waste from marginal material to one that conveys value, aesthetics, and meaning;
- Operational and design-based: exploring, through lab activities and industry collaboration, new methods and tools to reintegrate preconsumer waste into production cycles.

From a methodological perspective, RE-WASTE adopted a transdisciplinary and participatory approach, integrating design, engineering, materials chemistry, and social sciences. This integration enabled a holistic reading of the waste issue—moving beyond techno-centric solutions toward regenerative practices capable of connecting diverse knowledge systems and visions. Design was framed as an enabling device, capable of fostering dialogue between academic knowledge, tacit knowledge (craft and manufacturing), and emergent knowledge (startups and innovators). The project's outputs extended beyond physical products to include maps, prototypes, speculative scenarios, educational tools, and new design narratives.

EDUCATIONAL WORKSHOPS: LEARNING FROM WASTE

One of the project's key pillars was a cycle of design workshops conducted with fashion design students from the University of Florence and the Swedish School of Textiles (University of Borås, Sweden). These workshops aimed not only to teach circular design through hands-on practice, but also to explore the expressive, technical, and symbolic potential of preconsumer textile waste. The workshops focused on two primary design approaches:

- Zero-waste design: experimentation with pattern-making strategies that minimize waste at the design stage;
- Less-waste and reuse design: creative use of production offcuts through digital cutting, modular assembly, and layering techniques.

The first workshop was held with first-year students in the BA in Fashion Design at the University of Borås, within the course "Form och material 1: kropp och struktur", led by Rickard Lindqvist. Students worked with textile scraps sourced from prior class assignments and from the waste bins of the Garment Construction Lab. The activity enabled a dual investigation: it offered

a classification of possible design outcomes using preconsumer/post-industrial waste—ranging from garments to accessories and home décor objects **Fig. 1** — and explored diverse design strategies developed in response to non-standard materials.

These strategies included the use of symmetry to recreate balanced pattern compositions, reverse-engineering garments by starting from the negative space left on cutting tables, and creating unconventional products—such as soft toys or cushions—from seemingly unusable fragments. The process highlighted not only the technical and formal potential of waste but also its poetic and narrative dimensions, treating discarded material as a medium for aesthetic and emotional expression.



Fig. 1
Outcomes from the workshop “Negative Spaces/Positive Vibes” (The Swedish School of Textile, University of Borås, 2024).

The workshop also revealed how pedagogical settings can serve as experimental laboratories for sustainable design, enabling students to develop an ethical awareness of material responsibility and the environmental and social implications of their design decisions. Among the most meaningful outcomes were design approaches that turned material constraints into creative opportunities: using the inherent symmetry of scraps, inverting the cutting process, or transforming residue into alternative typologies. Emphasis was placed not only on the outcomes but also on the process itself as a critical and transformative act capable of reshaping material narratives.

COLLABORATION WITH ZEROW: FROM OBJECT TO SYSTEM

In parallel, RE-WASTE activated a collaboration with Zerow, a Tuscan startup specializing in the recovery of textile and leather waste. Through processes such as shredding, compression, and thermoforming, Zerow produces semi-finished panels from preconsumer waste with potential applications in furniture, packaging, and industrial design. This partnership made it possible to explore an alternative value chain for discarded materials—not just as inputs for fashion, but also as hybrid, multi-purpose materials that transcend disciplinary boundaries. During a workshop held between September and December 2024, students in the Industrial Product Design program at the University of Florence worked on the development of monomaterial objects designed to be durable, recyclable, and disassemblable. These projects embraced an explicitly “post-waste” aesthetic that celebrated the raw, composite texture of the regenerated material.

The first of these workshops involved approximately sixty third-year students. The initiative focused on reusing composite panels made of mixed textile and leather scraps that previously had no designated application. Students were tasked with designing office products and furniture elements based on ecodesign principles—easy disassembly, recyclability, and reduction of production waste **Fig. 2**. A key objective was to instill awareness of material usage, emphasizing reuse as both a structural and aesthetic strategy. The second workshop, titled “Visible Reinforcements”, was a more intensive seminar involving fifteen students from both product and fashion design backgrounds.

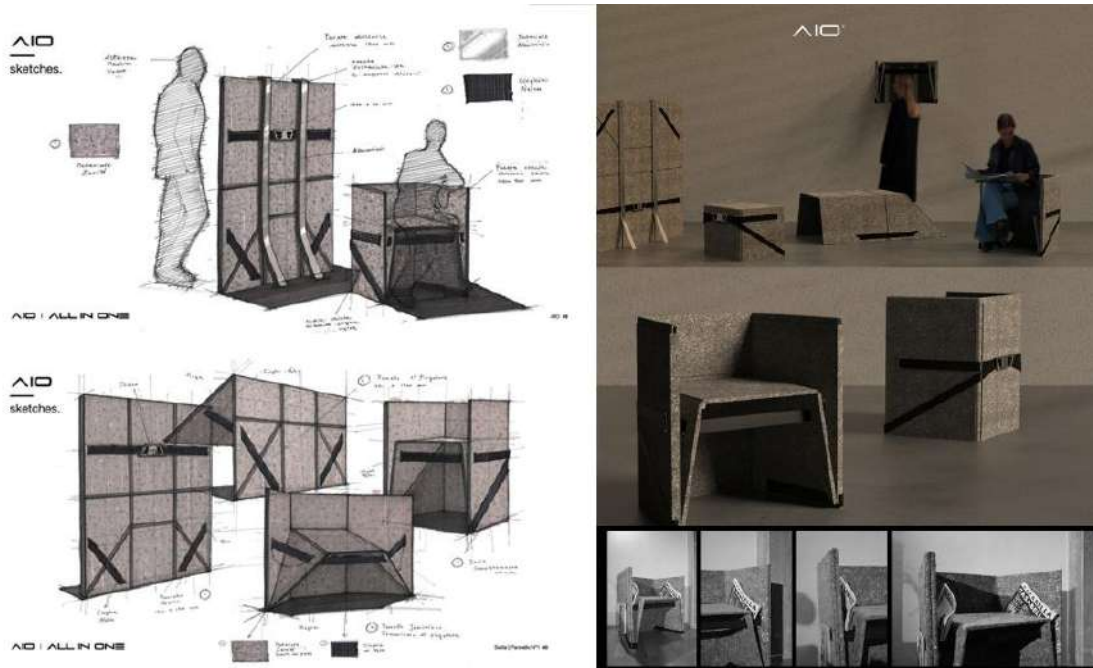


Fig. 2
AIO system project
from workshop in
collaboration with
Zerow (Università
degli Studi di
Firenze, 2024).

Organized in collaboration with Prodotti Alfa, a company specializing in regenerated leather reinforcements, the workshop sought to highlight the role of invisible materials—usually hidden within linings and internal components—that contribute significantly to a product’s durability. Students were encouraged to display these materials without coatings or finishes, demonstrating that good design alone can elevate underappreciated resources **Fig. 3**. The workshop challenged dominant aesthetics and promoted a narrative based on transparency and intrinsic material quality.

This experimentation had at least three major outcomes:

- Educational: it tested a model of integrated learning based on real-world problems and industry partnerships;
- Industrial: it contributed to identifying potential product development lines for the startup, through the exploration of new uses for recycled panels;
- Cultural: it reinforced the view of waste as an aesthetic, narrative, and systemic resource, to be communicated transparently rather than hidden.

Furthermore, the collaboration with Zerow demonstrated the importance of cooperative local ecosystems, where businesses, universities, and institutions work together to envision shorter, more transparent, and resilient supply chains. In this sense, the regeneration of waste is not only material—it is also organizational and relational.

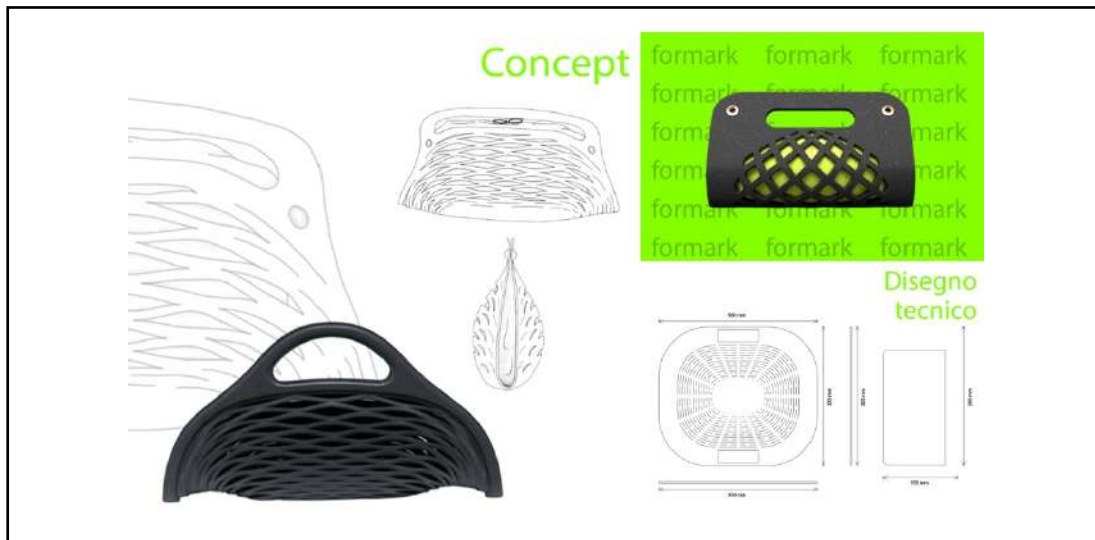


Fig. 3
Formmark bag project
from workshop in
collaboration with
Prodotti Alfa
(Università degli Studi
di Firenze, 2025).

The RE-WASTE project offers fertile ground for critical reflection on the transformative role of design in redefining textile waste and, more broadly, in enabling systemic sustainability practices. This section aims to articulate the main outcomes of the RE-WASTE experience along three interrelated dimensions: cultural, educational-productive, and systemic-relational.

WASTE CULTURE AND A NEW AESTHETIC OF VALUE

One of the most significant outcomes of RE-WASTE concerns the symbolic transformation of waste. Traditionally conceived as “matter without value” or residue to be concealed, waste has been reinterpreted within the project as material endowed with aesthetic, narrative, and design potential. This shift aligns with broader reflections on the role of design in shaping material imaginaries: value is not an inherent attribute but a cultural construct that can be renegotiated through design. The practices developed during the workshops demonstrated how design intentionality can reframe waste, endowing it with aesthetic and functional qualities that make it desirable. This process goes beyond mere reuse and signals a paradigm shift in how materials are perceived—resonating with Jane Bennett’s theory of vibrant matter (2010). Waste is no longer seen as the “other side” of production but as a living entity capable of influencing formal and conceptual choices. From this perspective, a new post-waste aesthetic emerges—one no longer centered on perfection, purity, and linearity, but on imperfection, assemblage, and trace. This aesthetic, in turn, becomes political: by valorizing what has been excluded or discarded, it challenges dominant criteria of value, taste, and legitimacy within the fashion system. In other words, the aesthetic of waste acts as a form of visual and symbolic dissent against the norms imposed by the market and the prevailing culture of luxury.

DESIGN EDUCATION AND ANTICIPATORY RESPONSIBILITY

A second area of reflection concerns the educational function of design. The workshops conducted as part of RE-WASTE showed that design education can serve as a laboratory for futuring—capable of training a generation of designers who are not only technically skilled but also aware of their agency within complex systems. Students were asked to work with real material constraints, to face both production and cultural limitations, and to imagine new operational possibilities.

This experience had at least three pedagogical effects:

It demonstrated that waste is not a limitation but a creative trigger;

It highlighted the value of situated design thinking, capable of responding to specific territorial, productive, and cultural contexts;

It reinforced the idea of design as an anticipatory practice—one that not only solves existing problems but envisions desirable futures aligned with an inclusive and regenerative vision of prosperity.

The approach diverged from traditional educational models based on abstract design exercises and linear problem-solving. Instead, the workshops functioned as environments for transformative learning, where design was explored as language, method, and critical tool. This kind of education does not merely produce "good designers," but cultivates informed citizens—individuals capable of reading the world through the lens of design and acting upon it.

TOWARD SYSTEMIC AND COLLABORATIVE REGENERATION

The third level of analysis concerns the systemic dimension of the project. As discussed in the theoretical framework, addressing pre-consumer textile waste requires moving beyond a sector-specific logic and viewing the problem as a symptom of deeper systemic dysfunctions: fragmented supply chains, lack of recovery infrastructure, limited cooperation among actors, and misalignment between policies and industrial practices. RE-WASTE sought to respond to these challenges by proposing a relational and cooperative model, based on encounters between heterogeneous stakeholders: universities, companies, designers, startups, and students. The collaboration with Zerow was emblematic: starting from a local challenge—the valorization of specific waste types—it became possible to construct a micro-supply chain of regeneration capable of generating cultural, environmental, and economic value.

This model rests on three principles:

- Situatedness: every circularity strategy must be rooted in a deep understanding of the local context, skills, and constraints;
- Collaboration: sustainability cannot be achieved in isolation; it requires building relational infrastructures among actors who share visions, languages, and objectives;
- Prototyping: systemic change does not occur by decree, but through iterative, adaptive experiments that generate collective learning.

In this vision, design acts as mediator and connector—facilitating convergence between diverse knowledge systems and practices. It is not only a matter of rethinking products, but of rethinking the very conditions under which design is made possible: who decides, with what resources, in what

timeframes, and toward what ends. Design, in this sense, becomes a cultural infrastructure for systemic innovation.

LIMITATIONS AND FUTURE CHALLENGES

Despite its positive outcomes, RE-WASTE also revealed several limitations and areas for future development:

- **Scalability:** many of the practices developed remain confined to experimental or educational contexts. To become structurally integrated, these practices must be translated into policies, incentives, and business models that support their wider adoption.
- **Business Culture:** many actors within the production chain still perceive waste as a cost to be externalized. A cultural shift is urgently needed—one that sees regeneration not as a constraint, but as an opportunity.
- **Institutional Dialogue:** projects like RE-WASTE can offer valuable insights for shaping more effective public strategies. However, a structured channel is needed to connect research, industry, and policymaking.

CONCLUSIONS

The RE-WASTE project offered a concrete opportunity to test how design can activate cultural, material, and systemic transformations when preconsumer textile waste is approached not as a residue but as a resource. Beyond the practical outcomes, the project highlighted the relevance of two theoretical perspectives—vibrant matter and prosperity by design—as conceptual tools that directly inform and strengthen design practice.

The notion of vibrant matter proved essential in reframing waste not as inert or deficient material, but as an active agent capable of generating new formal, symbolic, and relational possibilities. This perspective encourages designers to attend to the material's inherent behaviours—its textures, unpredictability, and traces of former use—and to let these qualities guide design choices. In the workshops, this shift translated into design strategies that embraced the irregularity and heterogeneity of scraps, allowing matter itself to suggest forms, joints, and aesthetic identities. In this sense, the theory of vibrant matter does not remain an abstract lens but becomes an operational attitude: it trains designers to recognize materials as coauthors of the process, fostering practices of care, attention, and adaptive making that are central to circular design.

Similarly, the paradigm of prosperity by design offered a strategic direction for aligning material experimentation with wider systemic visions. Rather than equating prosperity with economic growth or throughput, this framework foregrounds values such as regeneration, distributed agency, relational infrastructures, and contextual sensitivity. Within RE-WASTE, this perspective enabled stakeholders to look beyond single products or isolated technical solutions, and to instead imagine how waste recovery could contribute to broader cultural and territorial ecosystems. Practically, it guided decisions about stakeholder engagement, workshop structure, and the creation of openended prototypes intended not as final outputs but as catalysts for ongoing collaboration. Through this lens, design practice becomes

anticipatory and connective: it seeks to build enabling conditions for future regenerative processes.

Taken together, these theoretical reflections reinforce design's role as a transformative agent. Vibrant matter reshapes how designers perceive and work with materials, while prosperity by design reshapes how they envision systems and futures. Both frameworks expand the scope of design practice—from crafting objects to cultivating cultural meanings and socio-technical transitions.

The project also demonstrated that small-scale experiments—such as student workshops or prototyped waste panels—can generate systemic value when they are embedded in cooperative networks and aligned with longterm visions. However, structural integration will require supportive policy frameworks, more transparent supply chains, and stable platforms for dialogue among universities, companies, and institutions. The challenge ahead lies in bridging these levels and ensuring continuity between research, practice, and policymaking.

Ultimately, RE-WASTE illustrates that waste can become fertile ground for innovation only if accompanied by a shift in perception. By operationalizing theoretical reflections and translating them into situated design actions, the project shows how design can cultivate new imaginaries of value and contribute to more inclusive, resilient, and regenerative futures for the fashion system.

References

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|---|---|--|
| Bennett, J. (2010). <i>Vibrant matter: A political ecology of things</i> . Duke University Press. | <u>Weaving%20Prosperity.pdf</u> | applications. <i>Journal of Textile Design Research and Practice</i> , 6(1), 42–65. https://doi.org/10.1080/20511787.2018.1467197 |
| Coyne, R. (2004). Wicked problems revisited. <i>Design Studies</i> , 26(1), 5–17. https://doi.org/10.1016/j.destud.2004.06.005 | Franzo, P., & Salomè, M. A. (2025). Hacking the waste and the Anthropocene through fashion materials. <i>Fashion Practice</i> , 1–19. https://doi.org/10.1080/17569370.2024.2440882 | Howard, M., Böhm, S., & Eatherley, D. (2022). Systems resilience and SME multilevel challenges: A place-based conceptualization of the circular economy. <i>Journal of Business Research</i> , 145, 757–768. https://doi.org/10.1016/j.jbusres.2022.03.014 |
| Franzo, P. (2024). Weaving prosperity: Opening textile factories to art and people. <i>PAD. Pages on Arts and Design</i> , 17(27), 57–74. https://flore.unifi.it/retrieve/3134169a-384c-4990-b1af-83dba0323a46/Franzo_ | Fry, T. (2014). <i>Design futuring: Sustainability, ethics and new practice</i> . Bloomsbury. | Irwin, T. (2020). The emerging Transition Design approach. <i>Cuadernos del Centro de Estudios en Diseño y</i> |
| | Goldsworthy, K., Earley, R., & Politowicz, K. (2018). Circular speeds: A review of fast & slow sustainable design approaches for fashion & textile | |

Comunicación. Ensayos, (87), 19–46.
<https://dx.doi.org/10.18682/cdc.vi87.3762>

Irwin, T. (2015). Transition Design: A proposal for a new area of design practice, study, and research. *Design and Culture*, 7(2), 229–246.
<https://doi.org/10.1080/17547075.2015.1051829>

Murphy, R. (2012). Sustainability: A wicked

problem. *Sociologica: Italian Journal of Sociology Online*, 2, 1–20.
<https://doi.org/10.2383/38274>

Organisation for Economic Co-operation and Development (OECD). (2020). Beyond growth. In *New approaches to economic challenges*. OECD Publishing.
<https://doi.org/10.1787/33a25ba3-en>

Smelik, A. (2021). A posthuman turn in fashion. In *The Routledge companion to fashion studies* (pp. 57–64). Routledge.
<https://doi.org/10.4324/9780429264405-6>

von Busch, O. (2014). Fashion hacking. Design as future-making. In S. Yelavich & B. Adams (Eds.), *Design as future-making* (pp. 47–57). Bloomsbury.

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This special issue of DIID brings together the broadest possible reflection on projects that, with a low Technology Readiness Level (TRL), have attempted to translate years of ongoing research within the sector towards unexplored directions, towards renewal processes framed by sustainability and circularity. All of this is pursued with the aim of enhancing the sustainable competitiveness of Made in Italy through concrete actions developed in collaboration with companies involved from the very beginning, as well as with other firms interested in the relevant themes.

The projects were developed within the following universities: Politecnico di Bari, Politecnico di Milano, Politecnico di Torino, Università degli Studi di Napoli Federico II, Università degli Studi di Palermo, Università di Bologna, Università di Firenze e Sapi-enza Università di Roma.

The overall picture that emerges from this overview of research activities is rich in in-sights and demonstrates how our scientific sector, when compared with fields that have a longer historical tradition in research, is nevertheless capable of making a significant contribution. It also shows that scientific research in the field of Design is able to generate incisive and relevant reflections and solutions for the driving sectors of Made in Italy.

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