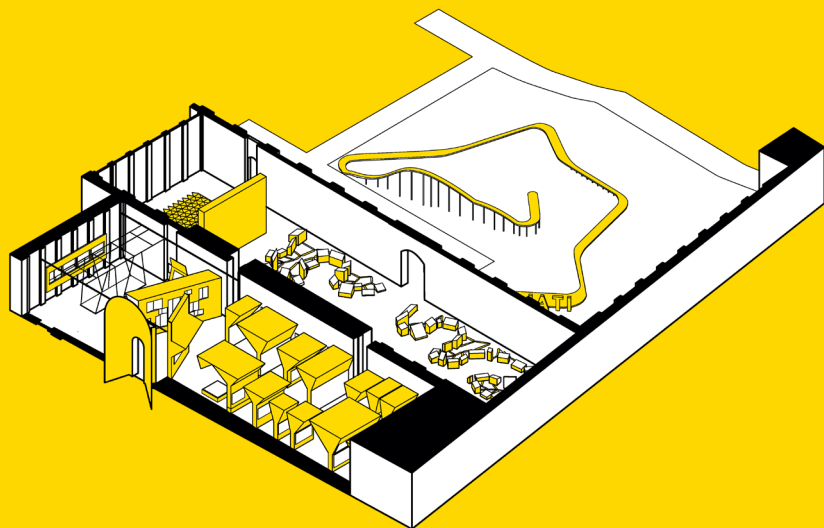


Beyond the exhibition

(Meta)project, curation, and
communication for sustainable/
responsible exhibit design

Editors
Lucia Ratti
Agnese Rebaglio



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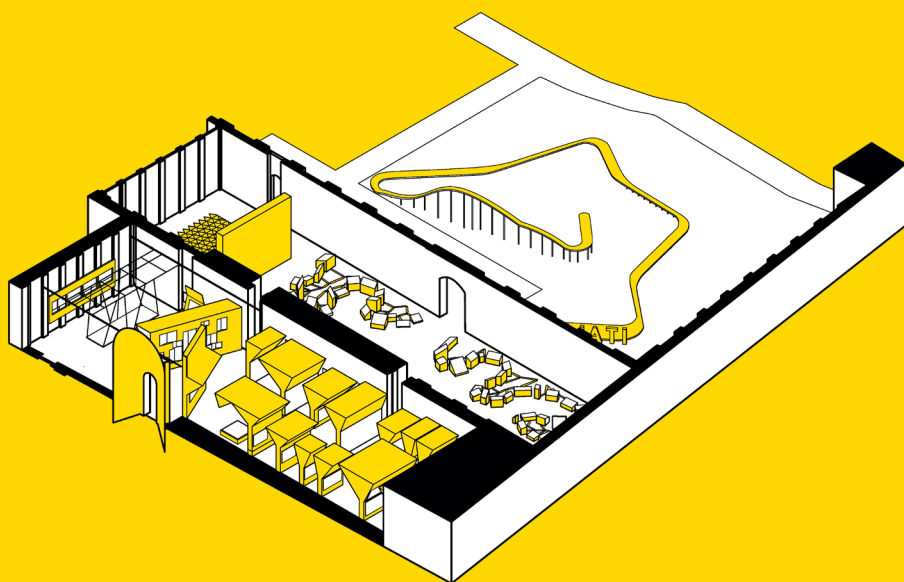
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Introduction

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Introduction

Some books arise from the need to name what one has only just begun to do, while others stem from the need to better understand what one has always done - and why it has always been done in that way. *Beyond the Exhibition* aspires to both: on the one hand, it brings together practices and reflections that are currently transforming the field of exhibition design towards greater environmental, cultural, and social sustainability; on the other, it seeks to question the premises of these transformations, asking where they lead and what they demand of those who design, curate, manage, and inhabit cultural institutions.

The title of this volume guides this endeavour by naming the very indeterminacy of its boundaries. “Beyond the Exhibition” does not refer to a physical space beyond that of the exhibition itself; rather, it evokes the blurring of a temporal and conceptual threshold: the conviction, shared by the contributions gathered in this volume, that sustainability cannot be treated as a residual issue to be addressed after exhibition decisions have been made - when implementation requires pragmatism to take centre stage - but must instead extend in both directions, reaching back into the phase that precedes the project - that “upstream” domain of curation, namely the narrative and relational structure that precedes material decisions - and forward into the phase that follows, where reflection upon and communication of what has been achieved, and of what remains to be done, com-

plete its life cycle by rendering its processes, impacts, and prospects for reinterpretation legible.

It is therefore a “beyond” that is both chronological and disciplinary, encompassing contributions that draw upon concepts and practices from other fields of knowledge and mobilise them as transversal languages or plural fields of experimentation, in an effort to underscore the collective nature of the relational and design processes that underpin the staging of cultural events.

This volume is the ninth in the series published by the NSBVN Interuniversity Cluster - Non Si Butta Via Niente - and forms part of the broader research project Exhibit 2.0: The Ecological Turn, funded under the TOCC – Capacity Building programme of the PNRR. Like the preceding volumes, it stems from the conviction that the ecological transition of the exhibition sector is neither a technical nor an exclusively managerial issue, but a cultural one: it requires new design paradigms, new professional roles, and new forms of collaboration among institutions, curators, designers, and communities.

The essays collected in this volume address this challenge from complementary perspectives and are organised into two sections.

The first section, “*Before the Form: Metaproject and Curation as the Infrastructure of Sustainability*,” explores the strategic and conceptual dimensions that precede the creation of the exhibition. The contribution by Barbara Di Prete and Fiorenza Protti opens the section by discussing the metaproject as a “translation device”: a tool capable of rendering the principles of sustainability accessible and actionable through analogies and interpretative codes, in this case the photographic metaphor. Through the correspondence established between regulatory pillars - such as the future CAM Allestitimenti - and photographic principles (framing, exposing, synchronising), the essay demonstrates how the metaproject can transform sustainability from an abstract requirement into a concrete operational parameter.

Lucia Ratti and Cecilia Ferrari develop a meta-design proposal applied to the museum-sharing platform Non Si Butta Via Niente, creating the project *Abstract Scenographies* a system for cataloguing and staging existing exhibition elements, designed to support designers in the early stages of conception. Their contribution focuses on how designing ecologically responsible exhibitions neither entails nor permits setting aside their narrative potential, which can be recognised as a latent resource even within what is already available. The contribution proposes reuse not only as a circular practice, but also as an interpretative exercise that interrogates the narrative potential embedded in discarded objects.

Agnese Rebaglio, together with Laura Carugati and Alessia Righi, shift the focus to sustainability as a semantic infrastructure: an immaterial design layer that organises the legibility and accessibility of content even before it takes physical form. Through the analysis of two case studies - the co-design process at the Museum of Civilization in Rome and the Design Philology digital platform project at the Polytechnic University of Milan - the essay demonstrates how social and cultural sustainability also reside in the design of open, reconfigurable connective systems capable of accommodating plural narratives over time.

The essay by Davide Crippa and Tania Cerquiglini addresses one of the most contentious issues in museum sustainability: the exhibition model - built upon international loans and replicated across multiple venues - which is presented as structurally incompatible with the reduction of environmental impact. Through an analysis of data concerning the use of permanent collections, an assessment of the carbon footprint of temporary exhibitions, and an examination of concrete cases - from the Design Museum in London to Palazzo Te in Mantua and the Queen Victoria Museum in Launceston - the essay argues that site-specific curation, grounded in the enhancement of what is already present, is not a compromise in terms of quality but rather a radical and necessary cultural practice.

The section concludes with a contribution by Raffaella Trocchianesi and Rossella Locatelli, who introduce the “*Exhibition Scores*” - a tool for *evaluating and integrating sustainability strategies*, conceived as an analytical and design framework that systematises multiple levels - surfaces, objects, graphic communication systems, and energy - allowing the simultaneous visualisation of exhibition components and the mapping of sustainability strategies throughout the project’s entire life cycle.

The second section, “*Practices in the Field: Design Experiments and Communication as Acts of Translating Responsibility*,” features contributions that explore, through case studies and real institutional contexts, how theoretical reflections on exhibition sustainability are being translated into concrete practices. These practices formalise content while making tangible the commitment to environmental responsibility that informs the scientific debate within the sector through design choices - whether communicative or material - aimed at grounding the transition.

Lucilla Calogero and Daniela D’Avanzo analyse the exhibition *Waste Age: What Can Design Do?* at the Design Museum in London as a paradigm of the meta-reflective exhibition: an exhibition project that made its own production process the object of inquiry, developing tools such as Life Cycle Assessment applied

to the entire exhibition chain and the operational guide *Exhibition Design for Our Time*. Their contribution reflects on the role of communication design as a process-oriented and strategic tool capable of making sustainable choices visible and shareable, not only as content to be conveyed but also as an organisational principle.

Alessandra Bosco, Lucilla Calogero, and Pietro Lora present the research project conducted in collaboration with the Civic Museums of Padua, consisting of a training seminar and the design of a pilot exhibition dedicated to the artisan-designer Paolo De Poli. Their contribution explores three macro-principles of sustainable exhibition design - configurability, reuse and transportability, and biodegradability - through an analysis that engages with both the history of exhibition design and contemporary experimentation. The exhibition devoted to De Poli thus becomes a laboratory in which the catalogue of municipal display units, digital fabrication, and reuse define a *modus operandi* oriented towards circularity. Eleonora Trivellin, Veronica Dal Buono, and Marco Mancini turn their attention to the context of trade fairs, an area historically less explored by research on sustainable design. Their paper addresses the specific nature of trade fairs and promotional events, characterised by an exceptionally high concentration of resources and a temporary condition that amplifies environmental impact, and proposes communication design as a strategic mediator between sustainability imperatives and market logics.

The contribution by Lucia Pietroni, together with Jacopo Mascitti, Daniele Galloppo, and Alessandro Di Stefano of the EcodesignLab group at the University of Camerino, presents the *Innovative Design of Showcases* project: the development, in collaboration with the company DACA Vetrine d'Autore, of two new systems of modular and sustainable museum display cases designed according to the principles of ecodesign, design for modularity, and design for reparability. The contribution demonstrates how even the most technical and specialised exhibition product - the museum display case - can be reimaged through a circular lens, opening up new business models based on maintenance and refurbishment services rather than solely on product sales.

Finally, Marco De Francesca's contribution brings the perspective of performative practices and participatory co-design into the volume. Through an analysis of *Verso Casa* - a performative walk culminating in the collective construction of a habitable iron sculpture, staged in two editions in Villasanta and Lecco - the essay explores the sustainability of temporary installations across three dimensions: reclaimed materials designed for dismantling and recycling; the relationships ge-

nerated through co-design with communities and institutions before and during the event; and the legacy that the work leaves behind in places and people after its conclusion, described as the “decay of the work” and proposed as an autonomous criterion for design and evaluation.

A broad reading of the contributions reveals several productive tensions that run throughout the volume. The first lies between the immaterial and material dimensions of sustainability: many essays show that the most significant environmental impact does not reside in the materials selected, but rather in the decision-making structures - curatorial, institutional, and logistical - that render them necessary. The second tension concerns the relationship between contextual specificity and the transferability of tools: the case studies analysed are situated and specific, yet the methods and logics that underpin them aspire to become shared resources. The third tension, perhaps the most profound, lies between urgency and the long term: the climate crisis demands immediate responses, yet the cultural and institutional transformations discussed in this volume unfold across temporal scales that are incompatible with such urgency.

These are not contradictions to be resolved, but conditions to be consciously inhabited. It is within this space that design - understood not merely as a professional practice but as a critical stance - can offer its distinctive contribution: not definitive solutions, but open tools, narratives available for reinterpretation, and infrastructures capable of making different futures possible. Beyond mere form, beyond isolated singularity, beyond the haste of immediacy.

Section



Beyond the Ephemeral

The Metaproject as a Translation Device for Exhibition Sustainability

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Beyond the Ephemeral

The Metaproject as a Translation Device for Exhibition Sustainability

Sustainability is now an indispensable design criterion, as it is redefining the standards, methodologies, and responsibilities of contemporary design.

The exhibition design sector - covering trade fairs, events, expos, and installations - represents a particularly critical domain owing to its ephemeral nature, which drives high resource consumption and the consequent generation of waste (Manzini, 2015; McDonough & Braungart, 2002). Growing attention to the environmental and social impact of design practices has therefore stimulated a systemic reflection on the ways in which exhibitions are conceived, realised, and dismantled.

In the European context, these design imperatives are framed by an articulated regulatory landscape in which the European Commission is actively promoting policies that direct the entire market towards an ecological transition. The European “Green Deal” and the “Circular Economy Action Plan” represent the cornerstones of this political agenda, steering EU institutions and economic actors towards more sustainable models of production and consumption (European Commission, 2020a). This plan addresses the entire product lifecycle - incentivising waste prevention, resource circularity, and the adoption of sustainability criteria from the earliest design stages (European Commission, 2020b) - but does not yet include a dedicated perspective on the exhibition sector (Fig. 1).

The “EU Regulation on Ecodesign for Sustainable Products” (ESPR) continues along the same trajectory: having entered into force in 2024, it extends eco-compatibility requirements to a wide range of goods placed on the market, promoting their durability, repairability, efficiency, and potential for recycling and reuse (European Commission, 2024). Although these regulations are not specific to the exhibition sector, they establish a context in which sustainable and circular design becomes a mandatory criterion - almost a prerequisite - indirectly influencing exhibition practices and requiring greater transparency concerning the environmental performance of materials used.

Furthermore, the Commission has launched a public consultation for the forthcoming “Circular Economy Act” (CEA), legislation expected in 2026 that aims to guide the transition from a linear to a circular economy within the single market - harmonising its rules, increasing the availability of high-quality secondary raw materials, and stimulating demand for recycled content in public procurement. These policies demonstrate that sustainability is no longer an “added value”, but an indispensable strategic component for both public and private actors. This is, first and foremost, a cultural shift, one that calls for ever-wider application.

At the national level, the same tendency is evident: Italian regulations are increasingly highlighting the urgency of incorporating sustainability imperatives among design criteria. Consider, for instance, the definition of the CAM - Minimum Environmental Criteria - devised for public procurement. Within this framework, the Sustainable Exhibit Cluster is currently analysing the “CAM Events”, proposing the drafting of a dedicated “CAM Exhibitions” to be submitted to the Ministry (Di Prete, Palomba, 2025).

This profound disciplinary revision must necessarily involve all actors in the supply chain - from clients to designers, from exhibition companies to curators, from museums, fairs, and host venues to end users. Only a convergence of intent and interests can produce an outcome that is effective in both environmental and economic terms, without compromising the communicative and narrative impact of exhibitions.

The first shift appears to be cultural, requiring a paradigm change in the thinking of professionals so that they understand that sustainability imperatives do not weaken the design process. They do not represent fallback solutions or constraints on creativity, but genuine design opportunities.

The second shift is technical and relates to professional development. It is necessary to guide designers - particularly those of the new generation - towards the use of more suitable materials, integrated impact assessment tools (from logisti-

DIAGRAMMA: IMPATTO DEL GREEN DEAL EUROPEO SULL'ALLESTIMENTO (FIERISTICO E MUSEALE)

FIGURA 1:

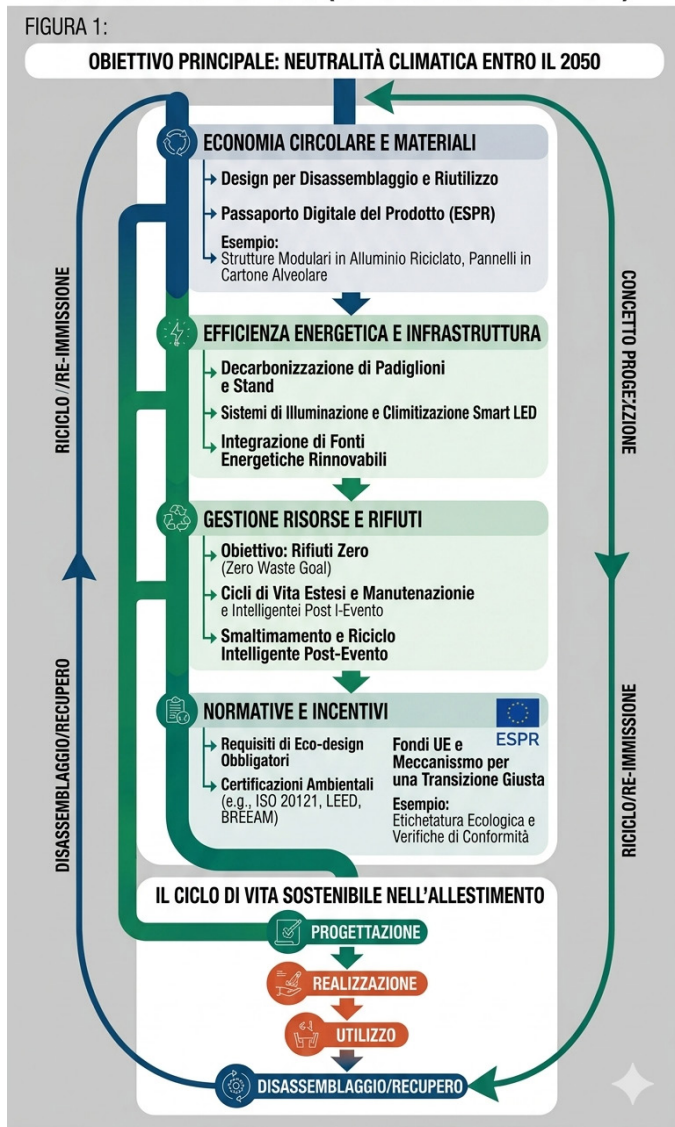


Fig. 1. Diagram of the impact of the European Green Deal on museum and trade fair exhibition design. Diagram by Davide Crippa.

cs to disposal), clear regulations, codified procedures, and constant verification. This change directly involves both practitioners and policy makers.

The third shift targets awareness-raising and widespread consciousness. In this case, the process directly involves citizen-visitors, who can become the foremost advocates of a new demand for exhibition sustainability.

It is precisely this last aspect that the present chapter focuses on, exploring the role the metaproject can play as a knowledge mediator - capable of opening a specialist perspective to a broader audience - as a tool of critical analysis for visualising innovative design scenarios, and as a connective language between different disciplinary domains.

The aim is to contribute to a reading of the metaproject for sustainable exhibition design, highlighting how it can transform a traditionally ephemeral domain into a laboratory of virtuous practices oriented towards ecological transition.

The Metaproject as a Tool of Anticipation and “Translation”

The metaproject can be defined as a strategic phase of the design process, aimed at structuring the conceptual, methodological, and operational framework within which the project itself will subsequently take shape. It precedes and accompanies the project, positioning itself as a tool for governing complexity and orienting choices. In this sense, it is a phase that anticipates every formalisation: the metaproject does not directly produce artefacts, but constructs the theoretical and methodological conditions of the project through the definition of interpretive models, decision-making criteria, and operational hypotheses. In other words, it is a “theoretical reflection that precedes the design act [...] on a plane characterised by a greater strategicness of thought as it becomes scenario, vision, perspective, and projection of possible worlds [...] without the necessity of an immediate productive result” (Colombo, 2005, p. 202). It is therefore, above all, an activity of exploration and interpretation of reality aimed at supporting innovation.

As Tomás Maldonado reminds us, a second salient characteristic of the metaproject is its propensity to integrate knowledge from different disciplinary domains (1974); but it is above all Andrea Branzi who helps situate it in terrain that is both pragmatic and visionary: he interprets the metaproject as a critical and cultural space, capable of questioning established design models in order to explore alternative scenarios. The metaproject thus takes shape as a research territory that does not merely solve problems, but produces visions and systems of meaning

that anticipate and orient the project, enabling design to engage with the social, technological, and economic transformations of our time (Branzi, 2006).

Adopting this perspective, the metaproject plays a fundamental role - especially in complex and interdisciplinary contexts, among which those related to sustainability can certainly be counted - where formal concerns are not the primary (or sole) focus. Consider, in fact, that sustainability in exhibition design implies an integrated approach that encompasses the entire lifecycle of the project and requires its preventive analysis, from the selection of eco-compatible materials to logistical planning, from managing assembly and disassembly dynamics to the disposal or reuse of structural elements (Bhamra & Lofthouse, 2007). This integrated approach makes it possible to shift attention from the individual exhibition artefact to its potential systemic continuity, counteracting its traditionally ephemeral nature: the exhibition is transformed into an open system, designed to evolve, be reconfigured, and reactivated in different contexts. In this new perspective, temporality becomes an opportunity for experimentation and an instrument of environmental responsibility.

The metaproject also fulfils an additional important task in communicative terms - for the dissemination of a deep-rooted culture of sustainability that is not exhausted in purely technical applications. It can be interpreted as a “translation method”, capable of making even elusive topics - or those hostile to the majority - accessible and comprehensible (Crippa et al., 2022). As a cross-disciplinary language, it unites different disciplinary domains and engages a wider audience, acting as “anticipation and intermediary”.

In this capacity, the metaproject synthesises some of design’s own values: an instrument of mediation between diverse needs and knowledge, as well as of transdisciplinary and intercultural translation (Baule, Caratti, 2016), design is a “posture of thought” that helps us represent, imagine, and sketch possible and different worlds. In its being a discipline capable of elaborating innovations of meaning that reinvent the rituals of our daily lives, “design can play a key role in engaging people both cognitively and emotionally in discussions on sustainability” (Di Prete et al., 2024, p. 13).

In the metaproject in particular, one can recognise the potential - even metaphorical - to offer a more inclusive, accessible, and familiar understanding of sustainability.

Strategies such as the use of flexible and modular systems, the adoption of “Design for Disassembly”² criteria, the reuse of individual components to minimise waste, the assessment of the logistical and energetic impacts of design choices,

and the adoption of recycled or recyclable materials are increasingly recognised as fundamental practices for reducing the ecological footprint of exhibitions (Vezzoli et al., 2014). Each of these themes could lend itself to a decomposition of the design act into phases - not necessarily sequential - translatable, depending on the disciplinary perspective, into metaphors useful for a broader understanding of the problem. Such deconstruction could in fact facilitate the construction of metadesign analogies capable of connecting different disciplines and thereby engaging a wider audience, drawing on their passions, attitudes, or specific professional backgrounds.

Non è solo una questione di comunicazione o di narrazione: “cambiare il modo in cui parliamo della realtà non solo modifica la nostra inclinazione verso di essa, ma ha il potere di cambiare la realtà stessa, o meglio il futuro della realtà” (Di Prete et al., 2024, p. 136); usare il metaprogetto come strumento di comprensione e di comunicazione, oltre che di progettazione, contribuisce dunque al cambiamento, perché per sua natura esso anticipa e ridefinisce il futuro: i futuri possono essere plasmati attraverso le storie che raccontiamo, e queste storie creano e disfano il nostro mondo possibile (Marenko, 2023).

By generating shared values and meanings, the metaproject thus extends sustainability scenarios from the technical and specialist domain to the social and cultural dimension, promoting models of collective responsible design.

The Metaproject between Design and Photography

Configured as an elective tool for decoding the complexity of sustainability in temporary exhibition design, for the reasons already outlined, the metaproject acts intrinsically as a translation method. In this essay, its function will be exemplified through a particular interpretive code: the photographic metaphor. It is through this lens that the theoretical and regulatory “pillars” analysed become tangible, transforming from abstract concepts into genuinely applicable design tools.

This choice is neither accidental nor merely aesthetic, but structural: photography, like exhibition design, is a process of selection, exposure, and “framing” of reality that requires a profound technical awareness in order to govern the complexity of the final result. It is from this perspective that the photographic vision transcends the simple analogical dimension and translates into a structured method, capable of providing designers with reference tools for integrating sustain-

The fundamental concepts on which to base circular design and production actions can be summarised in 5 macro-domains: promotion of design culture, collaboration between actors, timeline management, lifecycle analysis, and material selection. These concepts, in turn, find a direct parallel in some fundamental

photographic principles, giving rise to metadesign indicators with a dual disciplinary dimension and double interpretation (Fig. 2 and Fig. 3):

- Placing sustainability at the centre (Framing the subject)

Within a sustainable exhibition, “framing the subject” means attributing to environmental responsibility a central role, preventing it from being perceived as a marginal addition or a mere technical constraint to be fulfilled. If sustainability is not introduced as a structural component of the concept, it risks being imperceptible or subordinate - analogous to a subject that slips to the margins of the visual field. In such circumstances, an intervention in which the ecological imperative appears only as an accessory element risks communicative incoherence or a drift towards greenwashing practices. Conversely, when correctly framed, sustainability transforms into a design language and orients material choices, reuse, and the dialogue with space. Like a sharp photograph, every element contributes to the clarity of the narrative, making sustainability not only visible, but intrinsically meaningful.

- Encouraging cooperation (Choosing the lens)

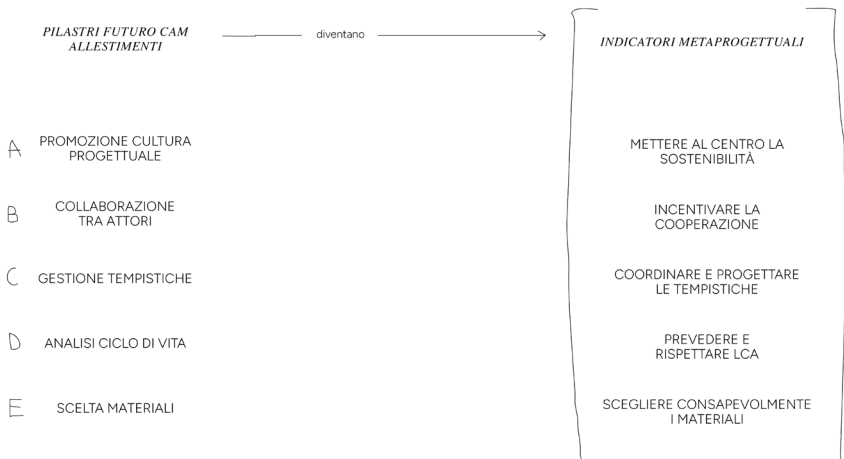


Fig. 3. Transposition of Regulatory Requirements through the Photographic Metaphor. The diagram illustrates the conversion of regulatory pillars into specific metadesign indicators. The process transforms the abstraction of the environmental criterion into a set of concrete actions, defining the directives needed to orient the project towards genuine sustainability.

Choosing the photographic lens corresponds to defining the scope, limits, and quality of collaboration between the different actors involved in the process. If coordination proves too scattered and lacking a clear direction, the risk is of generating a project of complex operational management - analogous to using a wide-angle lens to photograph a detail, where the inclusion of superfluous elements produces perceptual and structural distortions. Conversely, a collaboration that is too narrow and sectoral risks yielding a rigid exhibition, and operates like a telephoto lens on a panorama: it compresses planes and eliminates the complexity of the context. A sustainable exhibition requires broad yet focused coordination, in which the contributions of suppliers, designers, and curators are calibrated to the technical feasibility and semantic complexity of the project. Only an approach capable of balancing the overall vision with specialist specificities guarantees solutions that are not merely theoretically coherent, but concretely applicable to the reality of exhibition practice.

- Coordinating and planning timelines (Synchronising the shutter and flash)
Synchronising the shutter and flash refers to the management of the time factor - a crucial variable for ensuring the coherence of the intervention and the minimisation of waste, an essential parameter for evaluating logistical and energetic impacts. If the operational rhythm on site is not perfectly aligned with logistical requirements and material availability, systemic inefficiencies are generated - comparable to a poorly synchronised flash that fires out of time, rendering the exposure useless. The duration of the various phases of an exhibition must be proportionate to the resources employed: an excessive contraction of design timeframes precludes the implementation of complex sustainable solutions, while an unjustified extension of the installation period entails a superfluous expenditure of energy and materials. Only when the phases of design, production, and installation synchronise with the precision of a shutter does the exhibition achieve the optimal balance between efficacy and efficiency. This synchrony (to be defined in metadesign terms) makes it possible to prevent resource dispersal, ensuring a coherent and responsible final outcome.

- Anticipating and respecting the LCA (Processing the print)
Processing the print means recognising that the value of an intervention is not exhausted in its aesthetic manifestation, but depends on the entire lifecycle (Life Cycle Assessment) of an exhibition and its future potential for replication. This condition of “temporal extension” of the project is achieved through Design for

Disassembly strategies and the adoption of flexible and modular systems. A correctly conceived exhibition, in fact, does not exhaust its function at the end of the exhibition event, but is planned from the earliest concept stages to ensure its continuity through the reuse or regeneration of materials after the event. If this management is neglected, the project declines into critical ephemerality, producing unusable residues. Just as in a darkroom a rigorous development process avoids the deterioration of the image and guarantees its final stability and sharpness; in the same way, a responsible approach is called for - one that does not exhaust itself at the moment of dismantling, but defines a strategy, based on the capacity to forecast and manage the end-of-life of manufactured components (Castagneto, Fiore, 2013), capable of ensuring the persistence of those components over time.

- Consciously selecting materials (Balancing the exposure)

Balancing photographic exposure reflects the capacity to calibrate material choices between functional requirements, formal quality, and environmental impact. When attention is reduced exclusively to the aesthetic component, there is a risk of generating an intervention that is visually striking but ecologically problematic: like an overexposed photograph, in which an excess of light - comparable to an immoderate use of resources - ends up concealing the subject's details. Conversely, research oriented solely towards technical data, lacking narrative integration, produces an ineffective outcome, comparable to an underexposed image in which the message is not legible. The optimal balance is achieved when materials, in addition to minimising their ecological footprint, engage with the project organically. Just as the careful balancing of exposure parameters guarantees a sharp image, a conscious and well-calibrated material selection - drawing on recycled or recyclable materials - ensures an outcome that is simultaneously functional, aesthetic, and responsible.

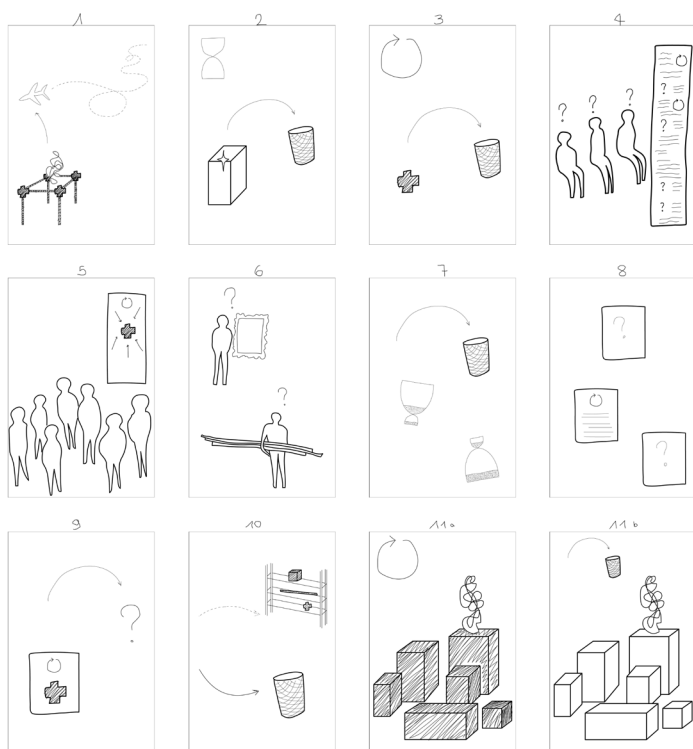
Through this comparison, the error is no longer interpreted as an isolated “failure”, but as an indicator of deviation from expected quality. Analysing design through photographic and exhibition shortcomings (Fig. 4 and Fig. 5) makes it possible, therefore, to recognise and isolate procedural anomalies in exhibition practice. In summary, the photographic metaphor does not merely illustrate sustainability, but encodes it in an accessible language, transforming the pillars of the CAM into legible technical parameters in which ecological coherence coincides with the effectiveness of the design outcome. This approach transforms circular exhibition design from a theoretical aspiration into a codified technical



criticità fotografiche

- 1 * inquadratura affollata
- 2 * esclusione dalla scena
- 3 * composizione inefficace
- 4 * ampiezza e distorsione
- 5 * specificità e limitatezza
- 6 * sfalsamento temporale
- 7 * sovra / sottoesposizione
- 8 * omissione di una fase
- 9 * alterazione elementi chimici
- 10 * tempistiche di immersione sbagliate
- 11 * sbilanciamento elementi

Fig. 4. Compendium of Photographic Shortcomings. A system of visual analogies that reflects possible incoherences in design strategy. Photographic anomalies become the benchmark for evaluating the coherence of choices made with respect to circularity objectives, making tangible what often remains implicit.



criticità espositive

- 1 * sostenibilità in secondo piano
- 2 * sostenibilità non progettata
- 3 * sostenibilità solo comunicata
- 4 * mancanza di collaborazione
- 5 * collaborazione inefficace
- 6 * attori non coordinati temporalmente
- 7 * tempistiche incoerenti con la fase
- 8 * lca incompleto
- 9 * lca non ottimale
- 10 * errata gestione di una fase dell'lca
- 11 * scelta non ponderata dei materiali

Fig. 5. Compendium of Exhibition Shortcomings. Transposition of photographic anomalies into exhibition practice. Schematic visualisation of recurring errors in exhibition practice (e.g. temporal incoherence, material waste, incorrect LCA management). The illustrations represent examples of a failure to plan sustainably.

process, capable of generating value beyond the temporary duration of the exhibition event.

Conclusions

As emerges from some recent reflections in the sector, the challenge of ecological transition demands the definition of a new professional figure, the eco-exhibitioner, understood as a cultural mediator capable of orchestrating the dialogue between creativity, technical expertise, and environmental responsibility (Crippa, Di Prete, 2024). This evolution responds to a profound cultural urgency: as Aya-na Elizabeth Johnson underlines (2021), culture determines what we consider exemplary and normative; consequently, exhibition design can act as a powerful bridge between awareness and action, transforming abstract concepts into spatial experiences. In this sense, design has the power to render the urgency of change tangible, prompting the public to reflect on their own habits and act concretely (Antonelli, 2019).

Into this framework fits the analysis developed here, which exemplifies the photographic metaphor as a method of interpretation and strategy of action: it does not constitute an isolated or self-referential exercise, but represents a concrete application of the extension of the metaproject to different disciplinary fields. Although the photographic metaphor has proved an effective interpretive code, it does not exhaust the possibilities of the method: it is the metadesign structure that is universal, not the particular language used to give it expression. This exercise can therefore be extended and declined through other codes, according to context, the designer's inclinations, their technical background, or the personal passions of those addressed. The metaproject thus opens onto a social and cultural dimension, becoming a shareable model of conscious design, capable of reaching wide audiences. One might, for example, turn to:

- the musical metaphor, where sustainability can be interpreted as the harmony between different instruments that must follow a rigorous performance discipline, balancing fidelity to the score with the capacity to manage improvisation without generating dissonance;
- the culinary metaphor, where the selection of ingredients, the management of quantities, and the precision of preparation determine the quality of the result and the capacity to valorise every component, minimising waste;
- the physical metaphor, where sustainability can be represented by the search

for equilibrium between opposing forces, in which every design action generates an environmental reaction and the mass of materials must be calibrated so as not to compromise the inertia of the system;

- the travel metaphor, where sustainability defines the route between complex preliminary planning and the actual experience of the stay. In this scenario, the installation phase represents the moment of transit - a labour requiring meticulous preparation - while the end-of-life becomes the final destination: not a point of arrest, but the threshold that gives rise to a new phase of permanence and transformation of resources over time.

In summary, defining clear metadesign indicators means providing a cross-disciplinary method capable of connecting technical and creative domains that appear distant. Only by making sustainability intuitive and accessible - including through these metaphorical translations - can we ensure that generic sustainability objectives are translated into widespread applications. In such a scenario, the metaproject acts as the logical link necessary to govern the passage from regulation to the constructive act, rendering environmental responsibility requirements no longer external constraints but intrinsic components of design thinking.

The metaproject is thus configured as that “space” in which sustainability moves from abstract principle to structural principle - in which technical, communicative, and regulatory requirements and ecological imperatives are decoded to become operational tools.

This perspective makes it possible to transform the ephemeral from a synonym for waste into an occasion for innovation, enabling the construction of a lasting legacy made of shared practices rather than residues (Crippa, Di Prete, 2024).

Notes

¹Interuniversity cluster, promoted by the Iuav University of Venice - Department of Design Cultures, whose research focuses on the teaching, study, and description of the innovations necessary to foster ecological transition within the Exhibit system.

²*Design for Disassembly (DfD)*: design approach that applies targeted techniques to simplify the assembly/disassembly of a product so as to allow for its repair, updating, and recycling - extending its useful life or enabling the reuse of components at end of life (Ministero della Transizione Ecologica, 2022, p. 27).

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Abstract Scenographies

Metaproject Hypotheses for Exhibition Reuse

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Abstract Scenographies

Metaproject Hypotheses for Exhibition Reuse

Reuse as a Critical Practice and the Metaproject as an Orientation Tool

Environmental, social, and cultural responsibility toward the outcomes of design is today one of the central challenges of contemporary Design, and lies at the core of a broad and articulated debate that cuts across disciplines, scales, and fields of application (Formia et al., 2023; Zannoni et al., 2024). From the optimisation of industrial production chains to the development of service systems that encourage eco-conscious behaviours or new forms of collective care, from urban regeneration to policies aimed at regulating the different sectors in which Design operates, Design today is called not only to reduce the environmental impacts of its processes, but also to critically question the relationship between subjects, material goods, and systems of production, use, and disposal.

In the search for possible design responses to a present that appears profoundly “unsustainable” (De Rosa, 2021), *reuse* - one of the “three Rs” of the Circular Economy (Schöggel et al., 2020) - emerges as a particularly significant strategy from the point of view of energy and resource consumption, alongside recycling (Keulemans & Adams, 2024). The term *reuse* refers to the practice of using a product or one of its components again, maintaining its original function or adap-

ting it to new uses, without substantial transformations and, at most, through minimal interventions such as cleaning or minor adjustments.

This definition makes it possible to distinguish *reuse* from recycling, while recognising their complementarity within circular strategies. While *reuse* aims to extend the useful life of a product, component, or system, preserving as much as possible its material configuration and use value, recycling instead intervenes when matter is transformed in order to be reintroduced into production cycles as a new resource or secondary raw material. This distinction is also necessary in light of the plurality of definitions of the circular economy, often understood through the combination of reduction, reuse, and recycling, yet at times improperly flattened into recycling alone (Kirchherr et al., 2017). At the scale of temporary exhibition design, reusing therefore means relocating, adapting, or re-signifying existing elements, whereas recycling implies reprocessing matter through transformation processes. The two strategies are complementary, but not interchangeable: recycling may represent a possibility when direct reuse is not feasible, while reuse more clearly preserves the continuity between object, function, and new design configuration, distinguishing itself from recycling processes that involve the disassembly and transformation of materials (Ginga et al., 2020).

The concept of *reuse*, however, cannot be confined to the scale of the product or material component alone. It belongs to a broader design culture of the existing, which within architectural and urban discourse became consolidated from the 1970s onwards through reflection on adaptive reuse, emerging in response to logics of replacement and tabula rasa, to preservation movements, and to growing environmental awareness (Lanz & Pendlebury, 2022).

Literature on the subject highlights a plurality of terms and approaches that make it necessary to clarify how the concept is used: within this contribution, *reuse* does not coincide solely with the preservation of the existing, nor with the recycling of matter, but rather with a process of relocation, reinterpretation, and re-signification of still-available elements (Stone, 2023; Lanz & Pendlebury, 2022).

Transferred to the scale of temporary exhibitions, this perspective makes it possible to read discarded elements as design resources open to new configurations, in continuity with temporary spatial reactivation strategies specific to Interior Design (Camocini & Nosova, 2017).

Beyond its environmental dimension, *reuse* can be interpreted as a design operation acting upon what already exists, exploring its latent potential and redefining its value through new systems of relations, uses, and meanings. In literature, it is considered not only an effective productive strategy for slowing the degradation

cycle of resources (Bocken, 2016), but also a set of cultural practices capable of activating processes through which individuals and communities reappropriate their own “traces of life” (Appelgren, 2020). Within these processes, both top-down and bottom-up, the value of objects is not given a priori, but constructed through operations of selection, interpretation, and transformation that require a critical and conscious gaze. In this sense, *reuse* takes shape as an open strategy that requires tools capable of orienting design action without crystallising it into prescriptive solutions.

There are, however, fields in which these potentially virtuous logics come up against a structurally ephemeral condition. Exhibition design represents an emblematic example: carefully designed, conceived to build narratives and relationships, it is often dismantled within a very short time, forgotten, and replaced. Yet such a rapid end is not the only possible one, and it makes evident the need to experiment with new approaches within the disciplinary field of exhibiting (Bao, 2020). It is precisely within this tension between brief temporality and design intensity that *reuse* acquires a specific relevance for the world of exhibition design. In advocating for *reuse* to be embraced as a widespread design practice, there emerges the possibility of developing devices and methodologies capable of making the potential of what already exists legible and of supporting design in its exploratory and conceptual phases.

Working within this processual node, the present contribution proposes the *Metaproject* as an orienting tool for design action in its early stages, through the construction of visions, criteria, and transferable strategies aimed at structuring and transmitting a conscious culture of *reuse*. Within this framework, the *Metaproject Scenografie Astratte* is not conceived as an executive project, but as an exploratory device and a space for design reflection, oriented toward the construction of scenarios and intervention hypotheses (De Moraes, 2010; Franzato, 2015), for the relocation, reinterpretation, and re-signification of existing exhibition elements. The essay focuses in particular on the field of exhibiting, examining the case study of the museum sharing platform *Non Si Butta Via Niente* and exploring a meta-projectual proposal conceived to encourage and enrich its potential uses.

The Operational Infrastructure of Reuse: Sharing Platforms and Non Si Butta Via Niente

One of the strategies of *reuse* that has gained particular traction in recent years

concerns the sharing of goods and materials through digital platforms. This phenomenon is situated within a broader framework in which the digitalisation of production chains and the servitisation of business models are recognised as key drivers in the transition towards the circular economy, through the structuring of Product-Service Systems designed to encourage shared access and extend the lifespan of goods (Chauhan et al., 2022; Grahn, 2022).

Following these trajectories, and in response to the critical issues surrounding end-of-life material management, a range of sharing platforms dedicated to the recovery, cataloguing, and redistribution of discarded goods has emerged. These experiences have also attracted growing academic interest, with research aimed at exploring and validating their role in supporting the circular transition (Crippa et al., 2022; Wu et al., 2024). Despite their heterogeneity - in terms of fields of application, material typologies, and operational models - these platforms share the objective of diverting still-usable resources from disposal streams and reintroducing them into new cycles of use. In this sense, sharing platforms can be understood as emerging infrastructures of *reuse*, capable of making what already exists accessible and activating circular practices.

Within this context, the cultural and exhibition sector has also begun experimenting with models based on sharing, redistribution, and the reactivation of materials and exhibition components, in line with approaches that understand design as a practice of transformation and reuse of the existing (Lanz & Pendlebury, 2022). In this direction, sharing and reuse platforms may be understood as enabling devices of circularity, in which the sharing of information plays a central role in encouraging user participation and activating sustainable behaviours of access and reuse of available goods (Ho & Yanagisawa, 2023).

Within this broader landscape, platforms operating across different sectors can be identified. Alongside experiences focused on recovering materials from the artistic and cultural sector, such as *Materials for the Arts* in New York and *La Réserve des Arts* in France, there are initiatives connected to the construction and packaging sectors, such as *Circular Arts Network* in Glasgow, as well as early experiments specifically dedicated to the field of exhibiting and temporary design, such as *Re-Biennale* in Venice. While differing in organisational models and aims, these experiences share an attempt to move beyond the linear logic of production–use–disposal, recognising in exhibition elements a potential that remains available for activation through practices of sharing, reuse, and relocation.

Within this context sits *Non Si Butta Via Niente* (NSBVN), a museum-sharing platform active in the Lombardy region, founded with the aim of rethinking

the destiny of exhibition artefacts at the end of their primary use, transforming what would normally be stored or discarded into a design resource available for reactivation. Incubated in 2021 within the *Innovamusei* programme of Cariplo Factory, and subsequently integrated into the research activity of the inter-university cluster NSBVN Sustainable Exhibit, funded by the European Union and the Italian Ministry of Culture, the platform operates within a context characterised by a high concentration of cultural institutions, museums, foundations, fairs, and companies, which constitute a fertile source of discarded materials generated through exhibitions and temporary events.

From an operational perspective, NSBVN offers a range of services including storage, rental, customisation, consultancy, and training related to exhibition design, configuring itself as a digital infrastructure capable of supporting processes of creative regeneration of exhibition artefacts. The platform presents itself not only as a warehouse of objects and materials, but also as a centre for research and experimentation, as well as a repository of knowledge connected to the world of exhibiting, its history, and its functioning.

Within NSBVN's digital warehouse, materials are organised according to an initial typological taxonomy, distinguishing categories such as furniture, exhibition structures, exhibitions, audio-video-light systems, and technical materials. This form of cataloguing makes a heterogeneous set of resources visible and searchable, offering a first framework of access to the inventory and facilitating its use by users. However, while this classification responds to needs of order and management, it remains only partially oriented towards supporting a conscious design use of materials. The division by typology tends to describe objects in terms of what they have been, rather than what they might become, leaving dimensions such as transformability, compatibility, composability, or narrative potential in the background.

This tension reveals a recurring limitation within digital infrastructures for *reuse*: while they succeed in making the existing accessible, they often struggle to provide tools capable of accompanying designers in processes of reinterpretation, frequently remaining limited to a function of mediation and storage, and risking reducing *reuse* to an opportunistic practice, guided by immediate availability or communicative needs more than by critical, conceptual, and narrative elaboration. Yet it is precisely within narratives that an object is “always a magical object”, as Italo Calvino recalls in a passage from his *Six Memos for the Next Millennium* (2012, p. 37). Read through a design lens, this statement invites reflection on how moving beyond the functional identity often automatically assigned to objects

- and, even more so, beyond the label of “waste” attached to those that appear to have exhausted their usefulness - may help reveal latent and still-unexpressed potential.

The contribution of this chapter proposes to outline a strategy for counteracting this dynamic of loss of potential meanings. The hypothesis advanced is that cataloguing may be reconsidered not only as an organisational tool, but as a design device capable of activating new readings of the existing and suggesting possible trajectories of transformation and meaning. Taking as its starting point the analysis of the materials made accessible through NSBVN, and subsequently using them in the development of a series of *Scenografie Astratte*, the project presented in the following section was developed: a metaprojectual proposal structured as a possible set of applied steps and conceptual prompts addressed to exhibition designers, conceived to promote a way of using the platform - and therefore reusing its resources - that can enrich both the “narrative” ideation phase of new exhibition proposals and the early stages of spatial design.

Scenografie Astratte: Metaproject, Phases, and Outcomes

The *Metaproject* is therefore proposed here as a methodological device supporting the early stages of the design process of temporary exhibitions, with the function of structuring and orienting exploration, specifically of the NSBVN archive, and more broadly of the pre-existing as a design resource. It is not intended as a tool aimed at the production of defined formal solutions, but rather as a set of analytical and conceptual operations directed toward the construction of criteria, scenarios, and preliminary configurations, useful in making material legible, comparable, reinterpretable, and operable on the design level. “It is precisely in keeping the design process and the consequent formal definition of the object open,” suggests Nebuloni, “that the *Metaproject* allows for the outlining of a strategy of innovation [...] based on the superimposition of a plurality of possible design trajectories and creative paths” (2015, pp. 33–34). In this sense, the *Metaproject Scenografie Astratte* does not coincide with a possible final outcome in the design of a series of exhibitions, but rather with an intermediate level of elaboration of multiple potential outcomes, aiming to transform a heterogeneous material inventory into a structured and transferable field of design possibilities.

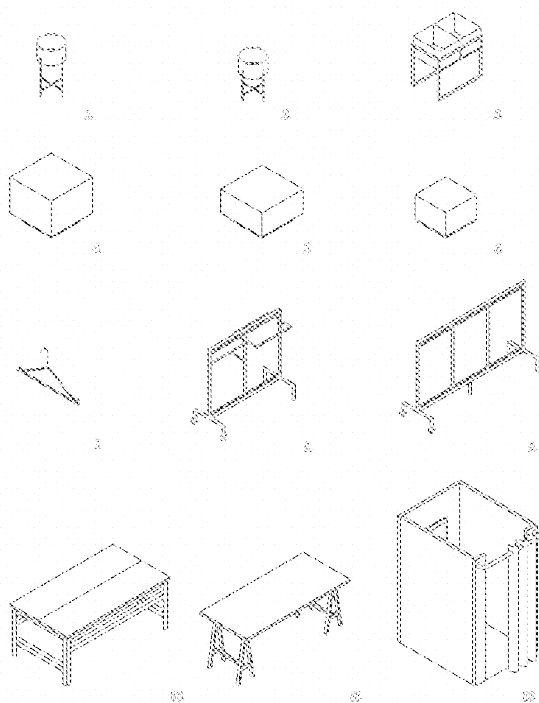
This section describes the process behind *Scenografie Astratte*, articulated through the two phases that composed it. The first phase was dedicated to the organi-

sation of the existing, starting from the NSBVN warehouse, and was developed through operations of cataloguing and clustering aimed at moving beyond the original function of the objects and reclassifying them according to material, dimensional, and typological attributes that could be easily reworked. The second phase then developed the outcomes of this survey, resulting in the definition of a series of potential exhibition typologies and in the proposal of possible spatial configurations, discussed and visualised in the following pages. In the succession of these two phases, the *Metaproject* first worked on the elaboration of objective categories, made available to whoever may choose to use them, and then on a “pilot” set of subjective interpretations derived from them, intended as an exploratory device and conceived as a trigger for as many future reinterpretations as possible.

Phase 1_Re-cataloguing to Re-read: Inventories, Sheets, and Maps. The first phase of *Scenografie Astratte* was dedicated to the construction of a reading system capable of transforming the NSBVN inventory-heterogeneous in function, scale, material, and state of conservation - into a field of work ready to be explored. Following the initial steps of a *Metaproject* as outlined in design theory, the work focused on defining the “set of requirements within which to address and resolve a spatial problem, through the production of alternatives” (Nebuloni, 2015, p. 33). To this end, the first step consisted in neutralising the original function of the objects, understood as a suspension of their previous use, with the aim of observing the artefacts as autonomous material entities, detached from a univocal functional meaning and therefore available for a new reading, both material and relational.

Re-cataloguing was therefore understood here as a metaprojectual action. In the process of reorganising the archive, objects were described through physical and spatial attributes that enabled their comparison across categories in subsequent stages. This information was then organised into inventories, analytical sheets, and graphic maps, intended to reveal recurrences, differences, and latent potential within the analysed corpus.

As shown in Figs. 6 and 7, the objects within the inventories were represented through analytical axonometric drawings highlighting their formal and dimensional characteristics. The inventories thus organise the objective information available for the different items, providing each element with a concise and comparable record, useful in supporting the subsequent phases of analysis and design development.



<i>n.</i>	<i>misure</i>		<i>tipologia oggetto</i>	<i>quantità</i>
1.	38x22,5x65h	cm	Sistema raccoglitore	+++
2.	38x22,5x50h	cm	Sistema raccoglitore	+++
3.	87,2x53,5x69,5h	cm	Sistema raccoglitore	+++
4.	80x80x62h	cm	Sistema da appoggio	++++
5.	80x80x42h	cm	Sistema da appoggio	++++
6.	60x60x42h	cm	Sistema da appoggio	++++
7.	40x21,5h	cm	Sistema di appensione	+++++
8.	210x56x154h	cm	Sistema stender modulare	++++
9.	140x56x154h	cm	Struttura stender modulare	++++
10.	200x110x87,5h	cm	Struttura di appoggio	++
11.	200x90x87,5h	cm	Struttura di appoggio	++
12.	120x150x210h	cm	Struttura cabina	+++

Fig. 6. Analytical abacus of the objects from the Non Si Butta Via Niente storage, represented through axonometric drawings and synthetic data on dimensions, object typology, and indicative quantities.

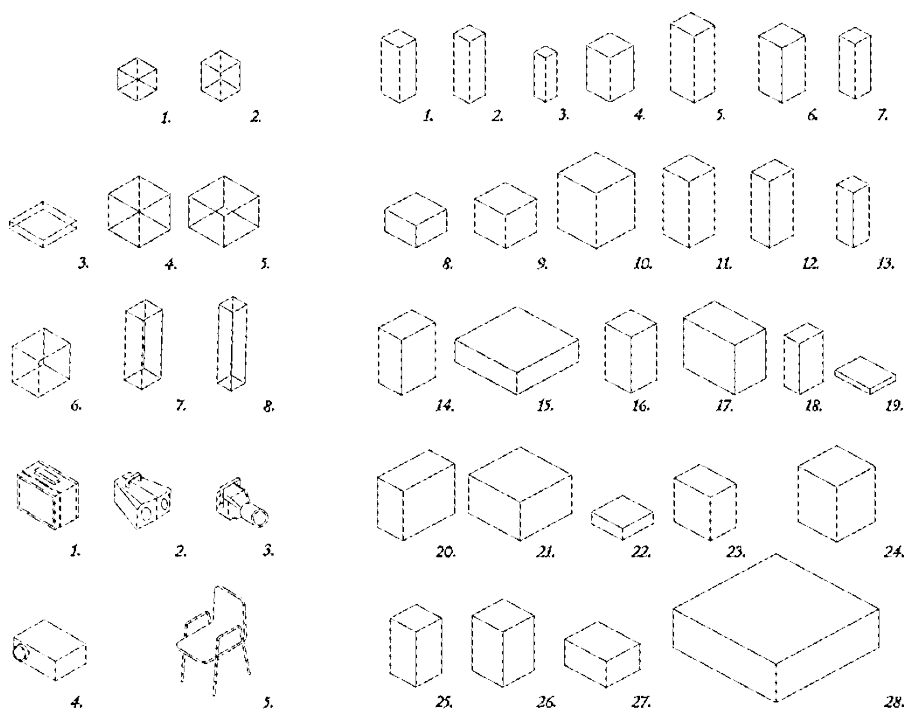


Fig. 7. Volumetric schematization of the Non Si Butta Via Niente objects and their preliminary clustering based on number, dimensions, material, and quantity.

Once the warehouse had been made navigable through this first level of reinterpretation, the inventories and sheets were used as the basis for structuring the synthesis map of the new operational archive, employed first as a working tool for construction and later as a communicative device for visualising the analytical and narrative categories identified. The resulting map (Fig. 8) aims to make explicit the reasoning underlying the *Metaproject*, clarifying the focus on the selection of pre-existing elements and the role of the criteria adopted for their organisation and subdivision into clusters.

As illustrated in the map, during the clustering phase the objects were organised according to four parameters: size, geometry, the perceptual qualities of materials, and the implicit spatial function suggested by their original use. These material parameters did not serve solely as objective criteria for the reorganisation of the

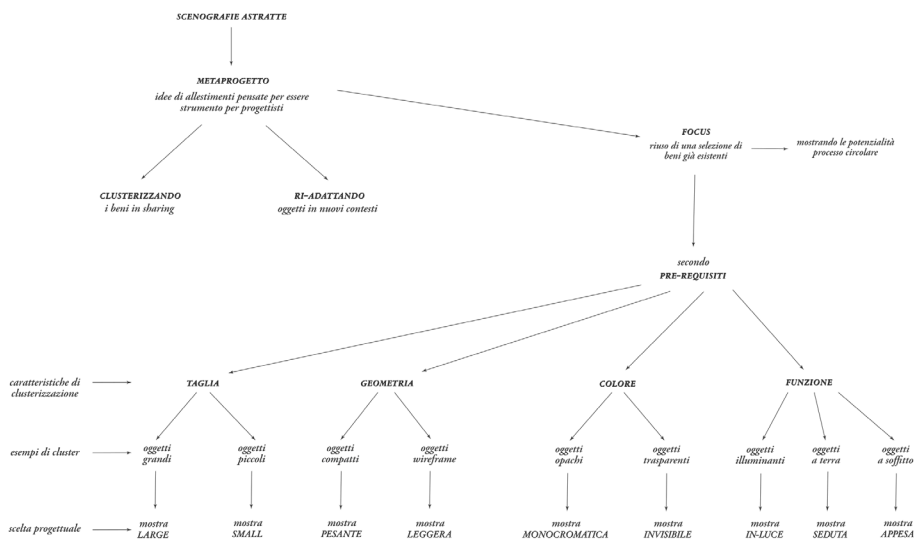


Fig. 8. Synthesis map of the Scenografie Astratte metaproject, linking object clustering criteria to the resulting exhibition families and highlighting the transition from the analysis of existing resources to the definition of exhibition scenarios.

items, but also functioned as a point of departure for the semantic associations that informed the action categories emerging from the analysis. The resulting clusters - intermediate structures between analysis and ideation - were therefore employed to outline a series of hypothetical exhibition “families”, whose narrative and conceptual characteristics were informed by the same parameters that generated the categories themselves.

Within this framework, transparent, heavy, or ground-supported objects informed the definition of possible exhibition typologies, such as invisible exhibitions, heavy exhibitions, or seated exhibitions. These are intended to suggest possible directions for future design development, grounded in the observation of existing materials while remaining open to interpretations capable of generating new meanings.

Phase 2_Composing to Imagine – Two Exhibition Hypotheses. The second phase of the *Metaproject* developed the outcomes of the organisation and clustering phase, leading to the definition of a series of exploratory exhibition scenarios, here named *Scenografie Astratte* for their temporary, narrative, and open-ended natu-

re. These hypothetical exhibitions operate as pilot devices, conceived to activate the metaprojectual directions that emerged in the previous phase and to test, on a spatial level, the relational potential between reused objects, exhibition display, and exhibited work. The resulting *Scenografie* therefore represent the outcome of an initial exercise in imagination: a possible spatial and conceptual translation of the categories previously identified, intended not as a definitive outcome, but as the beginning of an interpretative process that remains open to further, possible, and desirable developments by other designers.

The transition from clustering to spatial configuration took place through the activation of two design strategies: continuity and contrast. Alternative and opposite to one another, these two strategies did not correspond to stylistic or formal choices relating to the object itself, but rather to relational criteria established between the reused objects within the hypothetical exhibition, the space intended to host them, and the works they would support in displaying.

Their characteristics are briefly outlined below. The strategy of continuity is based on the construction of a coherent and fluid relationship between display structure and exhibited work. In the configurations generated through this strategy, the exhibition support elements contribute to the reading of the work through material, dimensional, or perceptual affinities, without introducing marked discontinuities. The exhibition set therefore does not assume a dominant role, but visually integrates with what it displays, guiding the visitor's gaze and movement while favouring a unified perception of the exhibition experience.

By contrast, the strategy of contrast introduces an intentionally misaligned relationship between display structure and exhibited work. Exhibition elements operate through difference, working on variations of scale, density, proximity, or modes of interaction. Here, contrast is not intended as formal opposition, but as a useful device in cases where the aim is to foreground specific qualities of the work, the heterogeneity of the elements involved, or spatial discontinuity, directing the visitor's attention towards a more analytical reading of relationships within the exhibition space.

Among the exhibition typologies resulting from the application of these two strategies to the categories of objects previously defined, two examples are examined in greater detail - one based on continuity and one on contrast: *Mostra Dietro l'Angolo* and *Mostra MicroLarge*.

Before discussing them, a note on the representational tools used to visualise these scenarios. On a representational level, but not only within the imaginative process behind the *Scenografie*, two distinct graphic-design supports were em-

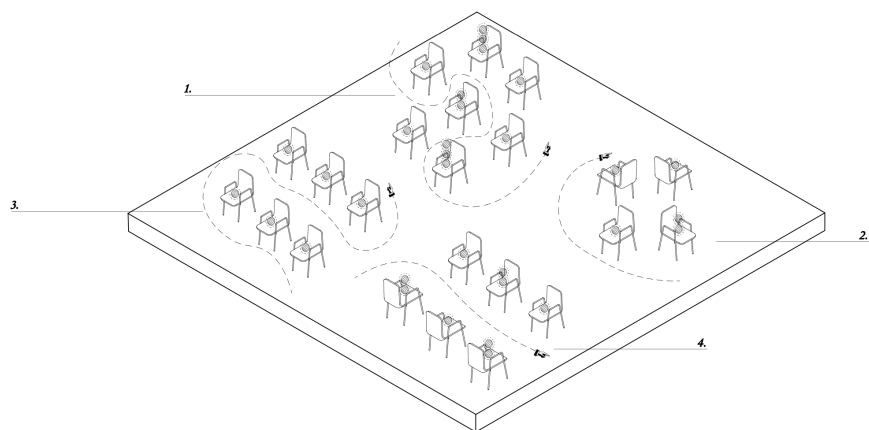


Fig. 9. Axonometric representation of one of the *Scenografie Astratte*, configured from clusters of reused objects and employed as an analytical-configurative support for spatial exploration.

ployed, operating on different levels while remaining within the same methodological framework (Figs. 9, 10). The first has an analytical-configurative character and consists of axonometric drawings of the projects, developed starting from the components of the inventory of available objects. The second is composed of evocative images generated through Artificial Intelligence, used to produce a series of visual versions of the *Scenografie* starting from the axonometric drawings and from a set of keywords connected to the conceptual categories. In this sense, the use of AI constitutes a further exercise of translation of the model, suggesting the possibility of subjecting it to future interpretations - human or artificial - in order to generate new variations and developments.

Mostra Dietro l'Angolo (Figs. 11, 12) applies the strategy of continuity through a spatial configuration based on visual mediation and the construction of a guided path. The works on display are not immediately accessible to view, but are progressively revealed through corners, screens, and partial views that orient movement and shape the visitor's experience. The reused objects, selected from clusters related to modularity, disassembly, and adaptability, are employed to construct an exhibition set functioning as a partial visual barrier. Structures made from commercial garment racks integrated with semi-transparent or opaque textiles generate lightweight mobile partitions, while modular display elements of varying



Fig. 10. Evocative image of one of the *Scenografie Astratte*, generated through Artificial Intelligence from the axonometric representation and a set of conceptual keywords, employed as an exploratory tool for the visualization of possible spatial configurations.

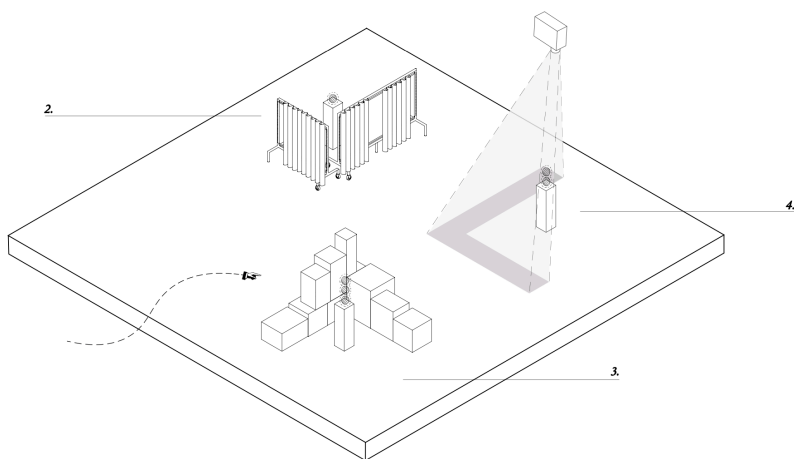


Fig. 11. Axonometric representation of *Mostra Dietro l'Angolo*, an exploratory scenography based on the strategy of continuity, in which reused objects and modular configurations define an exhibition path grounded in visual mediation and the gradual revelation of the artworks.

dimensions are assembled into angular configurations that articulate space across the different imagined versions of the exhibition. These may be complemented by a projected lighting intervention, tracing an immaterial angle across the floor and reinforcing the spatial logic without introducing further physical elements. Within this *Scenografia*, the display set assumes an active role in the construction of meaning, contributing to the definition of a fluid relationship between space, objects, and artworks. Continuity thus takes shape as a configuration in which the exhibition design becomes part of the exhibition narrative, accompanying the visitor through a gradual discovery of the contents.

Mostra MicroLarge (Figs. 13, 14), by contrast, develops the strategy of contrast through a reflection on differences of scale and on the inversion of the conventional hierarchy between display structure and exhibited work. In this configuration, the exhibition set takes the form of an extended structure distributed through space and designed to be traversed, while the works presented assume an intentionally reduced, concentrated, and punctual dimension. The reused objects, selected from clusters related to large scale and to varying degrees of modular aggregation, are used to construct a large-scale exhibition system without a primary front or predetermined direction. Contrast emerges particularly throu-

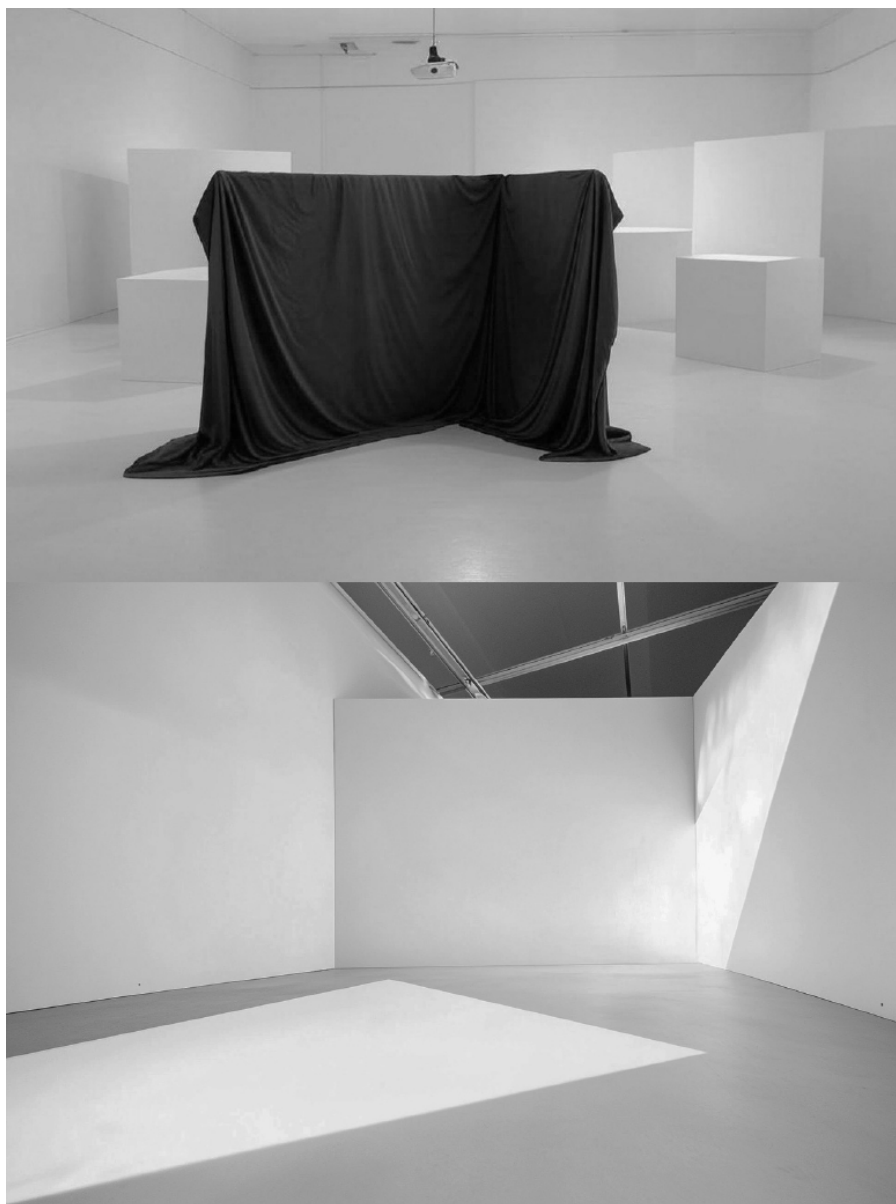


Fig. 12. Evocative image of Mostra Dietro l'Angolo, generated through Artificial Intelligence starting from the axonometric representation in Fig. 6 and its compositional and spatial principles, employed as an exploratory tool for the visualization of the scenography based on the strategy of continuity.

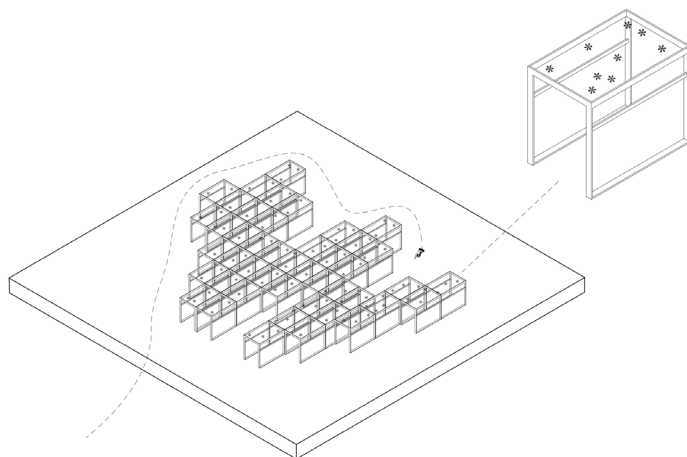


Fig. 13. Rappresentazione assonometrica della Mostra MicroLarge, scenografia esplorativa basata sulla strategia del contrasto, in cui un sistema espositivo modulare di grande scala, composto da oggetti riusati, struttura lo spazio in relazione a opere di dimensioni estremamente contenute.

gh the relationship between the extended scale of the structure and the relatively “micro” dimension of the works, which do not impose themselves at a distance but become legible only through physical proximity. Discontinuity, employed here as a key concept in the exhibition design, also comes to characterise the experience of the space itself: broader phases of movement through the “large” modular system alternate with moments of close attention, periodically reactivating the visitor’s concentration.

Conclusions: Open Tools for Designing with What Remains

This chapter has proposed a reflection on reuse in exhibition design not as an accessory practice or a form of opportunistic greenwashing, but as a design field in its own right, in which working with the existing becomes an opportunity to rethink the modes, temporalities, and forms of design. Rather than focusing on individual outcomes, attention has been directed here towards the processes, tools, and logics that make possible a design practice capable of operating through successive transformations.

To this end, *Scenografie Astratte* was introduced as an applied case study: a Metaproject developed to promote a conscious, non-superficial, and design-driven use of materials already available within sharing platforms such as NSBVN, developed through the proposal of a series of strategies for reorganising, first, and reinterpreting, later, its archive. The objective of the *Metaproject*, here as often in metaprojectual practice more broadly, is to propose a sequence of repeatable design operations, characterised by a precise critical and methodological approach, capable of outlining “hypothetical itineraries” (Deserti, 2003) for those who may choose to follow them in future design experiments.

The idea underlying this chapter, and the metaprojectual experiment it describes, is therefore that the question of *reuse*, particularly within the field of exhibition design, does not operate solely on the level of efficiency or optimisation, but rather on that of interpretation. Designing with what already exists implies accepting the presence of discontinuities, constraints, and traces that depend on the contexts and “material deposits” encountered from case to case, and treating these, too, as design material. Designing through previously used materials and objects implies a genuine shift in perspective, moving attention away from the generation of the “absolute” new and towards the re-signification, each time re-situated, of what is available within a given context. It is precisely in an attempt to support these processes of reinterpretation that *Scenografie Astratte* was developed, proposed as an open tool for a disciplinary field that remains adaptive and currently undergoing profound transformation.

While situated within a specific context and maintaining an exploratory character, the experiment opens up the possibility of extending this approach to other, more or less adjacent contexts. A first desirable step would be the application of the strategies proposed here within future real-world projects drawing on the NSBVN platform, and capable, through *Scenografie Astratte*, of engaging with it critically and creatively, generating not only design responses but also new interpretative categories for the archive itself. A further possible development of this research could consist in applying similar experiments to other existing sharing platforms, with the aim of building a body of open and shared tools, emerging from and addressed to the reuse community, as well as to the broader design community, contributing, one narrative at a time, to the ecological transition of the temporary exhibition sector.

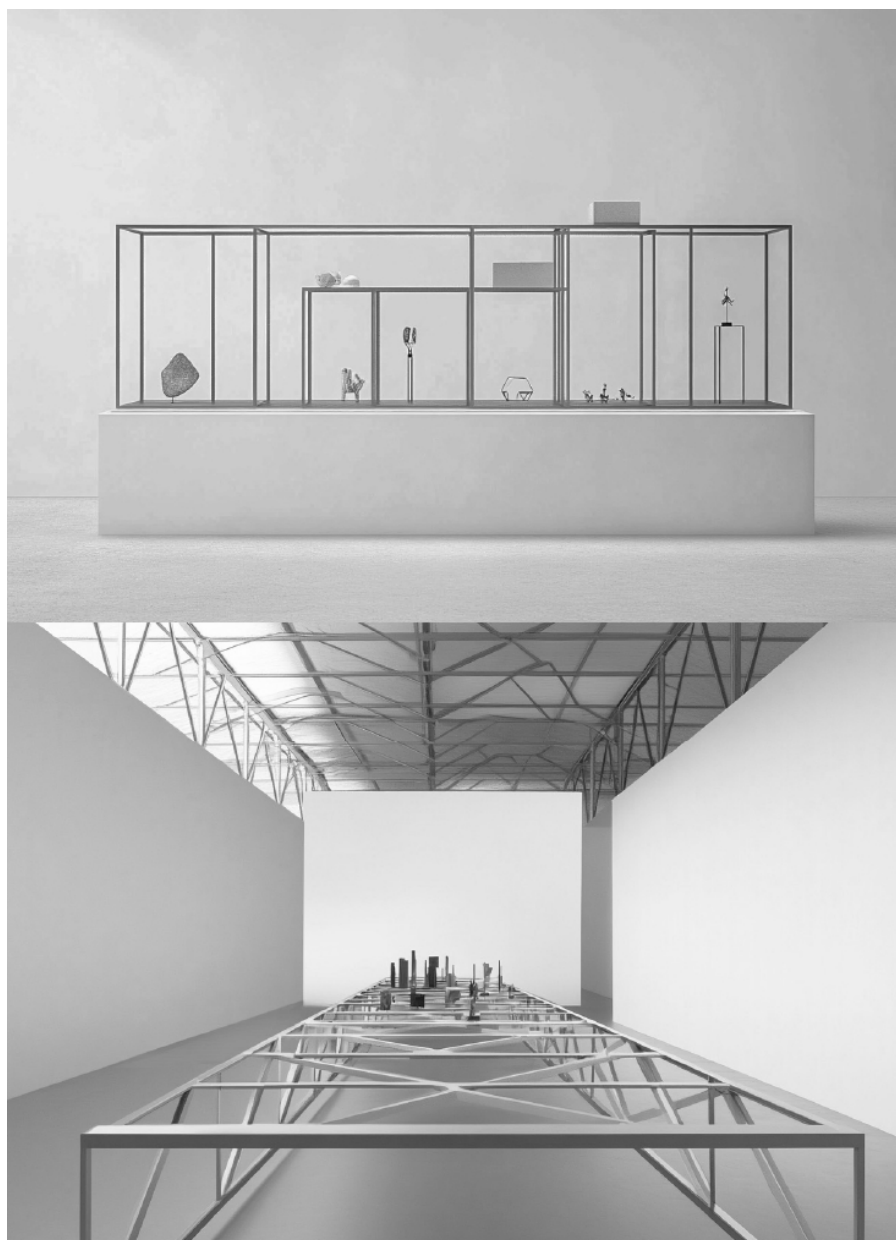


Fig. 14. Evocative image of Mostra MicroLarge, generated through Artificial Intelligence starting from the axonometric representation in Fig. 8 and its compositional and spatial principles, employed as an exploratory tool for the visualization of the scenography based on the strategy of contrast.

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Connections and Reconfigurations

Metaprojectual Foundations for Sustainable Infrastructures

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Connections and Reconfigurations

Metaprojectual Foundations for Sustainable Infrastructures

Sustainability, understood as a framework of meaning for the museum's social role, gained prominence between the late 1990s and the 2000s, when sustainable development began to be referenced as a basis for redefining museums' mission and impact (Worts, 1998). However, it was not until 2018 that a Working Group on Sustainability was established, followed by the formal integration of sustainability as a priority area at the 34th General Assembly in Kyoto in 2019. While, in those years, attention was clearly directed towards the “themes” and “contents” that museums promote through their cultural and social activities, the broader uptake of a new awareness of sustainability - as a set of practices and protocols for designing and producing exhibition installations - is relatively recent (Legget & Labrador, 2023). In this field, the role of design has been widely investigated where it has articulated its technical expertise in the development of sustainable exhibition systems, for instance through reuse strategies, life-cycle analysis of the materials employed, and collaborative platforms (Crippa et al., 2022).

A further layer of interest concerns the role of design in developing, through close collaboration with scientific and artistic curatorial teams, exhibition meta-projects that support sustainability in the overall structural design of the exhibition, at once perceptual and cognitive, even before sustainability is addressed in the unfolding of the display and its specific narrative. In other words, the sustain-

nability of an exhibition design is determined from the outset: from the project before the project (the meta-project), from the primary idea through which the exhibition is conceived, and from the organisation of its contents, which is inseparably connected to the form of the supports that communicate them. Curators and designers are increasingly expected to develop narrative experiences that foster civic responsibility and change starting from the very conception of the exhibition, reinforcing the activist vocation of museum cultural institutions (Janes & Sandell, 2019). This extends towards “fourth-generation” museum models (Pedretti & Iannini, 2020), and even to the practice of eco-curation, which seeks to include all kinds of entities beyond the human (Cameron, 2023).

The chapter that follows examines how the meta-project of semantic infrastructures can enable a form of sustainability that is not only environmental, but above all social and cultural. The term semantic infrastructure refers to the set of spatial, digital, narrative, and relational devices that organise how contents become accessible, connected, and interpretable. It does not coincide with a single display element or interface, but with the underlying system that makes relations among heterogeneous materials visible and meaningful. The meta-project is therefore understood as the design layer that precedes and structures the exhibition narrative, defining the conditions through which contents can be arranged, accessed, and reinterpreted. By positioning sustainability at this infrastructural level, the paper contributes to debates that have so far tended to separate environmental optimisation, cultural sustainability, and curatorial mediation. Two emblematic case studies will be presented, two exhibition projects that emerged from shared co-design processes between designers and curators. The two cases differ substantially in scale, in the nature of their collections, and in the exhibition strategies adopted. However, the two collections on display are connected by a robust connective infrastructure that constitutes their meta-project: this “weave” is continuously reconfigurable and supports and amplifies the value of the exhibitions, as it gives meaning to the association of heterogeneous contents and enables both guided and open-ended interpretive experiences for visitors. They therefore become paradigmatic of a design approach that works on the voids rather than the solids of what is exhibited, relating variable contents without saturating space. The meta-project thus becomes a cultural device capable of hosting and connecting multiple contributions, enhancing their meaning and legibility. In this sense, cultural sustainability lies in the possibility of bringing multiple voices to the fore and offering different levels of interpretation, accessible to diverse publics according to differing interests and modes of engagement.

At the same time, the system is environmentally sustainable because it operates primarily on an immaterial dimension: it enhances what already exists, works through digital tools and the organisation of contents, and avoids the addition of new material. Finally, it generates an open system, continually reconfigurable and negotiable, characterised by flexibility and reversibility, and capable of adapting over time to different contexts, narratives, and uses. The case studies presented here also explore two complementary ways of understanding sustainability as infrastructure within a process of strengthening the identity of two public cultural institutions: a museum of cultures and a design university. On the one hand, the intervention at MUCIV acts on liminal spaces as a physical device for orientation and relation; on the other, *Design Philology* builds a digital infrastructure of data, metadata, and narratives capable of reactivating a shared heritage over time. Methodologically, the chapter adopts a comparative case-study approach. The two cases were selected because they represent complementary forms of connective infrastructure: a physical and spatial system for museum orientation and social interaction in the case of MUCIV, and a digital and curatorial infrastructure for archival reactivation in the case of Design Philology. Their comparison makes it possible to observe how sustainability can be embedded not only in material choices, but also and incisively in the prior organisation of relations, access, and interpretive possibilities.

MUCIV

Spatial, Relational, and Narrative Devices for Reconfiguring Museum Identity.

Within contemporary exhibit design, sustainability is increasingly understood as a multidimensional process in which the social dimension plays a structural role, shaping design practices and models of engagement with the public. From this perspective, contemporary museological discourse moves away from the traditional view of the museum as an institution, positioning the museum within a critical process of redefining its cultural role and rethinking how collections are organised, experienced, and communicated. Modern museums are no longer mere containers that preserve and display objects; rather, they become spaces for democratic and inclusive exchange (Salerno, 2013)¹.

This paragraph explores an example of design experimentation aimed at greater social sustainability in exhibit design, analysing as a case study the co-design project at the Museo delle Civiltà (MUCIV) in Rome. The intervention emerged

in response to the institution's need to reshape certain aspects of its identity, in order to make a unified and collective profile perceptible and recognisable, one capable of integrating the museum's multiple sections and enhancing them through their reciprocal relationships. The Museo delle Civiltà (MUCIV) is, in fact, an institution that brings heterogeneous collections into dialogue, the outcome of successive processes of consolidation that incorporated several pre-existing museums. While, on the one hand, this stratification constitutes a cultural heritage of extraordinary richness, on the other it can produce a perception of fragmentation and make it difficult to construct a unified and coherent narrative.

As L. Marsh (2015) observes, designing systems able to articulate transitions between a museum's different exhibitions is a complex challenge, akin to devising a "spatial enigma" that enables visitors to enter a space, experience it, interpret it, and remember it. By identifying accessibility and identity as constitutive factors of social sustainability (Pop et al., 2019), the co-design intervention was conceived by taking these dimensions as intentional design conditions. It resulted in the activation of spatial, narrative, and informational devices aimed at facilitating perceptual processes, improving the quality of human–environment interaction and the experience of the place itself (Cellucci et al., 2024), with the goal of reducing barriers to access and strengthening a sense of belonging.

The research identified transitional spaces as potential sites of intervention – corridors, foyers, staircases, passages: not merely areas for circulation, but interstitial zones in which the museum can narrate itself and can orient and welcome different publics.

The museum's liminal spaces thus become strategic design opportunities, capable of systematically shaping visitor navigation, modes of social interaction, and the overall spatial experience, going beyond their primary function as mere circulation. Their characteristic flexibility makes them suitable for supporting diverse practices, including forms of informal learning, dynamics of unstructured collaboration, and moments of pause and social relation.

C. McIntyre (2008) has shown how transitional spaces function as genuine "blank canvases" and moments of "rest" within the museum experience, offering cognitive and perceptual pauses that support and reinforce the central motivations for a visit.

Within the MUCIV context, the design concept generated a modular catalogue of solutions to be placed in liminal spaces, conceived as an operational tool both for translating theoretical reflections on social sustainability into functional apparatuses and for connecting architectural, narrative, and social dimensions. The

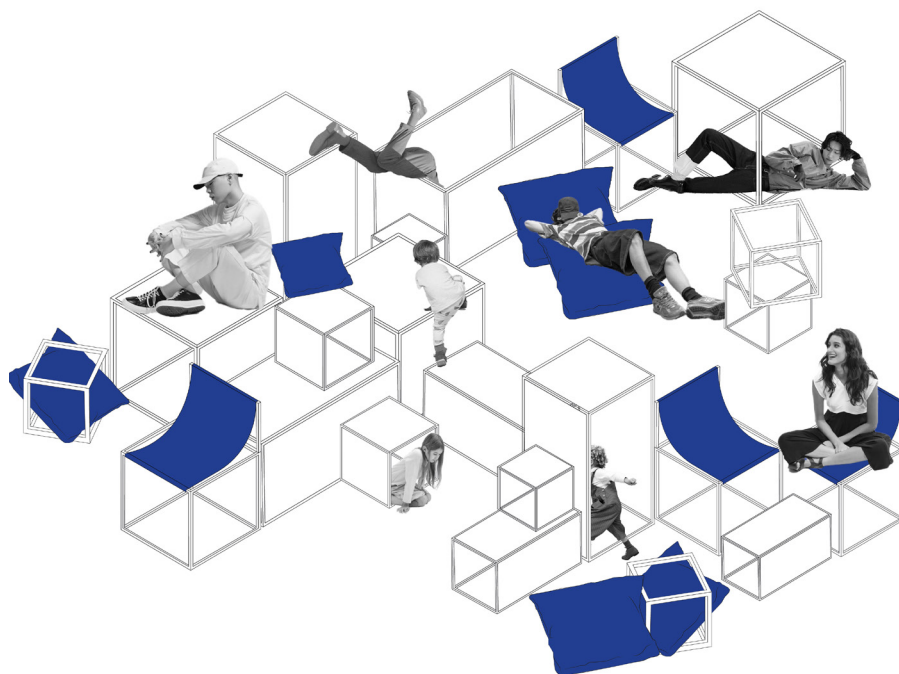


Fig. 15. Illustration of the collective seating configuration.

basic cubic element was developed into different configurations, giving rise to an open, democratic, and reconfigurable system. The module can take the form of single seating units or be assembled into a collective arrangement (Fig. 15), fostering moments of pause and sociability; it can also function as a container, a tactile sensory support, an informational and wayfinding totem (Fig. 16), or a playful element designed to activate dynamics of play and engagement (Fig. 17). Finally, it can be combined into a portal (Fig. 18), becoming a spatial landmark that physically and symbolically enhances the passage between sections.

The outcome is a repertoire of lightweight, minimally invasive connective structures - adaptable, scalable, and replicable - that creates a legible framework among different contents through non-hierarchical modes of use. These relational devices contribute to a democratic, identity-forming, accessible, and socially sustain-

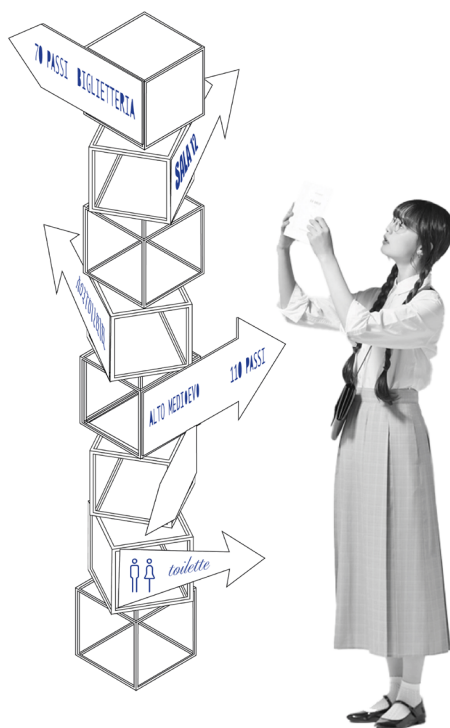


Fig. 16. Illustration of the cubic module in the informational totem configuration.

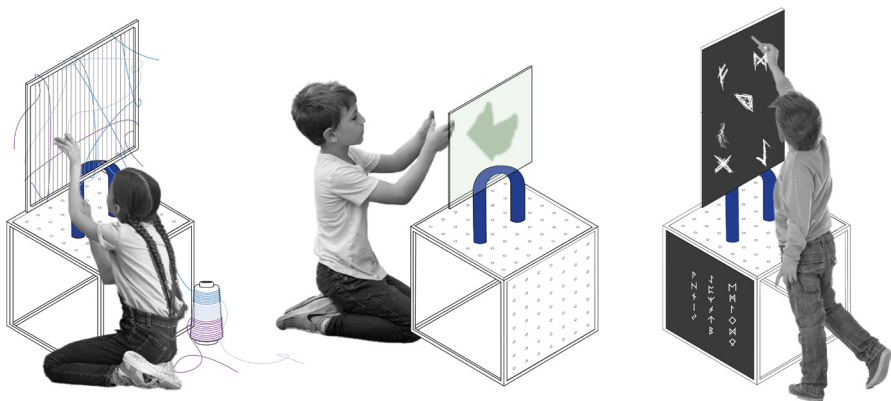


Fig. 17. Illustration of the cubic module as a playful device.

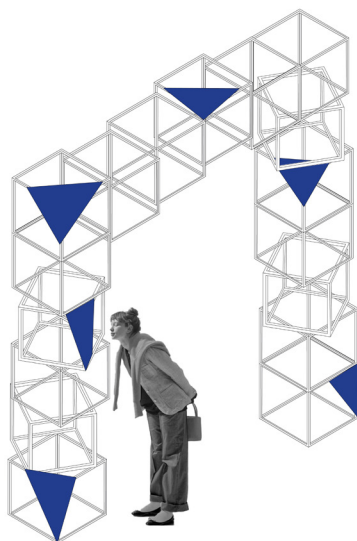


Fig. 18. Illustration of the cubic module in the portal configuration between sections.

nable spatial narrative. In this sense, the design of transitional spaces does not merely support the museum experience; it becomes an active component of it, acting as a mediation between architecture, contents, and community. More specifically, the system supports social sustainability through orientation, accessibility, pause, and informal interaction; cultural sustainability through the reconstruction of relations among the museum's sections; and environmental sustainability through the design of a lightweight, reversible, and replicable modular apparatus.

Design Philology

Data, Metadata, and Curatorial Practice: Reconfigurable Exhibition–Narrative Infrastructures. Within the context of the digital transformation of culture, sustainability and exhibition practices increasingly intersect with the design of data, metadata, and access infrastructures capable of making contents *queryable* and *reconfigurable* over time. Digital archives and collections, from this perspective, do not function as mere repositories, but as *cultural devices* that shape practices of selection, description, and visibility, determining pathways of consultation, connections, and interpretive possibilities (Ghaddar & Caswell, 2019). The field of *digital humanities* (Schnapp, 2014) has shown how digital environments transform models of cultural production, dissemination, and transmission, placing curation, modelling, and visualisation at the centre. In this framework, sustainability can be understood as the capacity to maintain and reactivate experience: not the serial production of closed events, but the construction of systems that enable the updating of sources, the generation of multiple pathways, and curatorial reconfigurations at limited material cost (Schnapp, 2016; Ridge, 2014). It is within this horizon that Design Philology is situated: an initiative promoted by the Department of Design at Politecnico di Milano, together with the School of Design and the POLI.design Consortium, aimed at collecting and enhancing the memory of the Design System while also experimenting with curatorial and narrative approaches based on an *open, incremental archive*.

The heterogeneity of the collected materials (official documents, publications, images, special contributions, interviews, and testimonies) makes it possible to archive both tangible and intangible heritage made of memories, placing highly institutionalised traces alongside more informal sources (Allyn et al., 1987; Lowenthal, 2015). In this sense, the aim is not to produce a single, definitive version of history, but to construct a *plural* and *collective* narrative in which certain

nodes may re-emerge and recur from different viewpoints, making convergences, divergences, and patterns visible (Halbwachs, 1992; Franks, 2021). Cultural sustainability here coincides with the possibility of keeping history open as a field of interpretation, preventing the archive from crystallising into a single sequence or an implicitly established canon.

Design Philology's platform is therefore conceived to translate this body of information into different, continuously updatable narrative configurations. It is organised through four complementary modes: *Archive*, *Timeline*, *Narratives*, and *Essays* (Quaggiotto & Priori, 2023).

The *Archive* provides a primary documentary access to the heritage, organising resources into queryable records - documents, people, events, and institutions - and making their metadata and relations explicit. *Timelines* introduce a temporal and multi-level view that does not simply arrange contents in sequence, but supports transversal readings through filters and aggregations, making clusters, discontinuities, and recurrences visible.

Narratives operate as visual and modular curatorial paths focused on themes, protagonists, and connections, while maintaining a constant anchoring to documents. *Essays*, by contrast, start from a textual argument and reconnect it to archival materials through hyperlinks, cross-references, and QR codes, allowing integrated digital and print engagement.

Together, these four modes define a system in which storytelling does not replace documentation, but activates it and makes it navigable again, establishing stable links between descriptive and interpretive levels.

The result is a device that makes reactivation an integral part of the project: the archive supports plural and successive narratives and, for this very reason, functions as a reusable and reconfigurable infrastructure that enables multiple pathways starting from the same heritage. Sustainability is thus situated in the long-term temporality of *care*: in the possibility of keeping sources accessible, updating and redistributing contents without necessarily producing new apparatuses each time, shifting value and duration from the exhibition event to the curatorial infrastructure.

Conclusions

The trajectory outlined in this chapter suggests that sustainability in museums can be reconsidered not only in relation to the contents conveyed or to operatio-

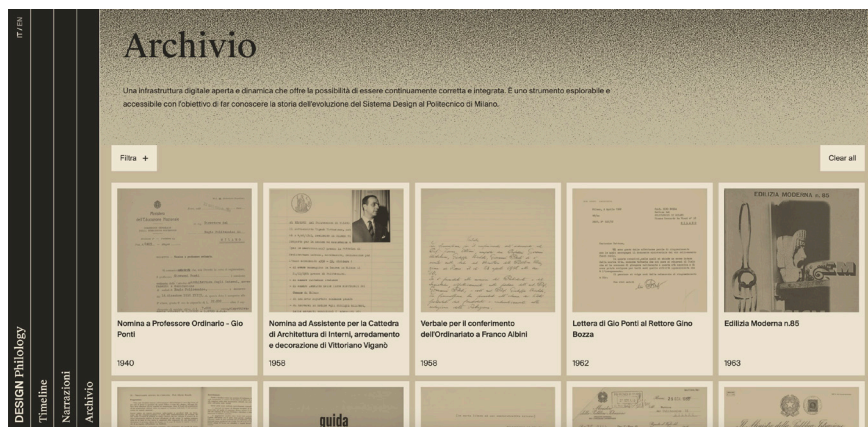


Fig. 19. The *Archive* section of the Design Philology platform.



Fig. 20. The visual curatorial model of the *Narratives*, based on a modular grid of events, documents, and short accompanying texts.

nal practices aimed at reducing environmental impact, but above all as a structuring principle of exhibition and curatorial design. From this perspective, sustainability emerges as a systemic quality that manifests upstream of the project, in the meta-project understood as a connective “weave” that defines its semantic, narrative, and relational architecture, even before its formal and material translation.

The two case studies have shown how the meta-project of connective infrastructures - physical in the case of *MUCIV*, digital in *Design Philology* - constitutes an element capable of supporting predominantly social and cultural forms of sustainability, as well as environmental ones. In both cases, design does not focus on new exhibition apparatuses or the spectacularisation of experience, but on the organisation of contents and the relationships among heterogeneous elements, through the construction of open, reconfigurable systems accessible to diverse publics. Sustainability thus lies in the possibility of activating multiple interpretive pathways, making complexity legible, and accommodating new narratives over time without crystallising the story in advance.

The two projects also show how design, in dialogue with curation, takes on a strategic role in shaping exhibition experiences oriented towards civic responsibility and participation. The *MUCIV* project acts on thresholds and interstices within the space: it treats liminal areas as sites of design and transforms them into a lightweight framework for orientation, pause, and relation, capable of reinforcing the museum’s unified identity while also engaging with the multiple identities of its visitors. Here, social sustainability is expressed as the design of access and inclusion, through adaptable and replicable devices that valorise “voids” as a narrative and relational resource. By contrast, the *Design Philology* case operates on the digital plane: through the organisation of a heterogeneous body of data and reconfigurable narrative views, it makes a form of permanent collective curation practicable. The digital archive is thus configured as a curatorial infrastructure that keeps history open, enabling multiple reactivations of the heritage and shifting value from the exhibition event to the system’s duration.

The two cases also suggest a transferable design principle for cultural institutions: sustainability can be pursued by investing in connective systems rather than in isolated exhibition solutions. Whether physical or digital, these infrastructures can be adapted to different collections, publics, and institutional scales because they operate on relations, access, and reconfiguration rather than on fixed narratives or permanent apparatuses.

From this perspective, sustainability does not coincide with the mere reduction of material impact, but with a long-term practice of care: the capacity to design

structures that can be updated and reinterpreted over time, enhancing what already exists and fostering a plurality of voices. The meta-project thus becomes a cultural device that supports the social role of museums and contemporary cultural institutions, contributing to the definition of more open and inclusive museum models in which design does not end with the exhibition act, but continues to produce meaning through the relationships it makes possible.

Notes

¹ The project, promoted by MUCIV, was developed through a collaboration between the agencies Destra-
tegy and Design Differente.

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Is the cost of carbon really worth it?

Curatorial Practices, Environmental Responsibility, and Exhibition Design Policies

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Is the cost of carbon really worth it?

Curatorial Practices, Environmental Responsibility, and Exhibition Design Policies

In 2021, the museum sector acquired, for the first time, tools capable of systematically measuring its environmental impact: the Gallery Climate Coalition developed a carbon calculator specifically for the sector, while URGE Collective conducted the first comprehensive environmental audit of a museum exhibition by applying LCA methodology to *Waste Age: What Can Design Do?* at the Design Museum in London (URGE Collective, 2023). The data reveal a clear pattern: the transportation of objects and people constitutes the dominant component of exhibitions' carbon footprint, increasing in proportion to the distance and frequency of travel (Qian et al., 2023). Yet the sector's response remains fragmented: what has been achieved has been accomplished "in spite of the institutional structure, not because of it" (URGE Collective, 2023, p. 16). Technical interventions - recycled materials, modular installations, sea freight - produce tangible improvements, but operate at the margins of the system. As the V&A's sustainability manager noted in one of the workshops documented by URGE, the most useful tool would be one that helps curators answer a specific question during the planning phase: "Is it worth the carbon?" (URGE Collective, 2023, p. 14). This is a curatorial question, not a logistical one. This paper argues that environmental sustainability within the museum exhibition system is not primarily a technical or managerial issue; rather, it is a mat-

ter of choices and, therefore, of curation. The decisions that determine environmental impact - what is exhibited, where it comes from, and how often it is moved - are programming choices, reflecting a paradigm grounded in an implicit yet powerful principle: mobility as a value in itself. The dominant model is based on the international circulation of a limited number of canonical works - Van Gogh, the Impressionists, Rembrandt - assembled into replicable formats. Although this system follows a coherent economic logic, it presents a structural contradiction: while these same works travel continuously, the vast majority of permanent collections remain in storage, inaccessible to the public. Stone (2002) found that, on average, 72–80% of works in American museums are held in storage; at the Fine Arts Museums of San Francisco, the proportion reached 95%. What is already famous is moved, whereas what is readily available remains in storage: this is the paradox at the heart of the system (Legget & Labrador, 2023). Are we certain that exhibiting only the most celebrated works truly enhances understanding of an artist? Are we certain that the value of other works - the sketches, the evolution of a creative process that ultimately leads artists to particular choices - does not deserve attention and interpretation? If these works are not considered relevant, why were they acquired for the collections? These questions confront us with curatorial and cultural concerns rather than merely technical problems, because reflecting on sustainability entails addressing a systemic issue that enables a deeper consideration of who we are and the path that has brought us to this point. They may also remind us that the purpose of an exhibition, beyond generating ticket sales, should be to foster dialogue with the public and deepen understanding of the themes it addresses, thereby cultivating greater awareness of the value of cultural heritage. For this reason, among many others, the questions raised by a systemic perspective on environmental issues restore a necessary clarity that may also strengthen the curatorial project, making exhibitions more focused and effective in pursuing the highest cultural objectives of art and the exhibition experience. Seriously addressing the sustainability of exhibitions requires confronting this paradox. Highlighting permanent collections - through the design of on-site exhibitions and the development of site-specific practices rooted in the institution's context - is not merely an ecological strategy; it represents a paradigm shift in the way exhibitions are conceived. This paper is divided into six sections: a review of the literature, an analysis of the dominant model, the development of the curatorial proposal, verification through case studies, an analysis of obstacles, and conclusions.

The State of Research: Three Parallel Streams and a Gap

The literature on museum sustainability has grown significantly over the past decade, yet it has developed along trajectories that rarely converge, leaving the central issue addressed in this paper largely unexplored: the relationship between curatorial choices and environmental impact. The first strand interprets sustainability as institutional responsibility. The new 2022 ICOM definition includes the term for the first time as a fundamental attribute of the museum (Legget & Labrador, 2023), stimulating research that situates cultural institutions within the framework of the Sustainable Development Goals (Wang et al., 2024). The limitation lies in the inherent vagueness of the concept: sustainability can refer to everything from energy efficiency to inclusion policies, without any of these uses contradicting one another (Legget & Labrador, 2023, p. vi). The risk, highlighted in the conversation among curators compiled by Burns, Witzke et al. in *Third Text* (2013), is that it becomes a veneer superimposed upon otherwise unchanged practices. The second strand focuses on the concrete measurement of the environmental impact of exhibitions. The CIMAM toolkit (2020–22) provided museum institutions worldwide with an initial shared methodological framework for assessing the environmental impact of their activities, including energy use, transportation, and materials; the Getty's PST ART program (2024), through its analysis of forty exhibitions held in California, produced the first large-scale comparative dataset in the U.S. context, demonstrating how logistical choices vary enormously from one institution to another even when exhibition scales are comparable. The research by Qian et al. (*Frontiers in Energy Research*, 2023), while focused on auctions, confirms that transportation remains the dominant component of the carbon footprint. The structural limitation is that attention remains concentrated on logistical and technical variables, without questioning the decisions made upstream: sustainability is considered during the production phase, when many key choices have already been made (URGE Collective, 2023). This is despite the fact that we know that eighty percent of the environmental impact of any action is determined during the design phase (John Thackara, 2005). The third strand concerns curatorial theory. Contemporary research has examined the role of the curator as a facilitator of relationships between artworks, space, and audiences (Manopoulou, 2023; Kenanoğlu, 2023), analysing the tension between exhibition formats and site-specific practices, as well as the mechanisms through which major exhibitions construct paradigms of glo-

bal visibility. This issue was explored by Demos (2013), who asked how curatorship might address the environmental crisis as a problem of form; in this regard, Righini (2025) argued that every curatorial choice produces impacts that cannot be undone but only displaced. This line of inquiry, however, remains the furthest removed from the operational dimension: rich in theoretical implications, it rarely extends to the practical and logistical chain. It is clear, then, that a distinct gap remains: none of these three strands has systematically linked the underutilisation of permanent collections - documented by Stone (2002) and the Smithsonian report (2005) - to the carbon footprint of exhibitions. Stone's work, in fact, operates within the domain of collection management rather than environmental sustainability, while environmental researchers document emissions without questioning the programming structures that generate them, and curatorial theorists develop critical tools without engaging with the logistics chain. This paper situates itself within this context by proposing to occupy that space: heritage held in storage is not merely a management issue, but an underutilised curatorial resource and the key to a different exhibition model, as well as to a broader shift in cultural vision within the field of curatorial practice.

The Dominant Model: The Exhibition Format and Its Environmental Cost

The contemporary exhibition system has organized itself around a mode of production that can be defined as the “exhibition format”: an exhibition built around a predefined thematic or authorial core, assembled by bringing together works from different museums, and designed to be replicated across multiple venues on an international scale. It is the dominant form of programming in medium- and large-scale museums, and the primary source of visibility and funding for a growing number of institutions (Art Fund, 2023). Its logic is that of an exportable cultural product: the more recognizable the subject, the greater its capacity to attract visitors.

This logic has precise and measurable environmental consequences. The URGE Collective report (2023) documented that transportation constitutes the dominant component of a temporary exhibition's carbon footprint, followed by energy consumption and materials, and that long-distance transport, rather than the number of trips, determines the overall

impact. The structural problem is that traveling exhibition departments are evaluated according to KPIs related to reach, reputation, and revenue: as long as environmental impact is not included among the criteria for success, reducing emissions remains the responsibility of isolated technical interventions that improve margins without addressing the underlying logic of the system. The curatorial dimension becomes apparent when one considers not only the cost of transportation but also the reasons why it is necessary. The exhibition format involves bringing together works from different locations because no single institution possesses all the required pieces. This aggregation is presented as a cultural value, but it presupposes and reproduces a hierarchy: only certain works, by certain artists, justify the logistics required for their movement. Others remain in storage. Stone (2002) documented that American museums expand their collections by between 2% and 5% annually in terms of the number of objects, while exhibition space does not increase at the same rate: between 72% and 80% of collections remain in storage at any given time. The contradiction is structural: the system that generates the highest transportation emissions is also the one that leaves unused the most readily available resource for reducing them. If the problem is that museums exhibit what is distant rather than what is nearby, the solution cannot be merely to reduce the cost of transportation, but rather to question the necessity of transportation itself.

Curatorship as an environmental lever: making the most of what already exists

There is one aspect that discussions of museum sustainability often fail to address: the issue is not merely how an exhibition is assembled, but what is chosen for display and where it comes from. On-site curation - exhibition-making that draws upon the permanent collection, the institution's context, and the local area - represents the most effective lever for reducing environmental impact, while simultaneously constituting a practice capable of generating deeper cultural meaning than that produced by replicating international formats. This argument operates on two levels: technical-environmental and cultural. From an environmental perspective, the logic is straightforward. The transportation of objects is necessary only if the programme includes exhibitions that do not already exist within the institution: if an exhibition is built around the permanent collection, that cost is eliminated at its source. It is not a matter of reducing tran-

sportation costs, but of eliminating the need for transportation altogether. The problem is that this question is not yet systematically addressed due to shortcomings in decision-making structures: as documented in the URGE report (2023, p. 45), environmental impact assessments typically take place during the production phase, when the curatorial project has already been defined and loans have already been negotiated. The question, “Is it worth it, in carbon terms, to include this object?” can influence decisions only if it is raised at an early stage - when the thematic scope is being defined, rather than when contracts are being drafted. The updated Bizot Green Protocol (2023) provides regulatory tools in this direction: virtual couriering, preference for regional loans, and more flexible climate standards (CIMAM, 2023). However, their adoption remains sporadic, driven by the initiative of individual professionals rather than by systemic institutional policies. From a cultural perspective, the implicit assumption underlying the “format” model - that exhibitions built around local collections are culturally less rich because they lack international prestige - presupposes that the value of an exhibition depends primarily on the recognition of the names on display, rather than on the quality of the curatorial project. The literature challenges this assumption: the contemporary curator is not an assembler of renowned objects, but a creator of relationships among works, space, and audiences (Smith, 2012). Constructing an exhibition from what is already available requires deeper, more situated work: interrogating the collection, identifying unexpected connections among works never previously exhibited together, and developing narratives that emerge from the institution’s specific heritage. It is a more demanding task, not an easier one. Moreover, it produces culturally richer outcomes, rooted in a specificity - historical, geographical, and institutional - that travelling exhibitions cannot possess. This insight is reflected in existing practices. The Museum of Contemporary Art in Lissone, under the curatorship of Alberto Zanchetta, provides an example of a meaningful programme developed entirely from within the permanent collection - a “pulviscular” approach that explores the collection in segments, making it accessible in new ways. A similar approach can be observed in Documenta 15 (Kassel, 2022), which carried the principle of rootedness to its furthest implications by constructing an exhibition based on collective and local practices and by explicitly embracing locality as a value in opposition to the globalization of the art system: its originality is inseparable from its rootedness (Kenanoğlu, 2023). The dichotomy between curatorial quality and environmental sustainability is therefore an ideological construct rather than a practical necessity - a construct that serves the economic system underpinning major international exhibitions.

Repositioning curation as a practice of discovering and activating existing resources entails three concrete transformations: in project methodology (the theme emerges from an inquiry into the collection, rather than from an imported format or pre-established themes), in temporality (on-site exhibitions require longer timeframes, incompatible with the “fast turnaround” documented by URGE, 2023, p. 18), and in indicators of success (which must include environmental impact alongside visitor numbers and visibility). As Anaïs Aguerre of the Bizot Group emphasized in the interview published by URGE (2023), one of the real risks is that sustainability becomes a communication tool without any corresponding change in internal decision-making processes. Sustainable curation is not a public relations exercise: it is a structural choice concerning what to exhibit and the consequences one is willing to accept. Sustainable curation is an approach evident in certain exhibition practices, in which the curator - even without explicitly addressing environmental themes - demonstrates, through original interpretations, the possibility of developing cultural projects according to the principle of “less material, more intelligence.”

Case Studies: Field Applications, Between Experimentation and Real-World Constraints

This section examines three concrete examples in which the principles described in the previous sections are applied in exhibition practice, each shedding light on a specific aspect of the issue: integrated impact measurement, the rotation of the collection as a curatorial act, and starting with - but not limiting oneself to - the collection, thereby highlighting the possibilities of a different approach.

Design Museum, Londra - Waste Age: What Can Design Do? (2021–22)

The collaboration with URGE Collective, initiated in 2021, resulted in the first comprehensive environmental audit of a temporary exhibition conducted using Life Cycle Assessment (LCA) methodology: every component of the carbon footprint was quantified, from the transportation of objects to the building’s energy consumption (URGE Collective, 2023, pp. 26–28). The results are instructive for reasons that extend beyond the numerical findings. The total impact of the exhibition amounted to approximately 28 tons of CO₂e; of this, 50% was attributable to a single installation shipped from Ghana, whose transport generated 5 tons of CO₂e. All other objects, the majority of which originated in London, collectively generated less than 20 kg of

CO₂e - 0.06% of the overall footprint. A single object transported over a long distance can therefore generate more emissions than all the others combined. A second finding is equally significant: had the Design Museum relied on the national average for British electricity generation rather than renewable energy, the total impact would have been approximately 185 tons of CO₂e instead of 28. The use of renewable energy reduced the carbon footprint by 85% - a magnitude that discussions of transportation impacts often overlook. What makes this case particularly valuable is not only the quality of the data, but also the process: collaboration among curators, designers, and environmental analysts was established during the early stages of the design phase. It is this early integration that enables curatorial decisions to be made with full awareness of their consequences. The Impact Model developed by URGE was subsequently made available to the wider sector.

Queen Victoria Museum and Art Gallery (QVMAG), Launceston, Tasmania. This case did not originate as an environmental sustainability project but rather emerged from a process of decolonization, illustrating what can occur when an institution systematically engages with its own collection. Between 2018 and 2022, QVMAG undertook a comprehensive audit of its collection of 1.5 million objects - the first since its establishment in 1891 - followed by the rehanging of the Colonial and Federation Galleries. The process, documented by McCaughan, Ooi, and Hall (2026), revealed gaps in documentation and institutional tensions, yet produced a tangible outcome: works that had never previously been exhibited were mobilized to construct new narratives. Julie Gough's work, *Impasse: Stolen Ground* (2021), created in dialogue with a colonial object already held by the museum, represents the most emblematic example, as its cultural significance would have been impossible without that specific relationship (McCaughan et al., 2026, pp. 13–14). From an environmental perspective, the profile of the rehang is almost the inverse of that of a standard exhibition: no long-distance transport and no complex logistics. The principal costs involved research, curatorial labour, and documentation - intellectual rather than logistical resources. The case also demonstrates that the first step towards on-site curation is often simply understanding what is already present within a collection: the audit revealed unexpected "documentary gaps and colonial silences" (McCaughan et al., 2026, p. 12), confirming that the systematic survey of a collection possesses intrinsic curatorial value even before any environmental implications are considered.

Palazzo Te - Mantova. The case of the Mantua Museum is similar to the pre-

vious one: it is precisely the location and the collection of wall frescoes that serve as the starting point for planning future exhibitions and their curatorships. This is a bold choice, allowing curators working for the Museum to propose a wide variety of themes, provided that they maintain a clear connection to the history of the site. This approach enables the Museum, in addition to strengthening institutional recognition, to organize exhibitions in which loaned works are particularly highlighted thanks to a curatorial concept that accompanies and structures all exhibitions. The Mantua curatorial framework involves identifying an annual guiding concept - a general, overarching theme - around which exhibition activities are built, linking them to educational programs. This approach to event planning acknowledges the role of research and is designed to highlight it, thereby fostering greater awareness of cultural heritage. Looking ahead to 2023, the chosen theme is "MANTOVA: THE EUROPE OF CITIES," with the aim of exploring the role of the city of Mantua in shaping the ideals and values of modern European society from the sixteenth century onward, as the director explains: "In those years, the cultural foundations were laid for a political practice that still operates today within the difficult coexistence of power and the rule of law, religion and secularism, economic mobilization, prosperity and poverty, war and peace. A practice of reason and freedom." A broad and overarching theme that allows for the conception of an exhibition such as "The Emperor and the Duke. Charles V in Mantua" (figs. 21–25), in which the dialogue between the two monarchs is recounted through a comparison between the "Portrait of Charles V with a Dog," painted by Jakob Seisenegger in 1532 and on loan from the Kunsthistorisches Museum in Vienna, and the "Portrait of Federico II Gonzaga" painted by Titian, housed at the Prado Museum in Madrid and presented in the exhibition through a high-definition reproduction created by the Factum Foundation. The exhibition, symbolically structured around these two portraits, is rich in meanings and narrative elements aimed at describing Charles V's arrival in Mantua in March 1530 and the scenography imagined by Giulio Romano. In doing so, it draws on documents and correspondence preserved in the State Archives of Mantua and the University Library of Pavia. The narrative also focuses on details such as the armor of Charles V, depicted in the engravings by Giovanni Britto held at the Central Institute for Graphics in Rome. The second episode concerns an exhibition dedicated to the Flemish painter Rubens, conceived as part of "Rubens! The Birth of European Painting" (figs. 26–30), in collaboration with the Galleria Borghese in Rome. The exhi-

bition traces the Flemish artist's career, demonstrating how the Renaissance influences developed during his years in Mantua and Italy continued and evolved in his mature paintings, eventually becoming an intellectual and artistic legacy passed on to his students. The works on display have been selected through international loans to highlight the dialogue with myths and with Giulio Romano's interpretation, connecting to the dimension of mythological fable that Rubens manages to transform into a universal language capable of speaking to all the courts of Europe. Here too, Rubens's work "The Ecstasy of Gregory the Great" is presented through a high-definition reproduction created by Factum Arte, which complements the original works on loan. In its approach, Palazzo Te demonstrates that the decision to start from the identity of the collection has not limited the themes or curatorial possibilities, but has instead refined the narrative of its collection, while also experimenting with unique solutions such as art reproductions. This approach is evident not only in 2023 but also in subsequent years, as demonstrated by the connection with Pablo Picasso in 2025 through the theme "Metamorphosis," which led to the creation of the exhibition "Picasso at Palazzo Te. Poetry and Salvation." Today, on the occasion of the 500th anniversary, this journey culminates in the production of a total work such as that created by director Isaac Julien within the Palace. Two constants emerge from the comparative analysis. The first is that sustainability produces real effects only when it is integrated into the initial stages of the curatorial process - not added after the fact when structural choices have already been made. The second and third are that institutions that have achieved significant results have done so by developing their own tools, not by waiting for external standards. Both constants point in the same direction: change is not technical; it is conceptual.

Structural barriers and conditions for change

Recognizing on-site curation as an effective environmental lever does not mean ignoring the reasons why this model has not yet established itself as the dominant practice. Change faces real resistance - not due to inertia or ignorance, but because the current system yields concrete benefits for specific actors. Understanding these obstacles in their specific context is the first step toward identifying the conditions that could foster effective transformation. The first obstacle is economic. The model of large-scale touring exhibitions is not

merely a cultural choice: it is a source of revenue. As documented by URGE (2023, p. 17), touring departments operate as profit centers - partner museums pay a fee to host the exhibitions, and this revenue funds a significant portion of the operating budget. Reducing long-distance loans can be perceived as a direct threat to the funding model - and in mid-sized institutions, for which a blockbuster exhibition represents the primary vehicle for visibility, the constraint is particularly acute. The second obstacle concerns conservation standards and loan requirements. Technical requirements - precise climate conditions, certified transport, qualified couriers - are scientifically grounded and protect fragile objects. The continuous raising of these standards tends to make loans increasingly expensive and complex, contributing to the stagnation of collections. The Bizot Group acknowledged this tension in the 2023 update to the Protocol: the more flexible conditions introduced - wider temperature and humidity ranges, microclimates rather than centralized climate control - are scientifically safe for most works. Resistance to their adoption is often more cultural than scientific, tied to a professional mindset that tends to maximize protection regardless of the actual risk level. The third obstacle is that of misaligned incentives. The most significant progress is achieved when environmental responsibility is integrated into the KPIs of all teams involved - curators, project managers, touring departments. Where this integration is lacking, sustainability remains the responsibility of individuals who operate within the institutional structure, with results that are lost when those people change roles. The fourth obstacle is the lack of standardized and mandatory reporting. Without comparable data, there is no pressure to improve. Each institution measures its emissions using different tools and methodologies, making the data incomparable - a situation similar to that of the British film and television industries before the Albert system. Arts Council England has already introduced environmental requirements into the public funding process: institutions must demonstrate that they have an environmental action plan. This model - funding conditional on reporting - is the most effective identifiable leverage mechanism, because it acts upon the structure of incentives rather than on individual best practices. The conditions for change operate on three levels: institutional (carbon budgets alongside financial budgets, environmental KPIs in touring departments), sector-specific (standardization of reporting through ICOM, the Bizot Group, and CIMAM), and educational (integration of sustainability as a structural methodological criterion in the training of curators). All three require deliberate action and a long timeframe - incompatible with the climate emergency. The GCC's goal is a 50% reduction in emissions by 2030; institutional and cultural transfor-

mations occur on much longer timescales. This misalignment is not a reason to abandon structural change, but to work simultaneously on multiple levels: short-term technical interventions alongside medium-term programmatic transformations. On-site curation is not an immediate solution: it is a direction. It is a direction that does not seek to eliminate the possibility of loans from other institutions (perhaps distant ones), but to promote a renewal of research and an elevation of curatorial quality in order to enhance existing heritage and to determine the actual need for loans of works based on a curatorial concept rather than the fame of a work.

Conclusions

This paper is driven by a well-documented paradox: museums constantly move the same famous works across continents, while leaving the vast majority of their collections in storage. This is not a matter of managerial inefficiency, but rather reflects a logic consistent with the value criteria upon which the exhibition system is built - the fame of the objects, institutional reach, and revenue from touring. Questioning the environmental sustainability of that system means questioning those criteria, not relegating them to the margins. The proposal for on-site curation is not a sacrifice of quality in the name of ecology: it is the recognition that curatorial quality and the reduction of emissions can share the same origin. Building exhibitions from what is already present - in the collections, in the context, in the local area - requires deeper work than that needed to assemble international loans of famous objects. The meaning that emerges is necessarily specific, not replicable elsewhere, not exportable as a format. It is this specificity, rather than the renunciation of mobility as such, that constitutes the paradigm shift. What remains open is primarily empirical: there is a lack of systematic data on the use of permanent collections in Europe, a theory of site-specific curation explicitly developed from an environmental perspective, and funding models that make what is already proven to be environmentally sustainable economically viable.



Fig. 21. Photograph of the exhibition “L'imperatore e il Duca. Carlo V a Mantova” - Palazzo Te - Mantova 2023. © Fondazione Palazzo Te



Fig. 22. Photograph of the exhibition “L'imperatore e il Duca. Carlo V a Mantova” - Palazzo Te - Mantova 2023. © Fondazione Palazzo Te



Fig. 23. Photograph of the exhibition “L'imperatore e il Duca. Carlo V a Mantova” - Palazzo Te, Mantova 2023. © Fondazione Palazzo Te



Fig. 24. Photograph of the exhibition - mostra “L'imperatore e il Duca. Carlo V a Mantova”, Palazzo Te - Mantova 2023. © Fondazione Palazzo Te



Fig. 25. Photograph of the exhibition “L'imperatore e il Duca. Carlo V a Mantova” - Palazzo Te, Mantova 2023. © Fondazione Palazzo Te



Fig. 26. Photograph of the exhibition "Rubens a Palazzo Te", Palazzo Te, Mantova, 2023. Foto: Gian Maria Pontiroli © Fondazione Palazzo Te



Fig. 27. Photograph of the exhibition "Rubens a Palazzo Te", Palazzo Te, Mantova, 2023. Foto: Gian Maria Pontiroli © Fondazione Palazzo Te



Fig. 28. Photograph of the exhibition “Rubens a Palazzo Te”, Palazzo Te, Mantova, 2023. Foto: Gian Maria Pontiroli © Fondazione Palazzo Te



Fig. 29. Photograph of the exhibition “Rubens a Palazzo Te”, Palazzo Te, Mantova, 2023. Foto: Gian Maria Pontiroli © Fondazione Palazzo Te



Fig. 30. Photograph of the exhibition “Rubens a Palazzo Te”, Palazzo Te, Mantova, 2023. Foto: Gian Maria Pontiroli © Fondazione Palazzo Te

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“Exhibition scores” and methodological approaches for a sustainable exhibition system

*A Tool for Assessing and Integrating Strategies for Environmental
Sustainability*

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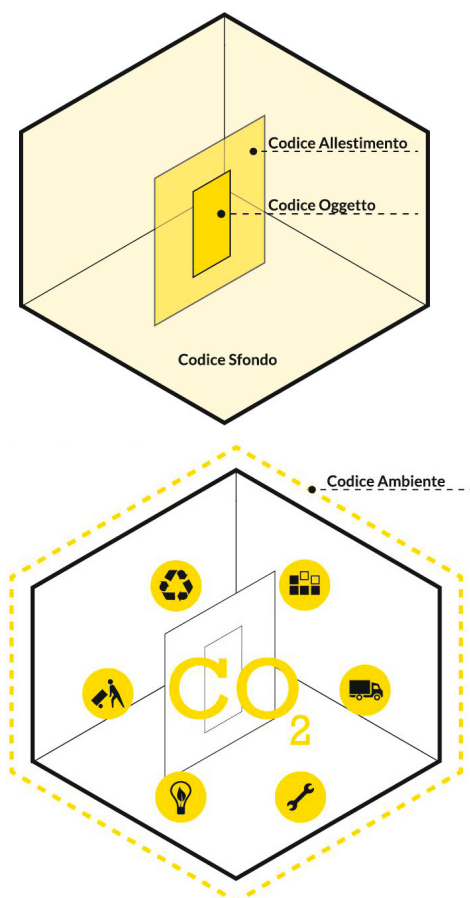
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“Exhibition scores” and methodological approaches for a sustainable exhibition system

A Tool for Assessing and Integrating Strategies for Environmental Sustainability

In the current context of the exhibition design discipline, a shift in attitude is underway regarding the sustainability paradigm: no longer perceived as peripheral or residual, but central to major design choices. It increasingly appears necessary to be integrated from the earliest concept phases, rather than delegated to other professionals or key players (for example, contractors and suppliers) during the dismantling and disposal stages. Above all, for the designer, it emerges as a dimension to be addressed according to a systemic logic, no longer isolated to the sole issue of materials, but one that considers the entire lifecycle of the exhibition device (Crippa et al., 2022; Talamo, 2022). This new radicalism requires moving away from a linear model, embracing forms of circularity, such as the rental of equipment and the reuse of exhibition components across multiple events, highlighting designers' need to address the management of design artifacts' use cycles at every scale (Crippa, 2024; Trocchianesi & Locatelli, 2024), with all the criticalities and potentialities that reverse-engineering (Creba & Devlieger, 2019; Devlieger, 2019; Ghyoot et al., 2020) or *re-manufacturing actions entail* (Giorgi et al., 2025).

Reflecting on the sustainable exhibit requires a broad analytical perspective, since the very definition of sustainability – and of the design associated with it (Ceschin & Gaziulusoy, 2016, 2019; Vezzoli et al., 2022) – is continually evolving



LEGENDA:

- | | |
|---|---|
|  Riciclabilità dei materiali |  Scomponibilità e riutilizzo |
|  Stoccaggio |  Trasporto |
|  Consumo energetico |  Modularità e adattabilità |

Fig. 31. The four codes for the installation: background code, installation code, object code, and environment code. Photo: Davide Crippa

and being refined (Foster, 2014; Fry, 2009; Swyngedouw, 2010). The concept of sustainability is articulated across multiple dimensions, not only the well-known environmental, economic, and social ones – the so-called “three pillars” (Purvis et al., 2019) – but also, for example, the emotional dimension, which can promote durable design and, consequently, extend the project’s lifespan (Chapman, 2009, 2015, 2021).

By proposing design solutions calibrated to contemporary sensitivities and needs and by enhancing their profound educational value, exhibition setups can act as a bridge between collective and specialist knowledge, making the latter accessible through the public’s experience (Di Prete & Ratti, 2024). At the design level, the exhibition element can adopt strategies that reflect the values of the circular economy, such as flexibility, adaptability, and modularity, bringing it closer to sustainable best practices. This level of design deserves its own codes and analytical tools. An example is the *Controistoria dell’Esporre*, developed by Davide Crippa (Crippa, 2024; Crippa & Botta, 2024). By intersecting the theoretical approaches to the History of Architecture proposed by Bruno Zevi and Corrado Levi, Crippa elaborates a series of interpretative codes for exhibition design: the Background Code (the place where the exhibit exists), the Exhibition Code (the tools of staging and narration), and the Object Code (what is exhibited). To these, he adds another level of analysis, represented by the Environment Code: a systemic and multidisciplinary deepening, as it integrates the first three and reflects on the sustainability of the spatial choices adopted. Also moving toward a methodological framework, albeit with different results, is the integration of sustainability-oriented approaches into the exhibition score tool described in this paper. Exhibition design, in its nature suspended between permanence and temporariness, is realized within a narrative framework with multiple means and purposes; by virtue of these aspects, it is possible to apply a horizontal and multivariate reading that breaks down its structure into various sections, through a graphic representation that allows one to see simultaneously and in parallel the different levels of the examined/designed exhibit (Trocchianesi, 2014). In these sections, conceived as expandable, the sustainable strategies implemented can be placed.

We start from the assumption that within the complex organizational process that characterizes a temporary cultural exhibition, the exhibition design project configures itself as a true three-dimensional narration of the exhibited contents. Exhibit design, a discipline that embraces the fields of exhibition design and museography, represents the point of synthesis between different design scales: *the spatial dimension*, which compositionally organizes the environment by defining

paths, volumes, and transitions; *the product scale*, which conceives exhibition artefacts such as panels, supports, display cases, and scenic backdrops; and finally, *the communication level*, which develops signage and infographic systems in harmony with the exhibition's theme.

Added to this intrinsic complexity are the tight deadlines that mark the realization of an exhibition and the multiplicity of actors and specialist competencies involved in the process.

It is precisely from this complexity that we start a detailed and specific examination of the possible ways of verifying and intervening on sustainable practices in the temporary exhibition design supply chain.

Exhibition Scores as Methodological Tools for the Verification and Integration of Sustainability Strategies

Today, the entire creative and cultural industries sector is called upon to confront the challenges of sustainability. As stated in the definition of a museum updated by ICOM in 2022, 'a museum is open to the public, accessible and inclusive, and promotes diversity and sustainability.' This vision also extends to exhibition systems, considering them both from the perspective of the production process and that of the finished product. From this derives an evolution of the museum's role: cultural institutions are increasingly configuring themselves as catalysts for accessible and participatory experiences. To be consistent with this mission, they must adopt sustainable criteria and practices from cultural, economic, and environmental perspectives.

In this context, the awareness of this issue on the part of the various professional figures involved in the exhibition design supply chain is also necessarily changing. Hence, the need for new tools and collaborative models aimed at integrating processes and practices that take sustainability into account during the design, execution, and dismantling phases emerges.

It is precisely at this point that the 'Tool for the Verification and Integration of Sustainability Strategies' will be introduced. This approach, both analytical and design-oriented in nature, configures itself as a specific application of the already developed 'Exhibition score' (Trocchianesi, 2014). The concept of the *score* stems from the need to break down the exhibition layout into its various parts, through a mode of graphic (notes, sketches, images) and conceptual representation that allows for a sequential, simultaneous, and 'parallel' view of the different levels of

which an exhibition is composed.

The tool is designed for designers who – playing a role ideally similar to that of a film director and orchestra conductor – must be able to control and manage the entire simultaneity of the parts that contribute to the exhibition setup, as if it were a true staging. In this way, a horizontal, multi-variable reading is proposed, in which different aspects can be isolated:

- *the articulation of content*: the logic and order in which the works are exhibited (the exhibition sections and the common thread generally guided by the curatorial approach);
- *the spatial organization*, strongly conditioned by the architectural container as well as by the sequence of contents and the curatorial approach; it determines the layout of the routes and the spatial paradigm that characterizes the overall exhibition design framework;
- *the exhibition artefacts and devices* placed in the various environments, which establish an actual relationship with the visitor as mediators between them and the cultural heritage;
- *the actions and interaction mechanics* between the visitor and the heritage, and between the visitor and other visitors, determine the dynamics that shape the entire visit (in temporal and spatial terms); these underlie the model of the cultural experience that underpins a project;
- *the language* with which content is communicated, the narrative register, and the stylistic imprint that characterizes the exhibition design project and manifests itself both in the signage-communication system and in the choice of materials, technologies, and interface of the exhibition devices;
- *the timeline*: the duration of the visit, not only in its entirety but also in relation to individual rooms and individual exhibition artefacts: the rhythm, pauses, and accelerations that mark the entire cultural experience (Biancardi, Sterza, Trocchianesi, 2025).

Naturally, further aspects can be added to these variables: the chromatic-material dimension, the sonic dimension, and any others depending on the characteristics and importance of certain design requirements.

Each of the elements considered so far represents a crucial variable, capable of deeply affecting the visitor's cultural experience and determining the quality of their cultural experience. From this derives the need for an approach to exhibition design based on structured methods and practices, indispensable for managing the complexity of interdependent factors articulated across multiple levels.

But let us now return to the '*Tool for the Verification and Integration of Sustaina-*

bility Strategies', which precisely presents itself as a spin-off of the *Exhibition Score*. This consists of four layers (ideally supplementing those previously identified in the score), always organized sequentially from left to right according to the visit experience, in a parallel arrangement:

- The level of the *coverings*: here, interventions on the architectural context are illustrated (e.g., window decals to shade natural light, partition walls, false ceilings, floating or ephemeral floors). This item is important because this type of intervention often has a significant impact on the economy of a temporary installation, in terms of quantities, materials, and finishes.
- The level of *display artifacts*: here, elements that make up the entire exhibition system are included (cabinets, panels, display cases, notice boards, plinths, 'habitable' volumes, dividing screens). In this case as well, the impact of these artifacts varies depending on the materials, surface treatments, modularity, and assembly systems.
- The level of the *graphic-communicative apparatus*: here, all elements that form part of the identity and visual communication of the exhibition are included (e.g., wayfinding systems, room panels, captions, decorative and/or informational applications). This is a significant category, as reusing graphics is rarely feasible, which is why using systems and materials (digital or analog) that account for application methods and waste is crucial for a sustainable approach to the project.
- The level of *energy*: here, technological devices that require energy to operate are highlighted, whose presence should be carefully managed (e.g., micro-climate and humidity control systems, lighting fixtures and systems, sound devices, digital and multimedia elements, mechanical devices). This aspect is critical for assessing the extent of energy consumption and, if necessary, for making integrated, combined, or complementary choices.

This type of analytical design tool, besides being 'modular' and adaptable, lends itself to integration with additional tools aimed at focusing attention and in-depth study on specific elements and/or aspects of the installation, considering them within the entire design and implementation process.

An analytical model to understand and guide the project

Before proceeding with the detailed description of the Tool levels, which are useful not only for analysing the logic behind reducing the environmental impact of

the project but also for identifying potential improvements in this direction, it is appropriate to frame some necessary actions that the exhibition designer, when deciding to incorporate the paradigm of sustainability into the setup, must undertake during the pre-event phase.

The first crucial step is to contribute to creating a collaborative network in which all the actors involved are aware of the strategies to be applied and the actions through which they will be implemented. The objectives will be consciously shared with respect to the scale, the context's possibilities, and the fact that stakeholders in the pre-event phase differ from project to project. For example, conservators and curators, if it concerns a museum installation; fair operators and companies, if it takes place at a commercial fair; fashion brands and event producers, if designing for a temporary event within the fashion system. The same applies to the design process that integrates specific authorizations (fire safety, public entertainment licenses). It is likely that during the realization and dismantling phases, the roles of installers and suppliers will overlap. Practically, this means, for example, preparing a timetable with meetings to verify the progress of the proposed strategies (e.g., establishing the use of percentages of circular, semi-circular, and bio-based materials and, based on these, projecting in advance the end-of-life scenarios for the various set elements) and accepting that some may be more structured than others. If it is decided to incorporate a quantitative LCA (Life Cycle Assessment) evaluation of the project, the most recognised method within European policies (but not only) aimed at transitioning towards circular systems (European Commission, 2020; European Parliament, 2024; Hauschild et al., 2018; Sala et al., 2021; Sonnemann et al., 2017), it is important to organise some initial meetings with all key figures, where achievable objectives are identified, the evaluation procedure is explained, indicators are chosen, and it is clearly explained in a transdisciplinary manner (Tress et al., 2005) what each actor's contribution will be. For example, with installers and suppliers, the process of filling out the designer-defined format for collecting data useful for the assessment will be shared and explained. This step is important to ensure that suppliers do not feel lost in the face of such a request nor perceive it merely as a checklist without tangible repercussions. Another important pre-event action, closely linked to reuse and flexibility strategies for the installation, is to verify the existence of an inventory of internal resources, owned by the client, that can be reused. While reuse is one of the main pathways of circularity for the exhibition designer – we could say it is almost an imperative – it cannot be ignored that it intersects with critical issues:

authorship, compliance, when necessary, costs, and timing, especially when compared to new production.

Once these initial steps have been defined, the process continues by designing and integrating the following strategies:

- *Promoting reuse and adaptability*
- *Applying the principles of design for disassembly*
- *Selecting materials considering the entire lifecycle*
- *Monitoring quantities.*

Although in the Exhibit score, the first two strategies fall within the phases of PRE-EVENT DESIGN AND CONSTRUCTION, it presents a unified and systemic vision, whereby these practices are directly connected to the definition of subsequent strategies and determine the impacts of DECONSTRUCTION and the FLOW of materials in the POST-EVENT phase. In the discipline of design, a strategy (Sherin, 2017, p. 104) is understood as a planned action, based on a vision, clear objectives, and criteria for measuring achievement. Every design project – from a product to a setup, up to a participatory workshop – includes a strategic component. The strategy can emerge as part of a structured process, evolve through creative iterations, or be the very goal of the project. The exhibition designer, as a sustainability strategist, plays a key role in defining realistic objectives, identifying the participants in the problem-solving process, and clarifying each person's role. From the perspective of Design for Sustainability (DfS), strategies represent different contributions to a broader and more dynamic sustainability project; they can include aligning with the policies of Life Cycle Thinking (Sonnemann et al., 2017), belonging to eco-design (McDonough & Braungart, 2002), or to system design for sustainability (Vezzoli, 2010; Vezzoli et al., 2022). Many of these strategies are cross-cutting and involve research and development sectors - academic, institutional, and even private - which can lead to profound changes in the economy and business scenarios (Campioli et al., 2018; Giorgi et al., 2025; Talamo, 2022).

In the score, the framing of the listed strategies occurs in two phases (see Fig. 32): an initial analytical part, dedicated to collecting and representing specific data about the elements that create the setup, and a second part, dedicated to the graphic rendering of what emerged in phase 1 and translated into various levels (*coverings, display, artefacts, and graphic-communicative elements*). The strategies to promote reuse and adaptability, and to apply the principles of design for disassembly, are closely linked. Following them means adopting technical and con-

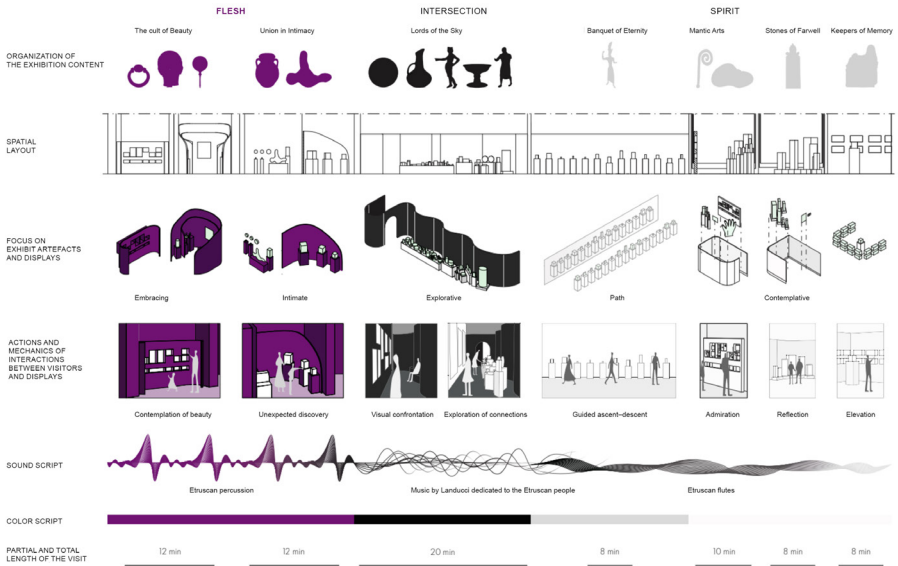


Fig. 32. An example of an *Exhibition score* (Autrice 1, 2014) applied to a temporary exhibition design project for an art exhibition entitled: *Flesh and Spirit. The Eternal Etruscan/Carne e Spirito. L'eterno etrusco – 2025* (Davide Boeri, Rocco Casari, Veronica Imperiale, Chiara Mapelli, Xin Yi Chiara Zhang)

structive choices aimed at simplifying the assembly and disassembly of setup artifacts, enabling circular practices (e.g., repair, reuse, recycling) in a non-destructive manner, increasing their usage cycles, or allowing their re-utilization. In our tool, in the analysis section, the designer can insert drawings (axonometric views, details, schematic sections) that precisely illustrate the compositional choices aligned with these actions. Regarding the selection of materials, considering the entire lifecycle and monitoring quantities, the focus is on the quantitative composition of the chosen materials, relating resource consumption to the post-event end-of-life. For the main elements of the setup, the material composition is shown in a graph, focusing on both the upstream phase of resource consumption and a simplified analysis of end-of-life within post-event flows. In the first case, according to the following macro-categories:

- *circular elements for reuse (a practice to always prioritize, if possible)*
- *elements with a component of pre/post-consumer recycled material*

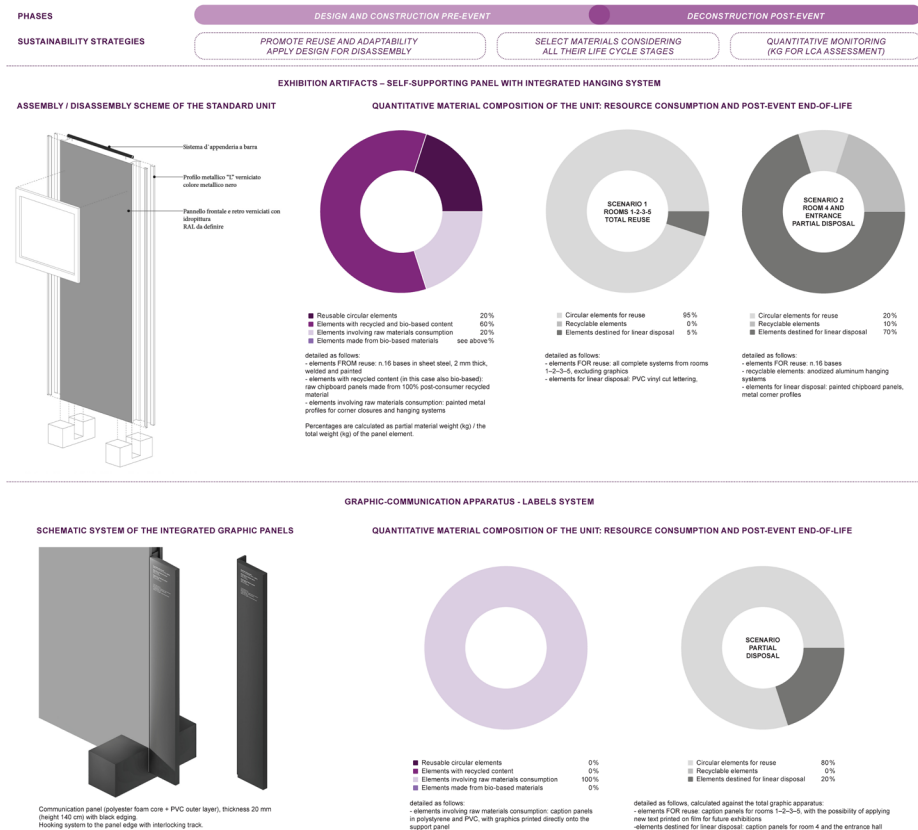


Fig. 33a. Example of the application of the tool for verifying and integrating sustainability strategies. The analysis considers two scenarios and highlights the project's strengths - the effective and functional application of Design for Disassembly, aimed at the complete reuse of certain components - and areas where further action can be taken to promote greater sustainability - specifically, the end-of-life management of materials containing recycled components. Source: created by Author 2 using data from the AOUMM studio's exhibition design project (caption graphics by FRAM STUDIO) for the exhibition DIVISIONISMO. DUE COLLEZIONI, Galleria d'Arte Moderna, Milan, 2021–2022

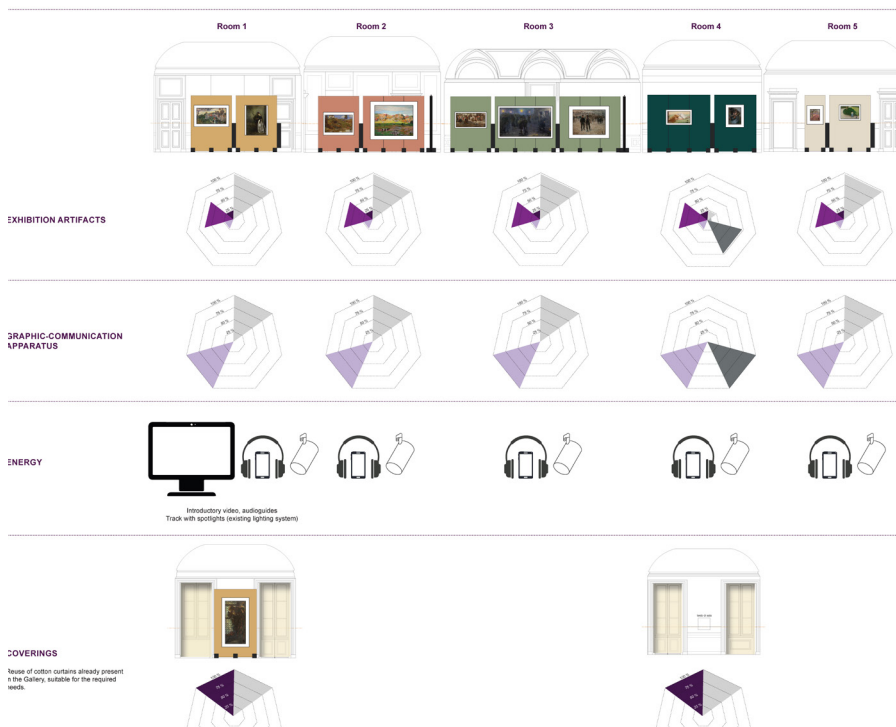


Fig. 33b. Example of the application of the tool for verifying and integrating sustainability strategies. The analysis considers two scenarios and highlights the project's strengths - the effective and functional application of Design for Disassembly, aimed at the complete reuse of certain components - and areas where further action can be taken to promote greater sustainability - specifically, the end-of-life management of materials containing recycled components. Source: created by Author 2 using data from the AOUMM studio's exhibition design project (caption graphics by FRAM STUDIO) for the exhibition DIVISIONISMO. DUE COLLEZIONI, Galleria d'Arte Moderna, Milan, 2021–2022

- *elements with a bio-based component*
- *elements with primary resource consumption.*

In the second case, various scenarios can be developed (from the most virtuous with total reuse to the worst with total disposal) using the following categories:

- *circular elements for reuse*, i.e., 100% reusable even through upcycling. It should be noted here that actions aimed at reuse – for example, re-manufacturing - do not necessarily have reduced impacts. In such cases, it is recommended to identify the percentage of elements that are actually reusable through zero- or low-impact actions or full remanufacturing.
- *recyclable elements*, whose usage values decrease in subsequent uses because the materials of the original component undergo significant transformations (crushing, melting, etc.).
- *linear disposal elements*, i.e., single-use or disposed of as waste with low-quality recovery (downcycling, incineration, landfill).

For each of these macro-categories, the designer specifies in detail the material type and, where required, the percentage of bio-based or recycled components. The material percentages are calculated as partial kg of the material over the total kg of the device. This unit of measurement is chosen because it is useful for integrating potential LCA evaluations as the project progresses.

In the second part of the described instrument (Fig. 32), the results of the analytical section are represented, sequentially from left to right and with a parallel progression, relating the four layers of the constructed artifacts - graphic/communicative setup, energy of the setup - to the specific charts of the upstream and end-of-life phases. This highlights the virtuous aspects of the project, the critical points that require improvement, and, more generally, the potential for integrating innovation processes into practice.

Conclusions

The tools described demonstrate how adopting a structured analysis methodology can decisively contribute to making the exhibition designer more aware of a specific aspect for which they may have direct responsibility. From this perspective, the tool is currently subject to further development to incorporate some considerations related to operational sustainability: on one hand, optimisation of transportation through the pre-assessment of weight and volume of the disas-

sembled device to define logistics, necessary means, and packaging solutions, as well as possible post-use storage; on the other hand, the systematic introduction of comparison between environmental certifications of materials (for example, when available, EPD documents) into decision-making processes, in order to guide more conscious and measurable choices.

More generally, four types of utilization of the aforementioned tools are identified:

- *Analysis of an existing setup*, as they allow for ‘breaking down’ the entire exhibition system and delving into the details of individual choices, highlighting all the project variables.
- *Verification during the design phase*, as they provide a fairly detailed examination of the methods being employed throughout the exhibition process, enabling potential corrections or modifications during the course of the work.
- *Communication of the project*: as they serve as useful communication artefacts aimed at ‘unfolding’ the entire experiential journey from the beginning to the end of the visit, providing a comprehensive and multi-level overview with some focus on important and particularly complex ‘nodes’ that require attention.
- *Collaboration among different professionals*: as they act as a basis for discussion to verify or implement certain shared decisions at an interdisciplinary level (e.g., with the curators of an exhibition) or operational level (e.g., with the exhibition installers).

Although not purely technical tools, they reveal a certain usefulness precisely because they follow the logic of systematising information through particularly effective and intuitive scriptographic methods. There are essentially three areas of application: one related to research, which allows for the structuring of in-depth analysis of case studies, also thanks to the support of interviews with designers aimed at exploring specific steps and gaining a deeper understanding of design choices that are not always visible ex-post. Another application is desirable in a professional context as support for designers and curators, serving as a tool for dialogue and collaboration. To address this specific challenge, designers could use it in the initial or verification phases of a project to identify the most appropriate strategies, map the knowledge and skills of the network of stakeholders they are engaging with, and simultaneously support proposals for organisational change that integrate DfS into their strategy and operations. Finally, it can be employed

in educational settings as a method and design-driven approach to the practice of exhibition design. In this sense, it can help educators communicate more effectively to students the richness and complexity of the connections between Exhibition Design and Design for Sustainability, as well as explain how different approaches to DfS can lead to different design outcomes. Additionally, the framework can provide a solid foundation for designing courses and training programmes dedicated to sustainable exhibits.

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Section



Communicating the Sustainability of Temporary Museum Exhibitions

The Case Study of Waste Age: What Can Design Do?

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Communicating the Sustainability of Temporary Museum Exhibitions

The Case Study of Waste Age: What Can Design Do?

Designing Sustainable Exhibitions: The Role of Communication Design

The sustainability of temporary museum exhibitions is an issue that communication designers are increasingly confronted with. On the one hand, in terms of production, through innovation in materials and processes; on the other, in terms of communication, regarding how these approaches can be highlighted and conveyed, both internally within museum institutions - to encourage good design practices - and externally, to convey awareness messages related to environmental sustainability. This paper aims to explore approaches to communicating sustainability in the museum context by analyzing a case study: a temporary exhibition considered throughout its entire lifecycle as a lens for observation and a subject of analysis, with the goal of providing useful tools for improving future exhibition practices. The case study examined is *Waste Age: What Can Design Do?* (Design Museum, London, October 2021 – February 2022), an exhibition organized by the Design Museum in London and curated by the Urge Collective - a multi-disciplinary group active in the fields of design, ecology, and cultural research. The analysis presented here stems from a seminar on the theme of visualizing sustainability¹, organized by the authors, which featured the participation - among

others - of designers Alexie Sommer and Federico Gaggio, members of the Urge Collective. The writing of this contribution developed from that presentation, which was transcribed using digital tools, then reread and revised by the authors to extract the key concepts and themes that formed the starting point for the proposed analysis.

The seminar Communicating Sustainability: From Print to Spatial Experiences - A Comparison of Research and Practice

The idea for the seminar, held online in November 2024 and hosted by Università Iuav di Venezia, arose as part of a research project focused on the sustainability of temporary museum exhibitions². Specifically, the working group focused on the role of communication design, investigating how sustainability can be effectively conveyed within the context of temporary exhibitions. This process led to the organization of a seminar aimed at exploring the role of infographics and data visualization in relation to communicating sustainability. The goal was to explore the potential of designing communication artifacts structured according to different modes of expression and contexts of use: from print graphics to digital media, to interventions in physical and exhibition spaces. The seminar, aimed at researchers, students, and faculty, prioritized a practice-based approach to ensure a focus on design and experimentation. It involved a selection of international scholars and professionals active in the field of design, inviting them to share experiences and projects related to sustainability communication.

Communication Design in the Context of the Ecological Transition of Museums. In the debate on communication design and sustainability, the focus often centers on production aspects: eco-friendly materials (such as substrates, inks, and finishes), waste reduction through optimized processes, short supply chains, the use of local production, and logistics. However, alongside these practices, there is an equally important but less-explored area: communicating sustainability. In museum and exhibition contexts, communication design can play a significant role in making the adopted sustainable principles visible and raising awareness among both institutional professionals and the general public.

From this perspective, as noted by the speakers during the seminar, communication design plays a strategic role in making sustainability values tangible, translating them into visual languages, experiences, and narratives capable of fostering awareness and engagement.

Scholar Joanna Boehnert (2018) has highlighted the central role of design within

the ecological transition process, emphasizing its dual potential: on the one hand, its ability to influence production systems; on the other, its cultural and social function, which can support transformations and promote sustainable practices through effective communication systems. From this perspective, visual communication becomes an essential tool for making sustainability tangible, accessible, and understandable, contributing to the activation of behavioral changes (Robertson, 2018, p. 10). Robertson, in fact, emphasizes the importance of communication designed not only to facilitate understanding of phenomena but also to suggest and guide possible solutions. The work of Prandi et al. (2021) also falls within this framework, as it explores the role of infographics as a tool for promoting environmental awareness. In this context, communication design is understood not only as a representational technique but as a heuristic device capable of making complex dynamics visible, facilitating the construction of shared visions, and supporting decision-making processes (Scagnetti et al., 2007).

In light of these considerations, institutions and organizations working on environmental issues are adopting informational tools - particularly infographics - which are recognized in the literature for their effectiveness in representing complex scenarios, organizing detailed data, and highlighting meaningful relationships between different elements (Cairo, 2013; Lankow, 2012).

With this in mind, starting in 2019 (Ciliberto, Crippa & Ronco Milanaccio, 2024, p. 149), some museums have begun to independently develop operational tools (toolkits) to monitor the environmental impact of temporary exhibitions, both in terms of the materials used and the processes adopted (AAM, 2024; BIE, 2021; CIMAM, 2021; ICOM, 2021; Gallery Climate Coalition, 2024; Kobal et al., 2022; NEMO, 2022; Urge Collective, 2024). These tools enable the collection of data useful for assessing the ecological footprint and also serve as practical guides to facilitate a sustainable transition in the exhibition sector, promoting conscious and thoughtful planning that takes into account the environmental implications of curatorial decisions - from the selection of works, to their transportation, to the installation of the exhibition. A further objective of these systems is to encourage sustainable practices in interactions with the public as well, for example through awareness campaigns linked to the Sustainable Development Goals (UN, 2015). The Impact Model developed by Urge Collective in 2022 and published online in its first version in 2023 (Urge Collective, 2024) is a monitoring tool designed to quantify the carbon footprint generated by temporary exhibitions by analyzing parameters such as energy consumption, materials used, waste production, and transportation. This model was first applied in 2022 to the exhibition *Waste Age*:

*What Can Design Do?*²³, selected here as a case study and subject of analysis due to its relevance in terms of design approach and, in particular, for the emphasis placed on the meta-design phase. The Urge Collective working group conducted an in-depth retrospective analysis of the exhibition, which resulted in an operational guide for sustainable design, intended for future Design Museum projects and potentially replicable in other contexts (Urge Collective, 2024). The approach adopted was defined by designer Alexie Sommer as ‘meta-reflective’ (Sommer & Gaggio, 2024) and forms the core of the analysis that follows, beginning with an understanding of the collective’s working method that developed it.

The Waste Age: What Can Design Do? Case Study: A meta-reflective exhibition exploring content and practice

The Urge collective is based in Norfolk (United Kingdom) and collaborates with various organizations to promote responsible behavior in response to the climate emergency. Composed of professionals from diverse fields - ranging from product design to fashion, and from data analysis to artificial intelligence - the team works in synergy to develop projects of varying scales, maintaining a shared vision focused on environmental sustainability. Among its most significant projects is the exhibition *Waste Age: What Can Design Do?*

From the earliest stages of development, Urge’s contribution was integrated into the exhibition project promoted by the Design Museum in London on the occasion of the 26th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP26, 2021), helping to rethink the very concept of a sustainable exhibition.

From the very first stages of contact between Urge Collective and the Design Museum, the goal was to offer a critical reflection on the paradox of an exhibition that, while addressing environmental issues, risked having a negative impact itself. This insight sparked an active dialogue, prompting the museum to consider subjecting the exhibition to an environmental assessment. The project thus took on a meta-reflective dimension, focusing not only on the exhibition’s content but also on the material and operational implications of its realization. This awareness fostered a form of co-design with the museum, leading to a rethinking of sustainability as a guiding principle - not merely thematic but also structural. A critical review process was initiated into the ways exhibitions are designed, produced, and dismantled, to reduce the use of non-recyclable materials, optimize re-

sources, and experiment with new, more responsible exhibition practices; in this sense, the exhibition became a pilot project. The goal was not merely to convey a message, but to make the exhibition itself a laboratory for learning and change within the museum - and thus a model that could be replicated in other settings and contexts. The environmental crisis, and in particular the waste crisis, was thus also seen as an opportunity to radically rethink curatorial practices, fostering a cultural evolution within exhibition institutions.

Life Cycle Assessment as a Communication Framework and Decision-Making Tool. The use of Life Cycle Assessment (LCA) made it possible to systematically evaluate the exhibition's environmental impact, taking into account the entire exhibition lifecycle: from material procurement to transportation, from construction to installation, through to dismantling and the management of the waste generated. The goal was to establish an environmental benchmark to guide future temporary exhibitions curated at the Design Museum in London, thereby transforming environmental assessment into an operational and narrative tool that informs design choices and is integrated into the curatorial process. The Urge Collective team conducted a detailed investigation into various aspects of the project, analyzing the museum's energy consumption, as well as the origin, transportation, and duration of the exhibited items. Even seemingly intangible factors, such as digital aspects, were included in the analysis, helping to provide a more comprehensive and systemic view of the overall impact.

Particular attention was paid to the materials used in the installation and the design of the exhibition displays, assessing the sustainability of both the physical components (supports, panels, structures) and the construction techniques employed. The analysis also included the production of graphic and communication materials, examining their supply chain, printing methods, and potential for reuse or recycling. The LCA thus took on a dual role: on the one hand, as a technical-operational tool for environmental monitoring; on the other, as a narrative interface to support environmental awareness, capable of guiding the museum institution toward more responsible practices.

Limitations, Reuse, and Transparency as Communication Assets. The post-exhibition phase was also analyzed within the context of the overall project, with particular attention paid to the traceability of materials and their fate after the exhibition closed. Thanks to the networks established by the project team and the museum, some of the materials were reused; other materials, however, having

no perceived value or a reuse plan integrated into the design phase, were sent for disposal. This highlighted how reuse must be considered from the very beginning of the exhibition process to be effective. The Design Museum chose to communicate transparently even the critical aspects of this experience, publishing the exhibition's environmental data - including a total carbon footprint of 28 tons of CO₂ (Urge Collective, 2024, p. 9) - and openly reflecting on design errors, as in the case of Ibrahim Mahama's work *Fadma 40*, whose transport significantly contributed to the environmental impact (Urge Collective, 2024, p. 9). This approach reinforced the idea that environmental transparency is not merely a management practice but an integral part of the museum's narrative and communication regarding sustainability.

Tools, Outputs, and Prospects for Structural Communication on Sustainability

The guide Exhibition Design for Our Time: Data Visualization and Decisions for Sustainable Exhibits. As a direct result of the research and experimentation process launched with the exhibition, the Design Museum has published a digital guide titled *Exhibition Design for Our Time* (Urge Collective, 2024). The publication, available for free on the museum's website, was created to document the process undertaken, share the most significant results, and provide tools that other cultural institutions can replicate. The guide analyzes in detail the various phases of the exhibition project, including the curatorial selection processes for artists and works, taking into account criteria of thematic coherence and the environmental impact related to their production, transport, and installation. The *decision tree* is a graphical tool used to synthesize the decision-making processes described above. These are visual hierarchical structures representing sequences of conditional decisions, designed to guide users in evaluating complex alternatives. These tools do more than simply illustrate options: they integrate environmental, technical, and design criteria, facilitating informed and systematic choices by curators, designers, and museum technicians.

Within the guide, decision trees illustrate different stages of the design process. For example, one diagram is designed to guide the curatorial team in considering whether to include a work that requires international transport, weighing the work's actual contribution to the exhibition narrative against its logistical impact (Urge Collective, 2024, p. 17) Another tree is dedicated to the selection of

materials for the construction of exhibit elements, proposing distinct pathways for durable solutions, modular constructions, recycled materials, or components designed for an extended life cycle through reuse (Urge Collective, 2024, p. 23). To complete the document, summary sheets are included that classify recommended materials and those to avoid, providing a practical, immediate reference to reduce the environmental impact of the exhibition project (Urge Collective, 2024, pp. 24–25).

The Impact Model: From Spreadsheet to Web-Based, Narrative, and Interactive Platform. Alongside the guide, the so-called Impact Model was developed - an open-source tool for assessing the carbon footprint of exhibitions, designed to complement and enhance the systemic approach to sustainable design. The first version of the model, released online in 2022 in Excel format (no longer available), allowed for the precise measurement of emissions associated with each phase of the exhibition project: from concept to development to construction, from the transport of objects to the touring phases. Initially structured as an advanced spreadsheet and thus a technical measurement method, the tool was subsequently expanded and enhanced as an interactive, narrative web-based communication tool (GCC, 2024) thanks to a collaboration with the Gallery Climate Coalition (GCC), an international nonprofit network that brings together galleries, museums, artists, and cultural operators, with the aim of promoting sustainable practices and reducing the environmental impact of activities in the visual arts sector.

Equipped with concise, multi-level visualizations, the tool allows users to generate comparative charts, bar charts, radar charts, and decision matrices, all designed to immediately highlight the most impactful components of the exhibition project. These visual representations, organized by phases and categories (materials, transportation, energy, logistics), allow for rapid, layered access to information, facilitating both the critical evaluation of design choices and dialogue among the various museum departments. In this sense, the tool serves not only as a technical support but also as an exploratory communication interface - a true visual decision-making aid. It is an integrated design output, capable of anchoring sustainability to decision-making processes and making it visible and accessible.

A systemic view of museum communication between participation and sharing. Through tools such as the *Exhibition Design for Our Time* guide and the open-source emissions measurement model, the collaboration between the De-

sign Museum and the Urge Collective has outlined a renewed vision of museum sustainability: no longer viewed as a symbolic gesture or technical adjustment, but as a structural component of institutional governance. From this perspective, sustainability is integrated into operational mechanisms, tracked through data, communicated transparently, and made accessible as a public resource.

This vision assigns communication design an active role in the ecological transition of the museum sector. Environmental communication thus becomes an integral part of the institutional mission: not an ancillary expression, but a strategic element that guides internal policies, staff training, and relations with the public and partners.

The communication tools described in the preceding paragraphs represent concrete steps toward a sustainable museology grounded in open and collaborative practices. As tangible outcomes of a complex, multidisciplinary design process, strategic visualizations and narrative interfaces can shape new standards of environmental responsibility for the contemporary museum system.

Conclusions and Future Prospects: Communication Design Tools as Catalysts for Museum Sustainability

The analyzed case study is a prime example of a sustainable and meta-reflective exhibition project, in which content, form, and process intertwine within a single communicative system, integrating sustainability into the exhibition design - not merely as a thematic focus but as an operational, communicative, and managerial principle.

In this context, communication design does not simply act as an expressive channel, but as a process-oriented mechanism, a narrative, and at the same time a strategic tool capable of raising awareness. In this sense, sustainable exhibit design presents itself as a cultural act that redefines institutional languages and visions; as a communicative act that makes choices visible and shares responsibility for them; and as a systemic act that affects the museum's operational practices and infrastructure.

The project *Waste Age: What Can Design Do?* thus proposes a model for integrating sustainability principles into the museum context, where communication design - understood as a process of co-design and critical reflection - is not merely a means but an integral part of the output, in an approach where the process itself becomes content.

The analysis conducted has shown that sustainability communication, together with the visual elements and design tools that support it, can play a structural role in museum design, influencing multiple levels of the curatorial and design process.

From this perspective, considering sustainability as an integral part of the exhibition project from its earliest stages can be a significant future approach, becoming a guiding criterion for defining curatorial, production, and logistical choices. Communication design can support this phase of the process by providing visual tools such as comparative models, decision trees, and data visualizations that facilitate systemic assessments. Based on the success of recent experiences, there is a clear need to develop updatable, shared, and scalable communication infrastructures across various institutional contexts: guides, toolkits, and open-source tools should be designed according to usability principles, capable of making sustainability operational, understandable, and accessible.

A museum that commits to a path of sustainability in a transparent manner can benefit not only from highlighting positive results but also from openly acknowledging the limitations and challenges that have emerged, thereby helping to build a culture of shared responsibility.

Notes

¹ Venice, Università Iuav di Venezia, “Communicating Sustainability: From Print to Spatial Experiences,” November 15, 2024, edited by Lucilla Calogero and Daniela D’Avanzo, <https://www.iuav.it/it/eventi/communicating-sustainability>

²Research project funded by the 2023 Research Funds “Linea 2A – Sostegno alla ricerca coordinata”. Members of the working group for the IUAV University of Venice: Authors et al.

³Some images from the exhibition *Waste Age: What Can Design Do?*, held at the Design Museum in London, October 2021 – February 2022, are available online at the following address: <https://designmuseum.org/exhibitions/waste-age-what-can-design-do>

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Principles and opportunities of sustainable exhibit

The case of the Civic Museums of Padua, between research and training

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Principles and opportunities of sustainable exhibit

The case of the Civic Museums of Padua, between research and training

This paper presents research conducted by the design area working group at the Università Iuav di Venezia in collaboration with the Musei Civici di Padova on the topic of sustainable exhibit design for temporary exhibitions. The pilot exhibition project dedicated to the work of the Paduan artisan-designer Paolo De Poli (1905–1996) serves as a design opportunity to reflect on several possibilities available to practitioners who seek to orient exhibit design toward principles of environmental sustainability. These themes concern the display and narration of tangible and intangible heritage and have been addressed across multiple scales: architectural, infrastructural, and interior.

The first, theoretical and methodological, phase of the research was presented at a training seminar addressed to officials and technical staff of the Paduan museums, during which a set of principles for sustainable exhibit design - identified through the critical analysis of case studies - were introduced.

Some of these core principles are not strictly tied to the contemporary moment but trace their roots to the early twentieth century, in the decisions made by designers seeking to rationalise and simplify the production of temporary installations. The re-reading of these precedents, combined with a sensitivity toward environmental concerns, provides the foundation for a sustainability-oriented inquiry grounded in the paradigms of display, moving toward an applied ecology.

gy that engages with qualities such as configurability, transportability, lightness, reuse, storage, decommissioning, and biodegradability. Configurability promotes the design of open, modular systems that are independent of the surrounding space and facilitates the reuse of their constituent elements; the reuse of elements is enabled by lightness and transportability, which ease handling and assembly, and is supported by storage practices that foster circularity and recycling; the potential of biodegradable materials, by contrast, facilitates decommissioning and dematerialisation (Bosco, Calogero & Lora, 2024; Material Cultures, 2022). Configurability pertains to the functioning, assembly, and usability of the display system; storage takes into account lightness and transportability; biodegradability bears on the intrinsic properties of materials and their capacity for aggregation (Fig. 34).

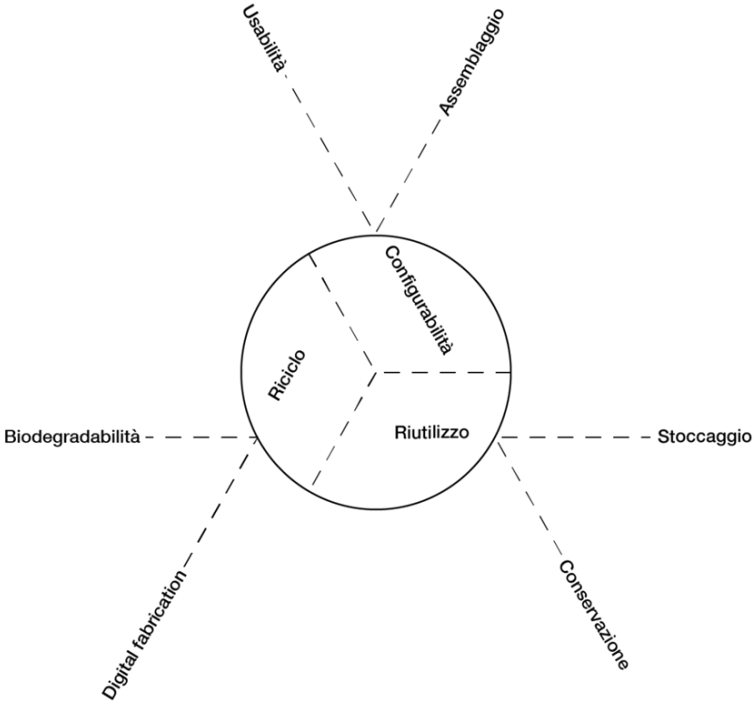


Fig. 34. Summary diagram of the sustainable display principles analysed by Pietro Lora

The collaboration with the Musei Civici di Padova provided an opportunity to test modes of adaptation and issues connected to the application of these principles within a museum context, including through the design of the exhibition dedicated to Paolo De Poli.

A Training Seminar for the Musei Civici di Padova on Sustainable Exhibit Design

The training seminar held on 19 November 2024 at the Musei Civici Eremitani introduced sustainability themes through the presentation of recently realised installations with a reduced environmental impact, alongside historically significant exhibits reinterpreted through an ecological lens.

The urgency of a paradigm shift in how museum institutions approach sustainability is evidenced by the overcrowding of storage and conservation spaces for exhibition materials (Foschi, 2024). This has prompted a substantial proliferation of toolkits and guidelines published by the most committed institutions (AIA, 2021; American Alliance of Museums, 2024; Barbican International Enterprises, 2021; Cambridge Seven, 2024; CIMAM, 2021; Gallery Climate Coalition, 2024; McGhie, 2021; Network of European Museums Organizations, 2022; Paz, 2022; URGE Collective, 2021; Victoria & Albert Museum, 2021). Among these, the case of the Musée d'Ethnographie de Genève (MEG) stands as a significant example for understanding not only the content of an ecological commitment document (Musée d'ethnographie de Genève, 2023), but also the care with which the institution, which has received dedicated awards, has demonstrated over time, through targeted actions, its willingness to take responsibility for its own environmental footprint (Durand, 2023).

The following sections outline the principles of ecological display presented at the seminar, highlighting their potential applications for the Musei Civici di Padova.

Configurability and Reconfigurability of Exhibition Installations

Configurability, one of the principles now associated with sustainable exhibit design, can already be identified in temporary installations from the first half of the twentieth century, where modularity, for instance, characterises the design of open systems. Among the most significant examples are advertising installations

for urban contexts, such as the project by Marcello Nizzoli and Edoardo Persico (1934) for the Galleria Vittorio Emanuele in Milan (Fig. 35), and the installations by Angelo Bianchetti and Cesare Pea (1947) realised through the reuse of Innocenti scaffolding tubes, described by Sergio Polano as “elementary stereometries [...] an erector set for adults in unusual exhibition settings” (1988, p. 76). The same principles characterise Franco Albini’s project for the Pinacoteca di Brera (1941), in which display systems composed of timber uprights and crossbars go beyond the industrial logic of standardisation, foregrounding the designer’s compositional intelligence and the skill of artisan craftsmen (Bucci & Rossari, 2005) in a site-specific intervention that allows for adaptation to alternative configurations (Fig. 36).

Open systems for temporary exhibitions are composed of units that can be re-configured in multiple applications. For instance, the installation designed by Gae Aulenti for the Museo Poldi Pezzoli employs Abet linear aluminium profiles, originally developed for the walls of Milan’s metro stations, which were subsequently reused in the museum space from 1970 for approximately twenty years, until they were replaced by a comparable system in the late 1990s (Manoli, 2024) (Fig. 4). Read through an ecological lens, the reconfigurability and longevity that characterised Aulenti’s project over time underscore the sustainability of the approach adopted.

Another example of a reconfigurable exhibition project is the minimal system designed in 1979 by Angiolo Giuseppe Fronzoni for the Teatro del Falcone in Genoa: a series of white volumes that in their first iteration were arranged like domino tiles on the theatre stage, and subsequently reused across the installation of several exhibitions (Polano, 1988, p. 56).

The principle of reconfigurability that characterises numerous projects in the history of exhibit design encompasses both the possibility of arranging prefabricated modules within a space in alternative ways, and of aggregating the elements of a system differently, thereby extending and remodulating configurations.

From this perspective, the design of the joint becomes a foundational element in the definition of an exhibition system. The exhibition U-Joints (2018), curated by Andrea Caputo and Anniina Koivu, investigated the joint as an element by elaborating a taxonomic systematisation of examples organised by typology, material, and type of connection. Among solutions for element aggregation, the Three+One system by Lukas Wegwerth (2018) stands out for the variety of installations it produces through the use of an elementary and versatile module. Proposed across multiple exhibition and general temporary-event applications, the Three+One

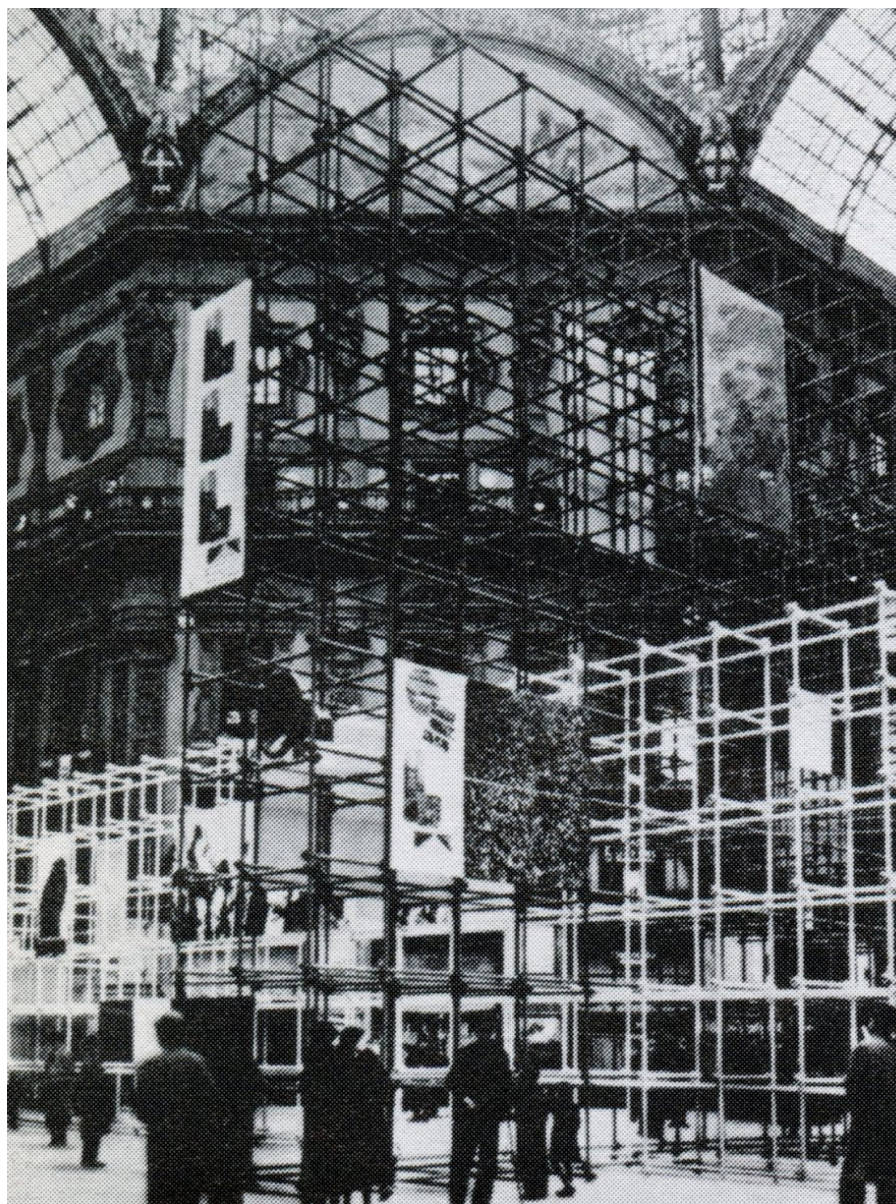


Fig. 35. Photograph of an advertising display in the Galleria Vittorio Emanuele, by Edoardo Persico and Marcello Nizzoli, Milan, 1934. Photo: da S. Polano Mostra-re_ L'allestimento in Italia dagli anni Venti agli anni Ottanta



Fig. 36. Photograph from the exhibition of Scipione and his contemporaries, contemporary drawings section, Franco Albini, Brera Art Gallery, 1941. Photo: da F. Bucci e A. Rossari, crediti di Fondazione Albini

system has been widely adopted by curators and technical specialists attentive to reduced environmental impact, economy of production, and ease of assembly. Among the numerous occasions on which Three+One has been applied, it is worth noting the Atelier Clerici pavilion conceived for the Luma Foundation together with Cookies Collective, designed for the 2018 Milan Design Week and consisting of self-supporting structures used as bookshops positioned in a courtyard. At La Triennale di Milano, on the occasion of the exhibition *The State of the Art of Architecture* (2020) curated by Joseph Grima, the same joint was employed in the construction of mobile bleachers and a series of tables. In 2021, Space Caviar adopted this system for the exhibits designed for the experimental exhibition *Non-Extractive Architecture*, installed at the V-A-C Foundation.

The independence of an installation from the surrounding architectural space constitutes a further principle on which to ground sustainable design. An authoritative reference is the L.T. (*Leger und Träger*) system designed by architect Frederick Kiesler for the International Exhibition of New Theatre Technique in Vienna in 1924. The system consists of independent, demountable structures that support panels both vertically and horizontally, and, equipped with cantilevered beams, allow visitors to adjust the height of images and objects according to their own viewpoint. Another intervention that demonstrates the adoption of principles of independence, reuse, and configurability from a sustainable perspective is the project by the collective Parasite 2.0 for the exhibition *Hyperdesign* (Museo MAGA, 2025), where the use of construction scaffolding clad with multilayer cardboard panels articulates the space into thematic environments and defines the exhibition's visual identity (Fig. 37). A further emblematic case attesting to the versatility of industrial semi-finished materials in exhibition contexts is the project by Xycomm studio for the exhibition *Roberto Sambonet. La teoria della forma* (La Triennale di Milano, 2024). The display system is composed of aluminium profiles and articulates into ceiling tracks along which vertical panel supports and extendable bases for anchoring structures to the floor can run (Fig. 39). Moreover, the material purchased for the installation represents a long-term investment, as provision has been made in advance for its storage with a view to future reuse.

The design of the exhibition system developed in the context of the research collaboration with the Musei Civici di Padova for the exhibition dedicated to Paolo De Poli is grounded in reflection on the potential for reuse and reconfigurability of structures already available in the museums' holdings. For this reason, the installation has been designed in its entirety to be independent of the surrounding



Fig. 38. Photograph of the exhibition system by Abet and Gae Aulenti, "Milan 70_70" Exhibition, Poldo Pezzoli Museum, Milan, 1970. Photo: Archivio Museo Poldo Pezzoli



Fig. 39. Photograph of the installation of Parasite2.0, ART AND DESIGN. DESIGN IS ART, MAGA, Gallarate, 2024. Photo: Roberto Marossi.

architectural space.

Preserving for Reuse: The Life Cycle of Display Structures

The collaborative experience with the Musei Civici di Padova on sustainable exhibit design for temporary exhibitions, and its application in the pilot exhibition on Paolo De Poli, led the research group to identify lightness and transportability as key qualifying criteria for sustainable exhibit design - these being fundamental requirements for the handling and assembly aimed at the reuse of components previously employed and stored from other events at the same or other venues. During the seminar addressed to museum staff, this topic was not developed from a historical perspective, as it is only marginally addressed and poorly documented in the literature. In order to identify materials and display elements potentially reusable for the production of the Paolo De Poli exhibition, a cataloguing of the display structures preserved in the municipal warehouses (Fig. 40) or present across the different exhibition venues of the Musei Civici di Padova was carried out. This survey, conducted in collaboration with technical staff and the installation team responsible for warehouse management, led to the creation of a database that documents the properties and life cycle of individual display elements; organises information relating to the occasion of their fabrication or purchase, any previous reuse, physical dimensions, material and ergonomic characteristics, state of conservation, and compliance with current regulations¹.

A significant point to emerge from the data collection concerns the tracking and documentation of the conservation status and regulatory compliance of display structures: if neglected, this aspect can incur additional maintenance costs in the event of reuse, but also during the eventual decommissioning phase, at which point costs would relate to the disassembly and disposal of stored elements that are no longer usable due to deterioration or non-compliance with current standards. The management of stored material is further complicated by the bureaucratic procedures required to regularise the decommissioning of assets belonging to public institutions deemed obsolete or alienable. This results in a congestion of spaces whereby municipal warehouses - ideally intended to preserve materials for reuse in new exhibitions - become occupied by unusable stock, creating operational difficulties.

Several museum institutions find themselves in circumstances analogous to those of Padova (Foschi, 2024). This condition makes apparent the need to establish



Fig. 40. Photograph of the installation by Daniele Ledda, *Xycomm*, Exhibition on Sambonet, Triennale di Milano, 2024. Photo: Daniele Ledda, *Xycomm*.

collaborative networks that facilitate the sharing of information about the state of their own storage spaces, with a view to developing relationships for the exchange and reuse of materials (Fagnoni et al., 2024; Trocchianesi & Locatelli, 2024). Materiùum [<https://materiuum.ch/>] is a Swiss association that, through an online portal, promotes and facilitates the reuse of materials in the construction and cultural sectors; *barder.art* [<https://www.barder.art/>] and *nonsibuttavianiente.it* [www.nonsibuttavianiente.it] operate in the same manner within artistic, museum, and exhibition contexts, and constitute exemplary models of tools for the sustainable management of materials and components through lending, exchange, and reuse.

Biodegradability, Recycling Potential, and Decommissioning

In the context of decommissioning, recycling and biodegradability are extensively studied topics and subjects of experimentation in the field of sustainable exhibit design (Baker-Brown, 2017; Bosco, Calogero & Lora, 2024; Crippa, Leonardi & Vacanti, 2023; Material Cultures, 2022). The theme of recycling was addressed summarily in relation to reuse in the preceding section, while the potential offered by biodegradability was explored during the seminar through a directed reading of selected exhibition design projects.

Biodegradable materials may be of organic origin and can draw on the specificities of local material culture. In this sense, the use of such materials, in addition to promoting a low-tech approach that often favours formal simplicity and modular solutions, such as bricks and panels (Material Cultures, 2022; Watson, 2019), can convey, through design, vernacular knowledge that is often overlooked yet distinctive of a specific culture. Working with local biodegradable materials introduces into the discourse a further sustainability principle: proximity, which relates social and cultural sustainability to environmental and economic sustainability.

The scholar Mary Anne Staniszewski (1998), in her argumentation on sustainable exhibit design, draws on the concept of self-reflexive design (p. 38) as a design approach in which the exhibition installation and the material on display coincide. This model of installation finds a significant historical precedent in the Material Show (1927) (Fig. 8), designed by Lilly Reich and Mies van der Rohe, in which, irrespective of any undeclared sustainable intent, the material that is both the object and subject of the display, placed at the centre of the space, foregrounds its own intrinsic qualities in relation to the environment in which it is situated

(Miller, 1998). This practice, which places the materiality of the installation at the core of the design, has been continuously revisited to the present day, including in relation to the sustainability of exhibits.

In the contemporary context, this approach is found in the research conducted by studio Medprostor as part of BIO 27 Super Vernaculars - Design for a Regenerative Future, the twenty-seventh Ljubljana Design Biennial, curated with the Architectural Association in London. The use of firewood as the central element of the experimental and sustainable installation provides a strong scenic presence and valorises the aesthetic and tactile qualities of a material that, once the exhibition has closed, will effectively return to being firewood (Kobal et al., 2022). More recent projects in continuity with this orientation further highlight the potential of unconventional materials in exhibition spaces.

In 2023, for the Milan Design Week, the Milanese studio Park Associati realised the exhibition project Hemp-scape and the parametric composition of Tatu bricks in Porto (Fig. 9), using hemp fibre bricks in both cases. These elements, originally conceived for use in construction, were reinterpreted as components of a display system that combines structural functionality, aesthetics, and sustainability. In the museum context, the London-based collective Material Cultures, on the occasion of the exhibition *Waste Age: What Can Design Do?* (The Design Museum, 2021), experimented with modular solutions using partition walls made of stacked bricks or prefabricated panels in raw clay, a material readily available locally and equally manageable at the decommissioning stage, as it was donated to city ateliers for potential reuse. Rebiennale R3 developed and produced monomaterial display blocks for the Irish Pavilion at the Venice Art Biennale 2024, characterised by an extensive use of raw earth (Fig. 10). This intervention, in addition to being an unprecedented site-specific work, enhanced the visitor's immersive experience through the tactile and olfactory properties of the material itself.

The examples described above attest to a growing interest in sustainable and self-reflexive approaches (Staniszewski, 1998, p. 38), in which material constitutes not merely a structural component but also a narrative and symbolic element of the exhibition project. Despite their versatility and reduced environmental impact, the biodegradable installations discussed here are confronted with a significant constraint: being composed of "living matter," they cannot support works that require specific conservation conditions such as controlled humidity, temperature, insulation, or other regulated environmental parameters.

For this reason, it was not possible to employ biodegradable materials of this kind

in the Musei Civici context, as they do not meet current regulatory requirements. Notwithstanding the difficulties of large-scale application, in the staging of works by the artisan-designer Paolo De Poli, and in particular his rich production of enamelled copper bowls and trays, and in dialogue with the theme of biodegradable materials, another domain of eco-design was also considered: digital fabrication. Taking as a starting point a hanging system that De Poli himself used in his personal exhibition space (De Poli, 2017, p. 120), experiments were conducted to produce bespoke supports in biodegradable material (PLA) that satisfy both exhibition display requirements and the regulatory framework governing the conservation of artworks. This proposal was developed through the use of digital fabrication, interpreting the digital as a “sustainable tool” (Cason Villa, Crippa & Di Giorgio, 2023, p. 91) that opens up possibilities for tailor-made display solutions with a reduced environmental impact at the decommissioning stage, while also concretely minimising the consumption of energy and resources.

Conclusions

The applied case of the exhibition dedicated to Paolo De Poli demonstrates how the principles of sustainable exhibit design can be successfully implemented, raising a series of questions that transform the paradigm of certain established museum practices. Through the reuse of display structures already available in the municipal warehouses, their reconfigurability, and the potential use of digital fabrication technologies to limit the impact of decommissioning, it was possible to optimise resources while effectively enhancing the works on display. This approach not only reduced costs and ecological footprint but also enabled the exploration of new design methodologies. Sustainability was thus realised both in the reduction of resource consumption and in the capacity to adapt existing materials and tools to specific exhibition requirements. Staff training through the seminar and the mapping of available display structures were pivotal moments in the overall development of the installation design process, as they brought to light the need for cooperation among stakeholders within an eco-design framework. Subsequently, digital fabrication technologies played a key role: through 3D printing it was possible to create customised components and details that enriched the installation in a previously unexplored manner. This approach not only ensured greater design flexibility, but also reduced waste, as materials were made available for potential future applications.

In conclusion, sustainable exhibition design is not merely an environmental necessity, but an opportunity to rethink the way in which we conceive of and experience exhibition spaces. It is a path that requires the integration of historical knowledge, advanced technologies, and a multidimensional approach in order to generate solutions that are simultaneously original, practical, and ecological. Looking ahead, the strengthening of material reuse networks and the adoption of sustainable design practices may represent the foundational pillars of a more conscientious exhibition sector.

Note

¹ As part of the ESF project “NSBVN - Sustainable Exhibit” at the IUAV University of Venice, in addition to the collaboration with the Civic Museums of Padua, a partnership was established with the Fondazione Musei Civici di Venezia. The inventory of materials stored in the Padua museums’ warehouses was carried out using evaluation criteria and a grid developed by research fellow Alessia Ronco Milanaccio for the Fondazione Musei Civici di Venezia.



Fig. 41. Photograph: Municipal Storage Facilities of the Civic Museums of Padua, 2024. Photo: Pietro Lora



Fig. 42. Photograph of Lilly Reich, The Silk Café, 1927. Photo: da Staniszewski, M. A. The power of display. MIT Press. 1998



Fig. 43. Photograph Park Associati, Tatu, Porto, 2023. Foto: Camilla Corato

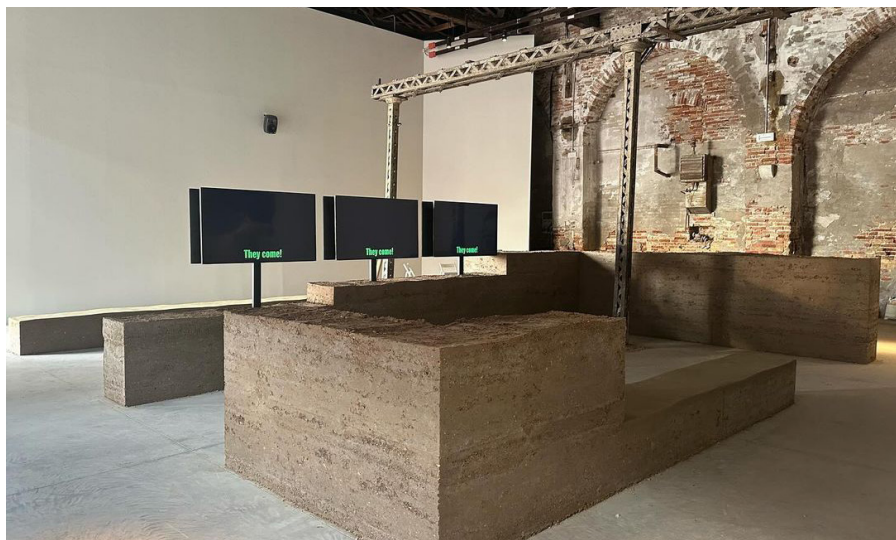


Fig. 44. Photograph allestimento R3 Rebiennale, Padiglione Irlanda. La Biennale di Venezia, 2024. Foto: Project Arts Centre

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The temporary exhibition within the commercial context

*The role of design in achieving sustainability in materials and
event management*

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The temporary exhibition within the commercial context

The role of design in achieving sustainability in materials and event management

To date, the topic of temporary commercial exhibitions appears to have attracted less interest from the design profession and, above all, to have received less visibility. Compared with cultural and educational events, there is often a lack of curatorial input capable of lending importance - and, above all, meaning - to those strategic elements that are not merely sales tools in the strictest sense. Another characteristic of commercial exhibitions is their high degree of fragmentation. Generally, a space defined by a minimalist design framework that establishes the common elements is subsequently completed by individual exhibitors, who arrange their areas according to criteria that may vary considerably in terms of spatial organization, display systems, materials, and so forth.

What they share with other temporary events, however, is the increasing degree of hybridity that has emerged since the pandemic. The physical and digital dimensions, even in these contexts, interact in a fully synergistic manner. For this reason, the fields of product, service, and communication design must be understood as inseparable, even though, in many cases, tangible and intangible communicative elements are what ultimately guide design choices.

In this regard, as early as the late 1980s, Franco Origoni (1989, pp. 2–3) viewed exhibition design as a form of three-dimensional communication, a means of giving material substance to a message. With the introduction of digital techno-

logies, it can be assumed that this kind of “fusion” has been further intensified. With regard to the organization of space, a recurring feature is the presence of organizational grids often based on regular geometries. In a sense, the Hippodamian model, from ancient Greece onward, has consistently been present in Western culture, even in artifacts involving vastly different scalar relationships (from the object to the territory, to paraphrase Ernesto Rogers, 1956), precisely because it is regarded as one of the most impersonal coordinate systems and, at the same time, one of the simplest to control. The geometric grid system based on right angles, capable of developing in three dimensions and serving as a guide for the transformation of space (Ottolini, Colaci 2025), offers advantages from both a constructive and organizational perspective, but it also accentuates its anonymous character. According to Franco La Cecla, grids and lattices, as impersonal coordinate systems, have become “the ‘official’ system, the sole one for operations of physical space transformation” (2000, p. 60).

In these highly functional settings, visitors and shoppers often interact with the space individually, and this factor has facilitated the transition of the commercial exhibition experience into the digital realm (Trivellin, 2022).

The rise of digital environments has led, on the one hand, to the creation of new, partially immaterial spaces and, on the other, to the stripping of identity from physical space, thereby necessitating a new interpretation of its public use. The dematerialization of trade shows also appeared to respond to a need to contain costs and consumption while increasing sustainability. It seemed that, even in this context, what Ezio Manzini and Carlo Vezzoli asserted more than twenty years ago was coming to pass: namely, that information and communication technologies would become “the evolved nervous system of social metabolism [allowing] a better approximation of the model of industrial ecology” (Manzini, Vezzoli, 1998, p. 29). Although the indirect relationship between people and objects has grown since the pandemic, trade shows have nevertheless retained their value as venues for intense and direct interaction - both human and material. However, the consumption of digital technologies that enable the realization of such initiatives requires design and energy investments that cannot be considered marginal (Trivellin, Mancini, 2024).

In many cases, the definition of “non-places” proposed by Marc Augé seems applicable to spaces designed to host temporary events. Even more than train stations and supermarkets, venues dedicated to events are “spaces of transient use, devoid of any roots in the local context, traditions, or history” (Aime 2024, p. 7). Marco Aime, who introduced the most recent Italian edition of the well-known

essay, emphasizes that, due to the fleeting nature of their use, these places “lose depth and are transformed into surfaces” (Aime, in Augé, p. 11). It may be interesting to transfer this statement from the anthropological domain to that of design, interpreting it literally; indeed, it is often precisely surfaces that define exhibition spaces and, at the same time, become the sites where communication takes shape: even the grid loses its substance.

Alongside this, the factor of time must be considered, not only from the perspective of perception and use, but also as a fundamental element of design. Time differentiates projects not so much, or not only, as a characteristic in itself, but rather in the way and to the extent that durability, maintainability, transportability, and similar considerations can influence the requirements of the project as a whole.

The events industry

The role of design in the fields of event planning, management, and communication continues to expand. In response to this evolution, new practices are emerging and regulatory frameworks are being established, with the primary objective of improving environmental, social, and economic sustainability. The very notion of an “event” inherently implies, even when not explicitly stated, a transient nature limited in duration (Mancini, pp. 34–35). It is precisely within this limited timeframe that peak levels of consumption occur, owing to the high concentration of materials, goods, resources, and people in a single location over a short period. In this context, significant carbon emissions become evident - concentrated rather than distributed over time - as do externalities in other areas, such as the inconvenience experienced by residents of the affected district or urban area, who must cope with heavy traffic and air pollution, limited parking availability, overcrowded public transport, and overstretched services. These externalities are not always compensated by the redistribution of the economic benefits generated by the event, which shares many characteristics with the phenomena of mass tourism currently affecting the social and urban fabric of numerous cities.

Design, in synergy with other disciplines such as economics, marketing, sociology, and anthropology, can act as a driver and catalyst for knowledge generation, with the aim of developing solutions and strategies that reduce the environmental impact of events while minimizing potential negative effects on host communities.

Thanks to regulatory instruments such as The Sustainable Events Guide, published in 2012 by the United Nations Environment Programme (UNEP), the international standard ISO 20121 adopted in Italy by UNI as UNI ISO 20121:2013 Sustainable Event Management Systems - Requirements and Guidance for Use, and the Ministerial Decree of 19 October 2022, Minimum Environmental Criteria for Event Organization and Production Services, it is possible to identify specific references and guidelines for event planning, production, procurement, and service management that are aligned with the sustainability goals of the 2030 Agenda.

Commercial and cultural events are, in fact, opportunities to share and communicate a company's values or the expressive content of an organized group of individuals. Essentially, they constitute tools through which organizations communicate with the wider world - temporary gateways through which businesses engage with international contexts by sharing their know-how, the state of the art of their activities, their research, and their vision of future scenarios. Within the context of an event, opportunities for professional training and public outreach are often provided, targeting both industry professionals and non-specialist audiences, including curious visitors and accompanying guests. Events therefore represent complex systems in which sustainability standards from different sectors frequently overlap, thereby increasing the complexity of the work required of designers and of the emerging role of safety managers. The events sector is, in every respect, an industry - characterized by inputs and outputs of goods and services governed by specific procedures - that may initially appear intangible, particularly because of its inherently temporary nature. In reality, however, like all industries, it is capable of generating value and, in the Italian context, of producing highly significant economic results. At the same time, the sector faces critical challenges in transitioning from a linear to a circular model.

With regard to events and conferences held in Italy in 2023, a study conducted by Astra Ricerche¹ and reported in *Corriere Economia* (Di Frischia, 2023) highlights the following figures:

- sector value: €861 million (+27% compared with 2022), with projected growth to €925 million within one year;
- number of employees: 600,000;
- economic impact: €65 billion;
- direct contribution to GDP: €36 billion per year.

These figures are substantial and position Italy as the sixth-largest country in the world in terms of revenue generated by this industry. In terms of event typolo-

gies, trade fairs and related events rank first (33.7%), followed by product and service launches, corporate conventions, and conferences. Celebrations and anniversaries, sporting events, and musical and cultural events are also experiencing growth. Although the commercial dimension of musical events, while important, is not conceptually predominant, it is nevertheless necessary to consider experiences in their organization and production, as large-scale music events have served as testing grounds for best practices that have subsequently been transferred to other contexts.

Indeed, this sector has pioneered innovative approaches to sustainability. It was within this context that the first scientifically rigorous studies aimed at quantifying energy consumption and CO₂ emissions were conducted. A 2012 study by Stanford University (Landreman) calculated the energy consumption associated with a concert by the British band Radiohead, using their performance at the Hollywood Bowl in Los Angeles, with a capacity of 18,000 spectators, as a case study. Assuming a two-hour performance, the sound system would consume 0.45 GJ (gigajoules), the lighting system 0.23 GJ, while audience transportation alone would account for approximately 4,200 GJ (4.2 terajoules) of energy consumption, assuming one vehicle for every three attendees travelling an average distance of 193 km (120 miles). These findings reveal a substantial imbalance in energy consumption - and consequently in CO₂ emissions - generated by the transportation of attendees. This pattern can readily be extended to virtually all event categories, including trade fairs and conventions.

Another area in which music festival organizers have made significant contributions concerns the generation of plastic waste associated with the consumption of water and beverages. Large-scale music festivals are typically held during the warmest periods of the year, and given the high levels of physical activity involved, water consumption becomes a critical issue. Organizers of the Glastonbury Festival (UK) estimated that during the 2014 edition, approximately one million plastic bottles were consumed by the festival's 200,000 attendees. This figure was considered unacceptably high, both environmentally and in terms of the festival's public image, given its longstanding commitment to environmental values and sustainable practices. Consequently, a radical change was implemented: beginning with the 2015 edition, disposable plastic bottles were banned and replaced by free drinking-water refill stations (Mancini, 2023).

Returning to examples from the exhibition sector, the Salone Internazionale del Gusto and Terra Madre have applied the principles of systemic design since 2006. With the objective of reducing the environmental impact of the event, "a

network of interdisciplinary knowledge was established to examine diverse and complex design domains with the aim of promoting new sustainable scenarios” (Fassio, p. 244). To achieve this objective, product and service suppliers were directly involved in the design process, prioritizing products that could be reused by the companies themselves at the end of their life cycle and, in other cases, significantly reducing the use of materials such as paper. This experience highlights the transition toward materials for pre-assembled systems, the repurposing of waste streams, and the dematerialization of communication processes. In this case, measurable outcomes were derived from within the event itself, without assessing its impact on the surrounding territorial context.

Another noteworthy Italian example is Ecomondo, organized by the Italian Exhibition Group. In particular, exhibition installations are designed by an external partner capable of managing the entire process, which has established an Exhibition Observatory involving researchers from a range of disciplinary backgrounds.

A joint university–industry research project

Based on the feedback gathered from Sicrea - a company operating in the exhibition design and communication sector, with which a collaborative initiative has been launched within the University–Industry Joint Laboratory “Communication Design for Sustainability” (University of Ferrara) - it is evident that a focus on sustainability and the principles of universal design have long been integral to the development of the company’s projects. Although not a large company, Sicrea organizes various types of temporary events, ranging from trade fairs to B2B events and cultural promotion initiatives. Furthermore, it is able to oversee its events throughout the entire organizational and planning process; consequently, sustainability-related issues extend beyond the scope of product design and communication.

When the sector was regulated, the company trained its staff, appointed an in-house sustainability manager, and initiated a process leading to certification. The focus on increasing sustainability includes waste separation - which is particularly challenging in these contexts - providing water to visitors without the use of plastic bottles, and promoting greater use of public transportation.

With regard to materials, one of the company’s design managers stated that they have implemented initiatives focused on recycling carpeting, graphics, and display elements, while also exploring new approaches, such as collaborating with social

cooperatives to repurpose PVC sheets into bags and other items that are subsequently sold. We recently finalized an agreement with carpet manufacturers who now rent rather than sell their products, committing to collect them and transform them into panels and components for use in the exhibition design sector². Building on this foundation, we were able to share an experience that enabled the development of seminars and internships involving students enrolled in the Industrial Product Design degree programme at the University of Ferrara. The main objective of the project was to define the furnishings for a standard pre-designed exhibition setup for the company, with key considerations including the reusability of components, ease of storage, and the use of low-impact materials, whether recycled or renewable. The scope of the study therefore focused on specific elements relevant to the exhibition phase and involved suppliers of materials and services, third-sector organizations, as well as the company with which the Department established the joint laboratory.

Although we are aware that furniture is not among the most significant contributors to environmental impacts across the entire lifecycle, this area of research highlighted points of common interest among all stakeholders involved.

The main regulatory references were the European Regulation establishing a framework for setting ecodesign requirements for sustainable products (2024) and the CAM Events criteria (2022). Based on these, temporary exhibitions at both local and national levels were investigated to verify the voluntary application of the guidelines contained in the criteria and the regulation. Subsequently, the focus shifted to furniture design, utilizing semi-finished products selected in consultation with companies from among those most commonly used. Recycled and recyclable flat semi-finished products were chosen to facilitate transport and storage. The companies supported the students at three key stages of the project: the definition of the design brief, the intermediate phase, and the final review. Finally, the team proceeded to full-scale prototyping. The research highlighted that, in order to reduce the environmental impact of temporary commercial events, it is not sufficient for ecodesign principles to be adopted and implemented solely by event organizers; rather, these principles must be shared by all participants, primarily the exhibitors.

The strategic role of communication

Given the wide variety of events, communication design can support audiences

in interpreting and understanding them by highlighting the elements that characterize different contexts. By focusing on the organization of information and content for specific audiences, as well as on the design of visual and verbal messages to ensure effective and efficient communication, it has consistently contributed to the development of temporary events. In this field as well, design can be oriented toward sustainability, both in the material production of communication artefacts and in the dissemination of content related to sustainable practices. The evolution of “sustainable communication” design, like that of design more broadly, has yet to achieve full implementation and methodological definition within the context of trade fairs and commercial events.

Its ethical roots can be traced back to the 1960s, when the theme of sustainability began to influence the work of many designers, also guiding communicators and graphic designers in response to the “original sin” of design, traditionally associated with industrial production and consumerism.

Documents such as *First Things First* (1964, updated in 2000) encouraged professionals to engage in projects capable of generating a positive social impact, moving away from a purely profit-driven approach and laying the foundations for an ethical vision of design. This perspective later evolved to address the challenges of environmental and social sustainability in contemporary contexts.

The rejection of advertising rhetoric and the deeply felt need to shift attention toward social responsibility gave rise to the significant phase of “public service graphics” (Piscitelli, 2019–2020). This approach has been applied in public, institutional, cultural, and social contexts to address issues of collective interest, leading to an evolution of languages and methods that has, in some cases, also been adopted and incorporated by agencies and private clients.

At the same time, the user-centered design (UCD) approach, which originated in computer science and was soon adopted within the design field, has become fundamental to the development of public services and communication tools capable of responding to users’ actual needs.

Despite the challenges, international efforts to integrate the principles of sustainable design into communication have increased, demonstrating a growing commitment to forms of design that combine efficiency, ethics, and environmental responsibility (Dal Buono et al., 2020).

AIGA (American Institute of Graphic Arts), in its document *Print Design and the Environment* (2003), emphasized the environmental responsibility of communication designers. The document highlights how design choices should balance economic, social, and environmental needs, minimizing negative impacts

and promoting sustainability throughout the entire product lifecycle.

A significant contribution comes from the renowned Canadian designer Bruce Mau and his Massive Change project, developed since 2004 in collaboration with Bisi Williams. The project explores the potential of design as a tool for addressing global challenges and shaping a sustainable future (Mau, 2020). Massive Change is based on a methodology centred on 24 principles and tools for addressing challenges and fostering positive change on a large scale, which are subsequently applied across different design contexts.

Particularly noteworthy are the projects he directed for Freeman, a company that produces live events, conferences, trade shows, and exhibitions in the United States. As Chief Design Officer, Bruce Mau positioned design at the core of Freeman's business strategies and creative processes, with a particular focus on the creation of immersive, user-centred, and sustainability-oriented experiences. Mau implemented solutions aimed at reducing the environmental impact of events while simultaneously improving process efficiency.

Conclusions

Currently, design - whether product or communication design - aimed at pursuing a "sustainable" direction, including in the context of trade shows and temporary events, is evolving along two main trajectories. The first, more tangible approach concerns the reduction of environmental impact through the use of sustainable materials for installations and communication, the optimization of resources, and the strategic use of digitalization when intended to reduce the consumption of physical materials. To improve the sustainability performance of events, it is necessary to identify methods for monitoring data, both quantitatively and qualitatively. As highlighted by the analysis of music events, the most critical issues concern supporting elements that do not define the identity of the event but are essential for its effective operation, such as transportation and food services.

The second approach, by contrast, focuses on a systemic perspective that connects materials, resources, people, and contexts, adopting the principles of systems thinking, Universal Design, and Life-Centered Design (Unbeaten Studio, n.d.). This approach places the user experience at the center of the project and promotes participatory processes involving local stakeholders, suppliers, and communities. Such practices not only reduce the ecological footprint but also

support local economies and respect environmental and social contexts. In this sense, Origoni's concept of design "as three-dimensional communication" - a meaningful experience for both the public and the surrounding contexts - can be revisited. Within this framework, the importance of creating synergies between academia and industry is emphasized. As noted earlier, the fragmentation of trade events - which bring together exhibitors of different types and with varying levels of financial commitment within a single exhibition - does not facilitate the project; nevertheless, their involvement is necessary to achieve goals that are more ambitious than those currently pursued.

The transition from linear to circular and regenerative design positions designers and communicators as facilitators and curators of the process, with a focus on inclusivity, sustainability, and innovation.

Exhibition spaces are transformed into narrative environments capable of engaging visitors and communicating sustainability values through the immersive experience of exhibition design; the design of installations and communication elements takes into account a diverse audience, adopting Universal Design principles to ensure accessibility and enjoyment for all.

As emphasized by Life-Centered Design (Benson et al., 2023), it is essential to design with a circular and regenerative vision, highlighting the role of the designer as an agent of positive change.

Through a systemic approach that integrates innovation, inclusivity, and sustainability, events can become catalysts for environmental and social awareness, contributing to community development and the conservation of resources.

Notes

¹ The study, entitled "Monitor on Events and Live Communication", collected responses from more than 300 managers of Italian companies across a wide range of industries, company sizes, communication investment levels, and geographical locations (Di Frischia, 2023).

² Interview conducted with Federico Chiesi on July 6, 2024.

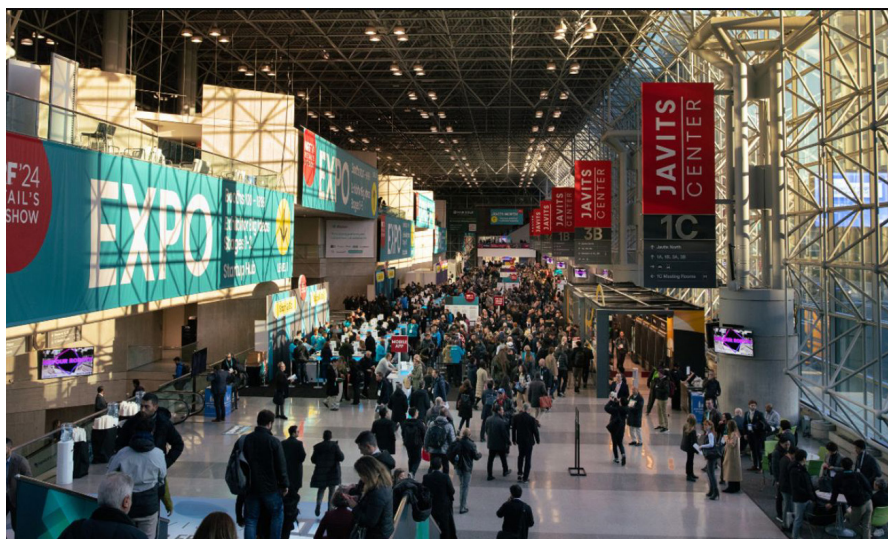


Fig. 45. Retail's Big Show, New York, 2024 – source: <https://www.freeman.com/resources/3-inspiring-ideas-from-retails-big-show/>



Fig. 46. Visitors' entrance, Earth technology expo, Festival dell'acqua, Fortezza da basso, Firenze. Courtesy Sicrea



Fig. 47. Desk, Earth technology expo, Festival dell'acqua, Fortezza da basso, Firenze. Courtesy Sicrea



Fig. 48. Interactive planet, Earth technology expo, Festival dell'acqua, Fortezza da basso, Firenze. Foto: Sicrea



Fig. 49. Immersive experience, festival dell'acqua, Fortezza da basso, Firenze.
Foto: Sicrea



Fig. 6. Make it matter. A huge metal graphic detailed ways for everyone to get involved. A bin with magnets encouraged visitors to showcase their green efforts at the event. Retail's Big Show, New York, 2024 – Foto: <https://www.freeman.com/resources/3-inspiring-ideas-from-retails-big-show/>



Fig. 50. Autonomous store , Retail's Big Show, New York, 2024 – Foto: <https://www.freeman.com/resources/3-inspiring-ideas-from-retails-big-show/>



Fig. 51. Robotics area, Retail's Big Show, New York, 2024 – Foto: <https://www.freeman.com/resources/3-inspiring-ideas-from-retails-big-show/>

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Sustainable museum showcases

Modular and Sustainable Design of museum display cases

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Sustainable museum showcases

Modular and Sustainable Design of museum display cases

For centuries, museums have been a focal point for preserving humanity's cultural heritage and collective memory. Through their collections, they provide a privileged space for intercultural and intergenerational learning, reflection and dialogue. In this context, display cases play an essential role, not only as a tool for exhibiting, but also as a medium for enriching the museum narrative and stimulating interaction between the visitor and the work on display. Beyond the mere function of containing and displaying, today's display cases have become complex devices that actively contribute to the enhancement of cultural heritage by creating empathy, providing protection, and promoting the long-term preservation of the works they contain (Lord, 2012). The design of showcase is an articulated and multidisciplinary process that requires the integration of different skills: technical-engineering, to safeguard the integrity of the works; museological, to respect and enhance the context in which they are placed; and industrial and eco-design, to achieve the best product performance in terms of manufacturability, exhibition flexibility, usability of the works, aesthetic quality (Lindenbergh et al., 2023) and environmental sustainability. This complexity requires them to accommodate and balance sometimes conflicting needs, such as providing adequate protection for the works while ensuring the best visual experience for the visitor. Different materials, both opaque, such as steel, aluminum and wood, and tran-

sparent, such as laminated glass or plexiglass, selected for their physical, aesthetic and safety characteristics, can be used in the production of showcases (Camuffo, 2001). A key aspect of the contemporary design of this specific type of product is the integration of advanced lighting, climate control, security, and sound support/amplification systems. These not only allow for the continuous management and monitoring of the interior environment of the showcases, a critical element in the preventive conservation of the works, but also enhance the visitor experience. Therefore, the quality of the display system depends on both the maintenance of the mechanical and aesthetic-perceptual performance of the display case and the continuous operation of the integrated lighting, security, conservation, and communication devices (Marty, 2008). At the same time, with the introduction of the new European Directive on Ecodesign (European Commission, 2024), environmental sustainability is becoming an indispensable pillar in the design of museum display systems. The directive emphasizes the need to integrate the principle of circularity into the life cycle of products, promoting reuse, reparability, upgradeability, remanufacturability and finally disassembly by recycling materials. This is today's greatest challenge and opportunity for innovation in museum showcase design, where the primary goal is too often the longevity of the display alone. Design aimed at increasing the sustainability and circularity of museum display cases by extending their durability through the practices of Design for Modularity (DfM) and Design for Reparability and Regeneration (Pietroni et al., 2023) is a crucial lever for new product development. In fact, these approaches make it possible to extend the life of showcases while making them adaptable to the changing needs of museum collections and reducing their environmental impact. A systemic, interconnected view of museum display systems, along with the use of standardized components, reversible joints, and recyclable materials, allows for reconfiguration, maintenance, and regeneration of showcases, thereby minimizing replacement and rehabilitation time and greatly reducing waste generation (Design Museum London & URGE Collective, 2023). This is the background of the research and innovation project "Innovative Design of Showcases", coordinated by EcodesignLab, a spin-off of the University of Camerino, and carried out in collaboration with the Marche-based company DACA-Vetrina d'Autore, which operates in the field of design and production of showcases for the presentation of cultural heritage (Amurri, 2018). The research pathway resulted in two new, highly customizable display systems that can enhance a wide range of artifacts and express high environmental performance because they were developed according to ecodesign criteria and principles aimed primarily at reducing and optimi-

zing materials and resources and extending product life (Penty, 2020). The paper describes the results and environmental benefits achieved in the creation of these new museum showcase systems, which feature reduced use of materials and components, modularity, compositional flexibility, and finally facilitated disassembly to simplify transportation, maintenance, and repair of individual modules.

Project goal and context

The project focuses on the functional innovation and the improvement of the environmental performance of showcase systems for museums, archives and libraries, no longer considering the showcase system as an aesthetically coordinated set of individual products designed to protect and display works, but as a macro device, interconnected, modular and flexible, intended for the preservation, communication and enhancement of cultural heritage. Composed mainly of four types of showcases (central, wall, counter and frame), the systems have been designed primarily to meet the growing demand of the many small and micro-museums in the national and European territory for high quality showcases with low operating and maintenance costs, thanks to their easy reconfigurability and adaptability. Characterized by innovative solutions that combine flexibility, functionality, aesthetics and environmental sustainability, the showcases had to meet the requirements of dimensional customization, sharing of the largest number of structural components, implementation of standardized opening and closing systems, rationalization of technological support systems and, finally, facilitation of transportation, repair and upgrading. At the same time, it was necessary to ensure that individual modules could be assembled and disassembled without compromising their structural stability. The design of the showcases therefore had to express functionality and safety through an aesthetic capable of placing the exhibits at the center of the visitor's attention, while minimizing the impact of visible structures such as frames. Finally, the new products should be an expression of the brand values of "DACA Vitrine D'Autore" and the know-how of the Marche-based company "Tre Elle", based on decades of knowledge of metal materials and experimentation with industrial and artisanal processing technologies. The display systems had to be developed in family lines with an easily recognizable aesthetic in the target market, and they had to meet a number of basic technical and functional requirements as a whole, but at the same time each of the product types that made up the family had additional specifications. The "Freestanding

Showcase” was to have a 360-degree view of the exhibits, adjustable height, direct and indirect lighting, integrated active or passive climate control, and a dual opening system, sliding and rotating. In addition, for the “Wall-mounted showcase”, an MDF back panel was to allow the installation of adjustable shelves, so that the interior could be adapted to different types of objects. Designed for small artifacts such as books, manuscripts, or coins, the “Freestanding Showcase” was to provide maximum visibility through the integration of a frameless glass hood and slide, tilt, and slide opening systems. Finally, the “Frame”, with horizontal or vertical flap front opening mechanisms as needed, was to be an effective solution for displaying flat objects such as paintings.

The project, which took about eleven months to complete, consisted of three macro-phases. It began with a series of analyses of the main national and international competitors in the sector and the solutions they adopted in their reference products, particularly in terms of modularity, lighting systems, air conditioning, security and opening devices. Based on the defined design requirements and criteria, the second phase developed the new exhibit system concepts, paying particular attention to the previously described modularity strategies and their consistency in relation to the four different types of showcases. The third and final phase focused on the development and prototyping of the showcases and the implementation of the two different exhibit systems.

Outline modular system

The first solution developed, called the “Outline Modular System,” is characterized by the use of specially designed aluminum profiles in the construction system to simplify the production process, dimensional customization, assembly and connection when setting up showcases (Fig. 52). The profile design, which is unique to the entire load-bearing structural system and common to the four product types and their declinations, is designed primarily for easy customization based on the customer’s dimensional requirements. Thanks to the use of special spacers, the structures can be buffered independently on each side with opaque or transparent panels and can be fitted with glass of different thicknesses, depending on security and climatic requirements (Fig. 53).

Showcases designed in this way require little transport volume and facilitate passage through the corridors of historic buildings, as they can be assembled directly in the exhibition space by the company’s own staff. As is often the case with the



Fig. 52. Outline, modular system of museum showcases with aluminum profile structure: EcodesignLab and DACA Vitrine d'Autore

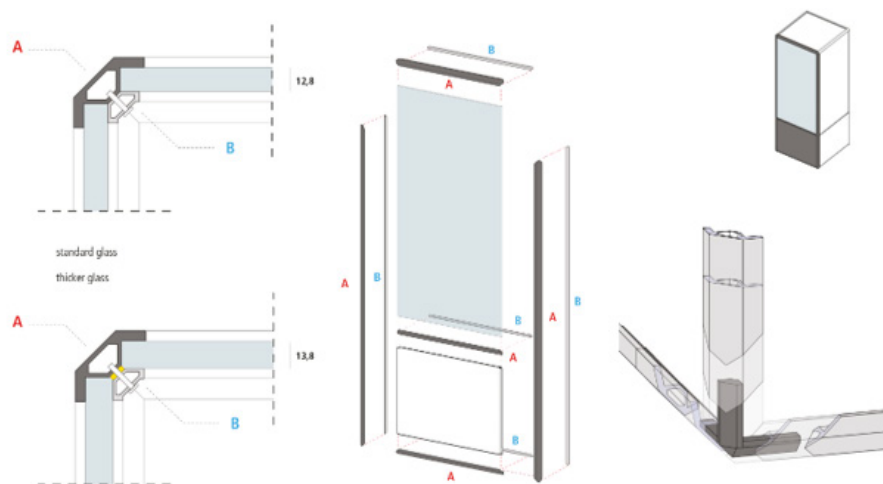


Fig. 53. Overview, details of standardized aluminum profiles, adaptability and joining strategies: EcodesignLab and DACA Author Showcases

use of aluminum profiles, cavities play a prominent role in the design, as do solid parts. These allow for the insertion of three-way structural connectors, serve as a duct system for active climate control and safety sensors, and support the different lighting layouts of the interior (Figg. 54-55).

Lego modular system

The second exhibition system, called the “Lego modular system”, aims to redefine the ways of spatial articulation and organization in the museum setting by connecting showcases to each other and to complementary exhibition supports, in order to create a continuous device within the halls that solves or simplifies the problem of installing new facilities within listed historic buildings (Fig 6). The supporting structure of each theca is made up of two square-section steel tubes, on which two other tubes of the same size are grafted. At the base are two thick molded steel plates that, in addition to connecting all the parts together, act as ballast to increase the stability of the showcase and as a seat for four height-adjust-

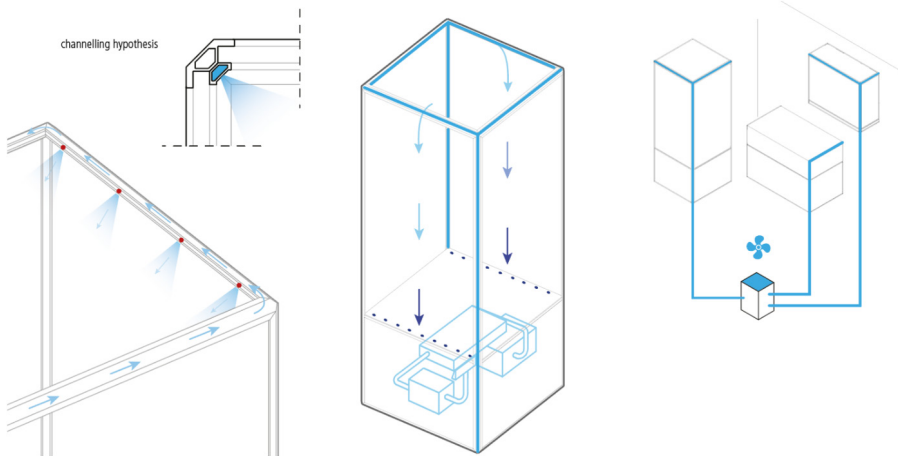


Fig. 54. Outline, example of an integrated active climate control system: EcodesignLab and DACA Author Showcase

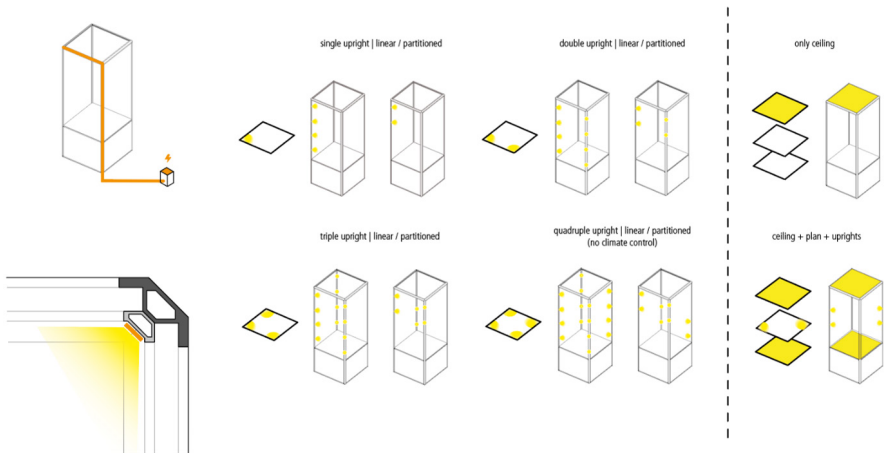


Fig. 55. Outline, the different lighting layouts that can be installed: EcodesignLab and DACA Vitrine d'Autore

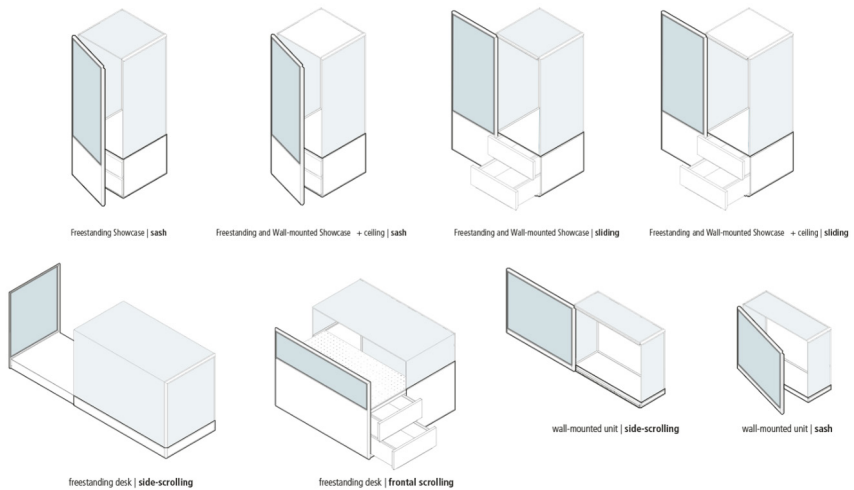


Fig. 56. Outline, the eight configurations available from the same structural scheme: EcodesignLab and DACA Vitrine d'Autore



Fig. 57. Lego, modular museum showcase system with bridge structure: EcodesignLab and DACA Vitrine d'Autore

stable anti-vibration feet on which the entire weight of the showcase is discharged. The part between the two plates is designed to accommodate the tunnel that allows the connection of the showcase to the museum equipment or other exhibition systems.

The system is therefore characterized by the sharing of the components of the showcases and their inherent modularity, but also by a tunnel that, in addition to defining the aesthetic identity to the product, allows the connection of the showcases and the environments set up, in historical buildings intended for musealization, often constrained and poorly modifiable in architectural terms (Fig. 58).

All the necessary systems (electrical, data network, security and air conditioning) are housed in a modular base, which is also the aesthetic and functional connecting element. Since the base is self-supporting, it can unfold over the vertical and horizontal surfaces of the rooms without compromising their integrity, defining relatively flexible museum paths punctuated by the more or less dense presence of showcases. At the same time, the system not only solves the problem of inserting showcases, but also aims to address the formalization of those elements that complement the environment (Fig. 59). Based on the concept of connecting

showcases, additional modules have been developed that are useful for displaying and setting up all those works that do not require strict control of thermo-hygrometric reference values.

Thus, platforms, backdrops and panels were hypothesized, using materials other than typical storefront materials, such as methacrylate, wood and textiles, which could also integrate projection systems and “touchwall”, while maintaining their primary function of connecting the various parts that make up the layout of the space. (Fig. 60). Again, the four basic types resulted in seven different basic configurations that can be further customized in terms of technological systems and aesthetic finishes (Fig. 61).

Modular design and circularity of museum showcases

The proposed case studies have attempted to demonstrate how a Design for Modularity-focused approach to museum showcase design offers significant benefits by streamlining structural systems, increasing production flexibility and product customization, and reducing resource consumption. The modularity strategy also allows for increased disassembly of components and recycling of materials at the end of the product’s life, in line with the principles of the circular economy. In this context, modular design plays a key role, promoting a “make to remake” approach (Pietroni et. al., 2023). This paradigm promotes the creation of easily disassemblable products designed primarily to extend their useful life through maintenance, repair, reuse, and remanufacturing, and only as a last resort to recycle their metal components by transforming them into high-quality secondary materials (Sonego et al., 2018).

Modularity thus becomes a fundamental requirement for transforming the use phase into a virtuous cycle of reuse, maintenance and upgrading, and the production phase into remanufacturing and remanufacturing. In particular, in the two projects described, the modules of the museum showcases are designed to ensure the easy interchangeability of components and the constant adaptation of support systems (air conditioning, security and lighting) to technological evolution, optimizing their functionality and increasing the durability of the entire exhibition system, as well as its environmental and economic sustainability. The intersection of modularity and sustainability is not only about designing museum display cases as optimized stand-alone units, but also about integrating them into a complex exhibition system that can adapt to the changing needs of museums.

Through the adoption of standardized structures, reversible connections, and the provision of replaceable, interchangeable, maintainable, and reusable modules, showcases can be continuously upgraded and maintained over time, ensuring a reduction in environmental impact and an extension of their useful life (Trocchianesi & Locatelli, 2024).

In this new scenario, a new business model for the specific merchandise sector is increasingly consolidated, based on the service of maintenance, upgrading, reuse and remanufacturing, with a double advantage: on the one hand, the modularity allows the end user to make spatial adaptations and reconfigurations of products and the entire display system independently; on the other hand, the company can offer a take-back service of showcases to upgrade or regenerate them, reducing waste and production and promoting the circularity of modules, components and materials (Crippa et al., 2022). Therefore, the adoption of modular design for “remake” not only meets the challenges of sustainability, but also facilitates the enhancement of cultural heritage by allowing museums to innovate their exhibition systems with an economically acceptable strategy, within a short time frame, and without risking the preservation and usability of the works.

Conclusions

The recently enacted European Ecodesign Directive encourages the integration of circular practices such as reuse, reparability, product life extension, and material recycling into museum exhibit design and exhibit design in general. In this context, the project “Innovative Design of Showcases” develops modular and sustainable showcase solutions especially for small and medium-sized museums. Through a design for modularity approach and from a circular economy perspective, flexible and reconfigurable showcases and museum furniture can be conceived, developed and manufactured. This approach not only reduces the environmental impact of the products and the entire display system, but also makes it possible to respond more effectively to the display needs of micro and small museums in the national and European territory, while optimizing the operating and maintenance costs of the showcases. Finally, this design approach to the modularity and circularity of display systems may eventually facilitate the development of new circular business models for manufacturing companies that intend to provide advanced services to their customers (repair, restoration, upgradeability, reconfigurability of display systems) rather than simply selling products.

Two innovative museum showcase systems, designed by EcodesignLab and manufactured by DACA Vitrine d'Autore, illustrate the application of this approach: "Outline", made of customizable and easily assembled aluminum profiles, which focuses its attention on the modularity of the structural system of the products and the integration within it of supporting technological apparatuses, and "Lego", with a tunnel and connecting exhibition complements, which facilitates the creation of flexible and reconfigurable exhibition paths, particularly suitable for historical buildings. The cases are designed to be upgraded and remanufactured, extending their useful life and reducing waste. This approach opens up business opportunities for manufacturing companies that can provide maintenance and take-back services for end-of-life products, strengthening the link with museums and promoting circularity. At the same time, it enables museums to update and adapt their exhibition systems in a sustainable way that responds to diverse and changing needs, enhances the visitor experience, and ensures the protection of works.

It is necessary to emphasize how the design solutions developed represent the meeting and the mediation of different technical, economic and cultural aspects, in order to develop innovative products with a high possibility of customization, in a rigorous logic of rationalization of production costs and response to the new and consolidated needs of the museum realities that characterize the Italian territory. The "Innovative Design of Showcases" project aims to demonstrate how sustainability and modularity can be levers for change and innovation in the museum sector in the future. By adopting innovative solutions such as those presented, museums can combine aesthetics, functionality, and environmental sustainability to promote more responsible and effective management of cultural heritage.

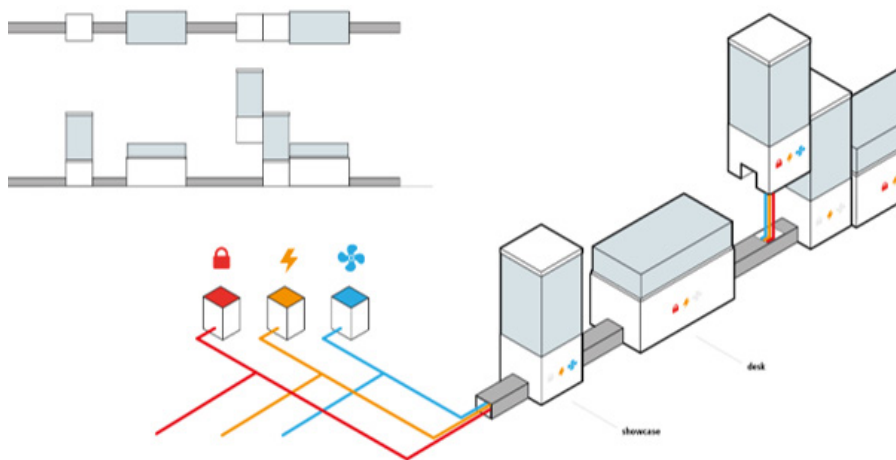


Fig. 58. Lego, Functional diagram of the connection base: EcodesignLab and DACA Author Showcases

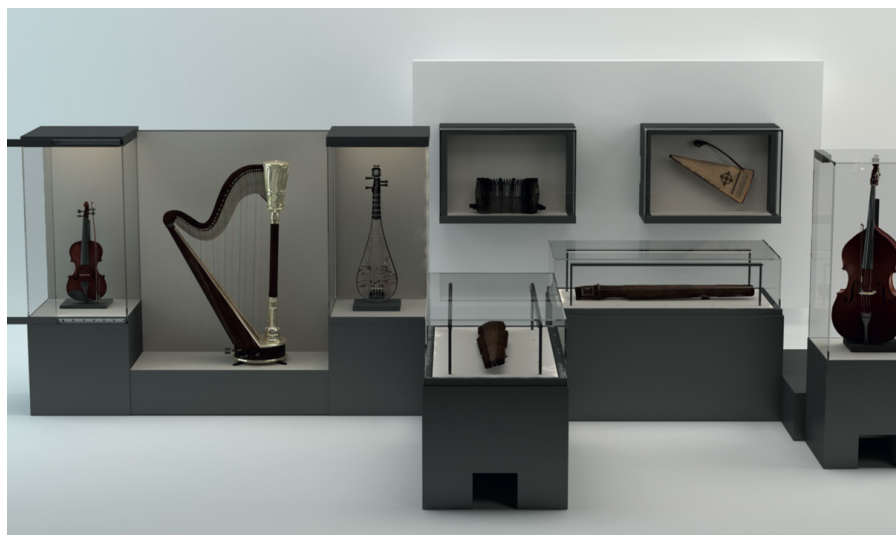


Fig. 59. Lego, continuous setup with showcases and exhibition furniture: EcodesignLab and DACA Vitrine d'Auteur

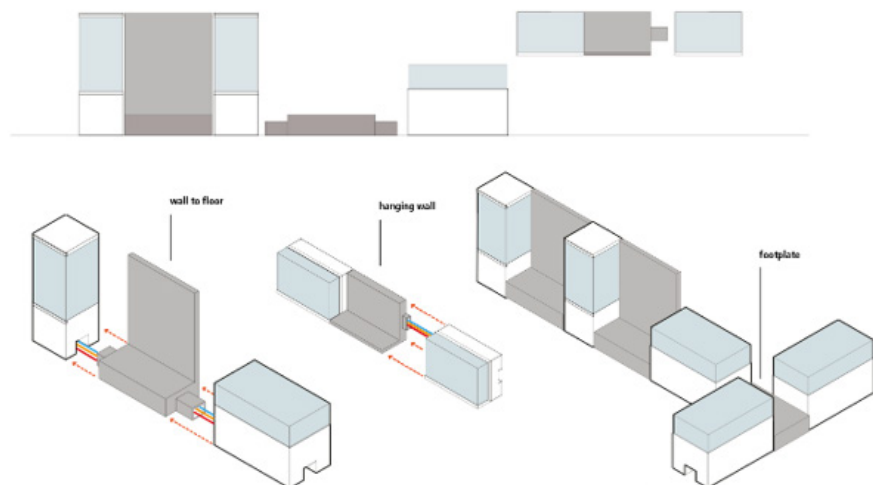


Fig. 60. Outline, the different lighting layouts that can be installed: EcodesignLab and DACA Vitrine d'Autore

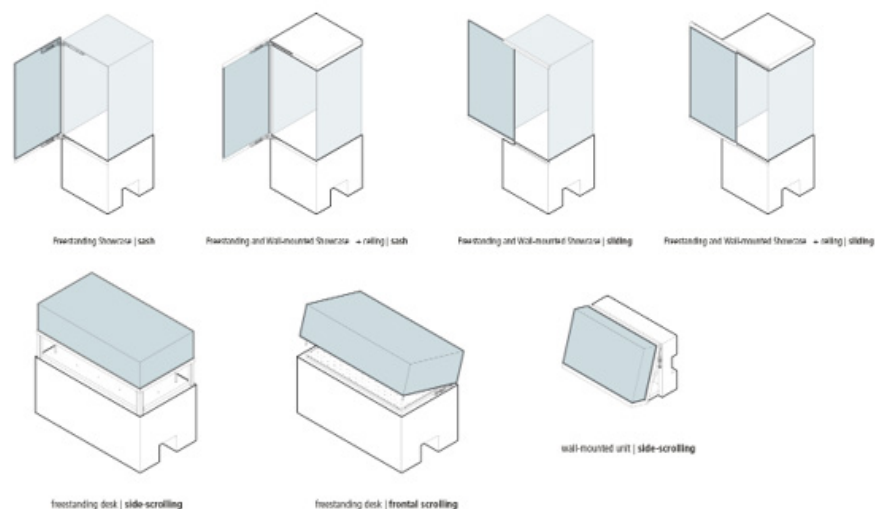


Fig. 61. Outline, the eight configurations available from the same structural scheme: EcodesignLab and DACA Vitrine d'Autore

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Building by Walking

Verso Casa: Performative Walk and Interactive Installation

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Building by Walking

Verso Casa: Performative Walk and Interactive Installation

The design of exhibitions, festivals, and events is a resource-intensive field, because of its temporary nature and the rapid succession of assembly and disassembly. For this reason, thinking about exhibition sustainability has often focused on the moment of construction: the choice of materials, the reduction of waste, the management of the end of life of its elements. This contribution adopts a broader reading, one that treats sustainability as a cultural and design infrastructure, active before the form takes shape and able to act even after the event has closed (Crippa et al., 2022). In this perspective, sustainability runs through every phase of the project, from planning to the involvement of people, from the impacts that remain to the transformations set in motion over time.

This contribution takes up this expanded reading and tests it on a concrete case. Verso Casa is a project of participatory performance art that crosses the public space of the city and culminates in the collective construction of an inhabitable sculpture. It originates within the author's research on the Transdisciplinary Performative Co-Design (TPCD) of public space, an approach that treats the performing arts as autonomous forms of knowledge production rather than as mere instruments of participation, and that investigates performativity as a way of designing and of knowing space (De Francesca, 2026, in press).

At its current stage, the research, on the theoretical level as well as in artistic

practice, focuses on the performative walk. Walking is one of the practices under study and is already in itself a situated form of knowledge of places (Careri, 2002; Ingold, 2011), yet it is not performative as such: it becomes so when a sound and/or textual dramaturgy, a live narration, the use of specific devices, and a more or less aware presence of an audience are grafted onto it as a deliberate layer, one that turns the route into an artistic event without cancelling its cognitive value (De Francesca & Rebaglio, 2026, in press).

The very possibility of analysing one's own work rests on a precise positioning of the author, who does not use art as a method but is himself an artist, and whose practice is at once the site, the instrument, and the object of the inquiry (Frayling, 1993). He is an artist-researcher-practitioner: he co-designs the participatory process and the dramaturgy, conducts the performance from within, and documents and analyses its unfolding (Schön, 1983). This internal position is treated as an epistemological resource rather than a limitation, because it gives access to tacit and embodied dynamics that could not be produced from the outside (Polanyi, 1966). To contain its interpretive risks, the analysis relies on a reflexive stance and on a documentation protocol that triangulates several sources: recordings of participants' voices, photographic and video materials, field notes, and diaries kept by external collaborators not involved in the artistic direction.

The inhabitable sculpture in which the route culminates is a temporary installation, and it is as an installation that it is observed here, through the distinction between outputs and legacy: between the concrete, documentable results of a project and what persists in people and places after it ends (De Francesca & Rebaglio, 2026, in press). Applied to the sustainability of the installation, this distinction brings out three registers that coexist in the same artefact: the material it is made of, the relationships that produce it, and the legacy it leaves behind.

A sustainability that exceeds the installation

A temporary installation in public space often has little that is truly temporary about it. Temporari-ness in the strict sense concerns the short time of the event, when the work is materially present; around it lie two further times, a preparatory time made of exploration, relationships, and decisions, and a long time made of legacy and deposit. Sustainability is played out precisely in the tension between the time of the event and the times that surround it, because many of the choices that matter live before and after the visible moment (Crippa & Di Prete, 2011).

On the level of material, it is metadesign that proves decisive, because it orients choices across the whole life cycle of the work, from materials to logistics to reuse or recycling (Bhamra & Loft-house, 2007). Modular systems, recovered materials, and Design for Disassembly give the work continuity beyond the event, so that the ephemeral becomes an occasion to build a legacy of shared practices rather than of waste (Crippa et al., 2022; Castagneto & Fiore, 2013).

Alongside this material dimension stands a relational one. The actors involved are first of all the inhabitants of the places, who enter the project already in the exploratory phase, together with clients, institutions, and the urban landscape itself, here a more-than-human presence, a subject as well as an object of the exploration. When involvement becomes co-design, that is, shared production of knowledge and choices, sustainability also takes on a social character, because it builds bonds and capacities that remain in the territory beyond the event (Sanders & Stappers, 2008; Manzini, 2015). The legacy concerns both the relationships among people and those between people and places, understood as socially produced space (Lefebvre, 1991).

A subtler dimension remains, tied to the long time. Performative practices are transformative acts: the performance modifies the shared situation in the very moment it happens, through the mutual activation between those who act and those who take part (Fischer-Lichte, 2008). Their effects persist in bodies, in relationships, and in the atmospheres of places even after the event has ended, in a process the research calls the decay of the work. Read in terms of sustainability, this legacy is the most lasting form of value that a temporary installation can produce.

Verso Casa: building by walking

Verso Casa is a performative walk, understood within the tradition of walking as an aesthetic practice (Careri, 2002), that ends with the participatory construction of an inhabitable sculpture, which then functions as sound installation. The project was realised in two editions in autumn 2025 in two very different Lombard contexts: the first in September, within the Festival delle Geografie in Villasanta, a small town in the province of Monza and Brianza; the second in October, within the Festival Immagimondo in Lecco. At each venue two performances were held on consecutive days, one open to all and one dedicated, at the request of local schools and associations, to pre-adolescents, adolescents, and

people with cognitive disabilities. Design and production took place in collaboration between the association ETS Laboratorio d'Arte Performativa Guinea Pigs (directed by the director Riccardo Mallus, the playwright Giulia Tollis, and the actress Letizia Bravi, together with the present author as performer and curator), which specialises in civic theatre, in-stallation, and participatory performance, and the architecture and sculpture studio Anelo 1997, for which the author worked as curator and designer, supported by a sound designer, Aldo Scar-pitta, and by a performer and author, Federico Espositi, expert in participatory theatre.

The work unfolds across three moments. An exploratory phase of co-production of knowledge about the territory, made of site visits and meetings with the community through local hubs and associations, which feeds the dramaturgy of the walk. Then a performative phase that coincides with the walk and with the shared construction. It ends with a settling phase that gathers the affective and memory traces persisting among the participants and between the participants and the places, and hands them on to later editions in the form of sound, photographic, and sculptural materials.

The walk addresses the theme of home through stations and transitions, working on a few cores. The enclosure, where walls, gates, hedges, and openings are recognised as devices that organise access and separation. The threshold, where the encounter between inside and outside is explored, along with a domesticity that spills over into public space. The overlook, where the relationship between private and shared space is probed. At some stations the performer-guides share their own experience of dwelling; at others the audience is activated in an open dialogue; elsewhere more theatrical devices come into play, such as wireless headphones that transmit sounds and voices. A meditative transition near the end, guided by a voice in the headphones along a short stretch of residual greenery, opens the encounter between the atmospheric presence of the landscape and the participants' sensing.

The sequence leads to a collective picnic in a place normally associated with an institutional function: the steps of the town hall in Villasanta and a courtyard of the Palazzo Belgiojoso museum complex in Lecco, both outside opening hours. That space, inhabited by seated bodies, shared food, and intimate stories, takes on a different quality for the time of the practice. The last station, in a city park, coincides with the construction of the inhabitable sculpture, whose form matures in the process that generates it, starting from the available materials and from the narrative content that emerged along the walk. Participants become spect-actors in Boal's sense (1974), co-authors whose bodily engagement transforms the

event from within. Once construction is complete, they are invited to inhabit and to narrate the architecture they have built, leaving a testimony that feeds the sound archive and finally listening to the contributions gathered up to that point, which turn the sculpture into a sound installation. It is in this “beyond display” perspective that the three registers of sustainability are now examined one by one.

The matter that returns

The artefact at the centre of Verso Casa is a modular inhabitable iron sculpture designed and built by the architecture and sculpture studio Anelo 1997. The iron used is second-choice material, supplied by steel companies that usually exclude it from the market or destine it to minor uses. The project recovers it and devotes it to artistic use. It arrives in bars six metres long, in this case with a square section four centimetres per side and two millimetres thick, which are cut, welded, and assembled through custom-made pins and joints made of the same material.

Two choices characterise this realisation. The first concerns construction: for the first time it is the citizens who take part in assembling the work, usually built by the authors alone. The second concerns technique: the reversible system of pins and joints makes it possible to assemble, disassemble, transport, and rebuild the sculpture several times. This is the logic of Design for Disassembly, which designs the artefact so that its components stay separable without damage and therefore repairable, reusable, or recyclable rather than to be demolished (Bogue, 2007); Italian research on the sustainable exhibit places it among the criteria of the circular installation, along-side modular systems and life-cycle assessment (Crippa et al., 2022). The same bars can be re-composed into different configurations, because the work has no definitive form. It is this reversibility that makes possible the project’s most evident trait: the sculpture travels. From one venue to the next the architecture resumes where it was left and grows with each edition, like a miniature landscape that condenses the collective discourse on dwelling produced along the walks. In the two 2025 editions it reached roughly six metres by six in plan and two and a half metres in height. The journey of the artefact is a form of reuse distributed over time: the same material serves several events, communities, and places, reducing the material each edition requires.

Once the cycle is exhausted, the iron re-enters recycling or is transformed into new works: the end of life becomes a threshold towards another existence of the material, not a stopping point, in keeping with the circular economy and the cul-

ture of reuse, for which the value of an intervention depends on the whole life span of its components (Castagneto & Fiore, 2013; McDonough & Braungart, 2002). Here, temporariness no longer means waste.

The relationship that remains

The sustainability of *Verso Casa* does not concern material alone. The project arises from a pro-cess of co-design that precedes construction and constitutes its condition. The exploratory phase brings the working group into dialogue with the host municipalities, the schools, and the local as-sociations, and gathers testimonies that enter the dramaturgy of the walk. Knowledge of the place is thus produced together with those who inhabit it rather than brought in from outside (Sanders & Stappers, 2008).

The work, participatory in nature, addresses all the inhabitants of the place: it is in the co-design phase with the population, public bodies, and associations that the choice was made to dedicate some performances to the open public and others to schools and specific groups, here students and people with cognitive disabilities. The work does not stay identical to itself but changes each time in its dramaturgy, in its relationship with the landscape and with people, and in what emerges depending on who takes part: in this sense it is not only site-specific but also people-specific.

Against this background, *Verso Casa* brings into co-design an element that usually remains mar-ginal there: the body and making with it. Most participatory processes take place on a verbal and rational level, where it is hard for participants to move beyond their own habits and prejudices. Introducing performativity, that is, performance as language and therefore as a transformative act (Austin, 1962; Fischer-Lichte, 2008), shifts co-design onto an embodied level: walking, building, and inhabiting an architecture together activates a knowledge of places that words alone reach only with difficulty (Ingold, 2011). Participation thus tries to go beyond formal inclusion, which claims to involve people without fully doing so (Arnstein, 1969; von Busch & Palmäs, 2023), to-wards a more genuine dialogue among the working group, local associations, and inhabitants. Physically building an inhabitable structure together produces, after all, a quality of belonging to space that verbal dialogue alone can hardly achieve.

Read in terms of sustainability, this dimension is social and territorial. More than an object, the project leaves in the territory a network of relationships and a sha-

red capacity to look at one's own places differently: a form of rootedness that remains available even after the event and can be reactivated on later occasions. The relational dimension also carries certain tensions, which the project acknowledges. The festi-val frame reduces the community's autonomy in defining the research questions and partly pre-structures participation. The artistic coherence of the work also depends on curatorial choices, such as the dramaturgy and the sound design, which are not taken collectively and which generate an asymmetry between the authorship of those who lead and the co-authorship of those who take part (Bourriaud, 2002). There is, finally, the risk that practices of this kind are used to legitimise choices already made within urban regeneration agendas (Paltrinieri, 2023). Acknowledging these tensions is part of an honest approach to social sustainability, one that takes them into account even when it does not resolve them. They remain an open field, to be addressed in future developments through more prolonged involvement and a more equitable sharing of design decisions.

The legacy and the decay of the work

The third register concerns what remains when the work is no longer there. In Villasanta the picnic on the town-hall steps charged that institutional space with a new quality, without altering it physically. A transformation of this kind does not close with the event: the atmosphere and the recognition of the place that the practice produced persist in the relationship between people and space (Griffero, 2010) and resurface in a later contact with that place. It is a change produced by a collective act of bodily occupation, one that keeps acting over time.

This outcome is what the research calls the decay of the work: the process by which a performative event deposits persistent traces in bodies, relationships, places, and the shared imagination of a community, beyond the duration of its own execution. The term points to slow sedimentation rather than loss, linking to a metaphor that has to do with physics and with matter itself: the work keeps acting as it dissolves, and the legacy is precisely this gradual deposit. It is a working concept that interweaves the theory of atmospheres (Griffero, 2010) and performance studies: reactivations serve to refresh and multiply this deposit over time. The distinction between outputs and legacy gives this legacy an operational value. The outputs of Verso Casa are documentable: the walk, the stations, the sculpture, the cumulative sound archive. The legacy is harder to measure, because it

concerns the lasting changes in the perception, the narratives, and the affective bonds of the participants (De Francesca & Rebaglio, 2026, in press).

The research treats legacy as a design objective and as an evaluation criterion, to be planned and documented from the outset (De Francesca, 2026, in press). In Verso Casa the cumulative sound archive and the sculpture that grows from venue to venue fix and make transmissible what would otherwise disperse, while the settling phase returns to later editions the affective and memory traces gathered along the way. The same multi-source protocol that documents the performance then serves to follow the legacy beyond the close of each single edition and to give participants back the experience in forms that keep acting upon them. Part of what the practice sets in motion, however, exceeds any documentation, and this excess is not a limit of the method but a sign that the practice has worked.

All this touches the sustainability of the installation. If the sustainability of a temporary project is measured also by what it leaves behind, an installation that lastingly changes the relationship between people and their places produces a value that exceeds its own material cycle: legacy is the form in which the ephemeral becomes inheritance.

Conclusions

Verso Casa shows how the sustainability of a temporary installation can be read on three planes that coexist in the same artefact. On the plane of material, the second-choice iron, the reversible modular system, the journey of the work between venues, and recycling at the end of life trace a circular path that reduces the material required and prolongs its life. On the plane of relationships, co-design with institutions and communities and the attention to inclusion produce a social sustainability and a rootedness in the territory. On the plane of long time, the decay of the work deposits a legacy that persists in bodies, memories, and the atmospheres of places.

The reflections proposed here arise from only two editions, a limited empirical scale, and form part of a broader research path on TPCD from which they are drawn. They should therefore be read as situated hypotheses rather than generalisable conclusions, ones that open the way to a re-search programme which, in the author's intention, will not only multiply the analyses of practices already realised but will also help to guide the experimentation of new episodes together with their adequate documentation.

Reading the installation in this way means treating temporariness as a design resource and recognising that the value of an intervention is not exhausted in the moment of its presence. Sustainability understood in this way concerns the material a work is made of, the relationships that generate it, and what it leaves behind when it is no longer present.



Fig. 62. Verso Casa, Villasanta, 2025. One of the stations of the performative walk, in which the group, listening to a voice and sound contribution through headphones, is invited to recognise the themes of dwelling in the urban space. Photo: Claudio Zani



Fig. 63. Verso Casa, Lecco, 2025. The performative walk through public space, a transition in which the group explores a place in the city in an alternative and playful way. Photo: Aldo Scarpitta



Fig.64. Verso Casa, Lecco, 2025. The participatory assembly of the iron modules.
Photo: Martina Di Bella.



Fig. 65. Verso Casa, Lecco, 2025. The inhabitable sculpture installed in the courtyard of Palazzo Belgiojoso in Lecco, hosting the participatory performance. Photo: Martina Di Bella.



Fig. 66. Verso Casa, Lecco, 2025. A moment of listening to the sound installation: the cumulative archive of the voic-es gathered gives the participants back their lived experience and prolongs its legacy. Photo: Martina Di Bella.



Fig. 67. Verso Casa, Villasanta, 2025. The collective picnic on the town-hall steps outside opening hours: an institu-tional space takes on a convivial quality that persists beyond the event, in line with the decay of the work. Photo: Claudio Zani

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ABSTRACT

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Beyond the Ephemeral

The Metaproject as a Translation Device for Exhibition Sustainability

Keywords: metaproject, sustainable exhibition design, photographic metaphor, CAM Allestitenti, exhibit design

This paper explores the role of the metaproject as a tool for translating sustainability into the design of temporary installations. Starting from the recognition of the sector's inherently ephemeral nature - which generates high resource consumption and waste production - the essay proposes the metaproject not only as a strategic phase of the design process, but as a mechanism capable of making regulatory principles - which are otherwise difficult to apply in practice - accessible and communicable. To this end, the paper introduces the photographic metaphor as an interpretive code: the five pillars of future CAM Allestitenti are translated into photographic principles - framing the subject, balancing exposure, choosing the lens, synchronizing the shot, processing the print - generating metaproject indicators with dual technical and communicative implications. The resulting charts of photographic and exhibition-related critical issues serve as operational tools for identifying and correcting unsustainable practices, transforming sustainability from an external constraint into a structural component of design thinking.

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Abstract Scenographies

Metaproject Hypotheses for Exhibition Reuse

Keywords: : Sustainable Exhibit, Exhibition Reuse, Metaproject, Sharing Platforms, Design Scenario

Every object has its own place, its own time, and its own function, but if these could be multiplied, observed, and reinterpreted in ever-changing ways, would their value be divided or multiplied?

Within the context of the ecological transition, reuse is increasingly emerging as a design practice capable of critically questioning linear models of production, use, and disposal of material goods. In particular, within the field of exhibition design, characterised by a structurally ephemeral temporality, reuse acquires a specific relevance, raising the need for tools capable of supporting a conscious design practice grounded in what already exists.

This chapter develops a reflection on reuse not only as a strategy for resource optimisation, but also as an interpretative and cultural practice, capable of reactivating the narrative and design potential of discarded artefacts. Starting from the analysis of the museum sharing platform Non Si Butta Via Niente (NSBVN), the essay investigates the role of digital infrastructures of reuse, highlighting both their limitations and opportunities in supporting ideation processes.

The chapter then presents Scenografie Astratte, a Metaproject developed as an orienting tool for the early stages of temporary exhibition design. Through operations of re-cataloguing, clustering, and the construction of exploratory exhibition scenarios, the Metaproject aims to transform a heterogeneous material inventory into a structured field of design possibilities.

While maintaining an exploratory and situated character, the proposed experience suggests the possibility of extending the metaprojectual approach to other contexts and sharing platforms, contributing to the construction of a critical, open, and transferable culture of reuse within the field of contemporary Design.

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Connections and Reconfigurations

Metaprojectual Foundations for Sustainable Infrastructures

Keywords: Meta-design, Digital Archives, Reconfigurable Systems, Curatorial Frameworks

This paper reframes sustainability in museum exhibition design as a matter of infrastructure rather than solely material optimization. Building on recent debates that expand sustainability from themes and institutional missions to practices and protocols of making exhibitions, the article argues that *meta-design* - the connective structure that organizes content, relations, and modes of access prior to any specific narrative - can operate as a key driver of environmental, social, and cultural sustainability. Two co-designed case studies are discussed as complementary applications of this approach. The first, developed for the *Museo delle Civiltà (MUCIV)* in Rome, engages with the institution's complex identity by proposing a system aimed at making the museum's multiple components legible and relational: a lightweight modular system supports orientation, accessibility, social interaction, and a more coherent institutional identity without saturating the galleries with permanent apparatus. The second, *Design Philology* (Politecnico di Milano), develops an open and incremental digital infrastructure based on data, metadata, and relational links. Through an *Archive* and *Timeline*, combined with hypertextual *Narratives* and *Essays*, the platform enables plural interpretations, repeated curatorial reactivations, and the inclusion of intangible heritage such as memories and testimonies. Across both cases, sustainability emerges through reusable, reconfigurable systems that privilege relationships and "gaps" over accumulation, extending the exhibition's value from the event to its long-term maintenance.

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Is the cost of carbon really worth it?

Curatorial Practices, Environmental Responsibility, and Exhibition Design Policies

Keywords: sustainable curation, carbon footprint, temporary exhibitions, permanent collections, museum sustainability, exhibition programming, site-specific, exhibition formats, collection management

The museum sector's growing focus on environmental sustainability has, since 2021, led to the development of increasingly sophisticated measurement tools - carbon calculators, LCA audits, reporting protocols - that have shed light on a previously opaque reality: the transportation of exhibition objects is the dominant component of the carbon footprint of temporary exhibitions, and it increases in direct proportion to the distance and frequency of transport. Yet the sector's response remains predominantly technical and logistical, leaving the root cause of the problem unexplored: the design choices that make that transport necessary.

This paper argues that environmental sustainability in the exhibition system is primarily a matter of design and must therefore begin with curation. The dominant model - the exhibition *format* built on international loans and replicated across multiple venues - generates structural mobility where it is unnecessary, while systematically leaving the vast majority of permanent collections in storage (Stone, 2002). *On-site* curation - exhibition design grounded in the permanent collection, the institutional context, and the specific characteristics of the local area - is proposed as a structural lever: it does not reduce transportation costs, but eliminates the need for them at the source. The paper further argues that this practice does not constitute cultural impoverishment; on the contrary, it requires deeper, more situated curatorial work, demanding planning and ideas. A curatorial approach, therefore, that starts from what institutions are in order to enhance them, examining loans as a system for narrating and understanding who we are and how we arrived here.

Through an examination of three parallel literary strands and the analysis of concrete case studies, the paper identifies the gap separating research on environmental impact from curatorial theory, and pinpoints the institutional, sectoral, and educational conditions that could foster structural change.

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Davide Crippa, an architect with a PhD in Interior Architecture and Exhibition Design, studied under the masters of Italian design, rounding out his education with an interdisciplinary perspective. In 2004, he founded the Ghigos studio and has since pursued wide-ranging research through exhibitions, installations, and projects of international significance. From 2007 to 2021, he taught at the Politecnico di Milano and the Nuova Accademia di Belle Arti in Milan; today he is an Associate Professor at the IUAV University of Venice and, starting in 2022, will serve as director of the Master's program in Innovation Design and Management at the same university. He writes articles and publishes books on design theory and criticism, always directing his attention toward constantly evolving scenarios; he is currently exploring the potential of interaction design and new digital fabrication technologies from the perspective of the circular economy, with a specific focus on the sustainability of installations.

“Exhibition scores” and methodological approaches for a sustainable exhibition system

A Tool for Assessing and Integrating Strategies for Environmental Sustainability

Keywords: Exhibition design, Sustainability, Design tools, Circular exhibit

In the field of exhibition design, sustainability is shifting from a peripheral and occasional requirement to a structural principle capable of guiding design decisions from the earliest concept phases. This chapter analyses this shift by proposing a systemic reading that moves beyond a material-centric approach and considers the entire life cycle of the exhibition device, including practices such as reuse, upcycling, and non-destructive disassembly. In this scenario, the designer assumes an active role in planning use cycles, adopting strategies aimed at circularity and impact reduction. The paper presents the sustainability-oriented integration of the *exhibition score* as a method for simultaneously and multilaterally visualizing the narrative, technical, and operational components of the exhibit. Through an implementable graphic representation, sustainability strategies are mapped across the different sections of the project, making it possible to assess critical issues, impacts, and potential within the entire exhibition system. The aim is to provide an analytical model capable of guiding informed decisions and activating circular, scalable design models applicable across research, education, and professional practice in Exhibition Design.

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Communicating the Sustainability of Temporary Museum Exhibitions

The Case Study of Waste Age: What Can Design Do?

Keywords: Sustainable exhibit design; Communication strategies and design; Environmental impact

The sustainability of temporary museum exhibitions involves addressing, on one hand, the challenges of production through the innovation of materials and processes; and on the other, the role of communication – both within museum institutions, to foster good design practices, and externally, to convey a commitment to environmental sustainability. In this context, communication design can serve as an enabling factor, as demonstrated by several recent initiatives. Among these, the integrated design project by Urge Collective for the exhibition *Waste Age: What Can Design Do?* (London, Design Museum, 2021-2022) is particularly notable. In this instance, the studio's approach to sustainable exhibition design entailed treating the exhibition as both a subject of analysis and a narrative tool, incorporating methods such as LCA, open-source toolkits, and storytelling strategies to make it an active component of the curatorial and design process. This paper stems from a talk by Urge Collective, presented at a seminar on sustainability visualization organized by the authors, and offers an analysis of the exhibition as a case study that underscores the pivotal role communication design can play as a catalyst for sustainable design within the museum context.

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Principles and opportunities of sustainable exhibit

The case of the Civic Museums of Padua, between research and training

Keywords: Sustainable exhibit design; Communication strategies and design; Environmental impact

The contribution presents reflections and activities carried out a research fellowship in collaboration with the Civic Museums of Padua, within the framework of the ESF project “NSBVN - Sustainable Exhibit” of the IUAV University of Venice. The research project investigated themes and principles of sustainable exhibition design and the development of a pilot exhibition with reduced environmental impact, to be hosted in one of the Civic Museums of Padua.

As part of the research activities, a training seminar aimed at the museum staff of the Civic Museums of Padua presented principles and themes of sustainability in exhibition design through the critical analysis of case studies and the presentation of tools - such as toolkits and guidelines - that promote internal evaluation of sustainable practices, supporting museums in their ecological transition.

The paper summarizes the principles of ecological exhibition presented in the seminar, organizing them into three macro-themes: reconfigurability; reuse and transportability; recycling and biodegradability. Reconfigurability and reuse are analyzed through an investigation of modular and flexible systems adopted in the history of exhibition design and in recent experiences. The focus on and intention to adopt reuse within exhibitions highlights both challenges and opportunities related to museum logistics, emphasizing the importance of creating collaborative networks among institutions to optimize the exchange and reuse of exhibition structures.

Finally, the study explores low environmental impact possibilities offered by bio-

degradable materials and digital fabrication for the realization of exhibition setups and display supports.

The experience gained from the exhibition project provides key elements for defining an ecologically oriented *modus operandi*, which can be systematized into guidelines and reference manuals for museum institutions. These can serve as valuable resources for museums, institutions, and exhibition spaces committed to reducing material waste and avoiding inefficient and costly exhibition models.

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Temporary exhibitions in a commercial setting

The role of design in implementing sustainability in materials and event management

Keywords: Temporary event, exhibition design, commercial culture, circular economy, reuse.

The design industry's interest in the field of commercial temporary exhibitions has gained momentum in recent years, although there are examples dating back as far as two decades.

Statistical and economic data reveal that, both in Italy and across Europe, this type of event is experiencing strong growth; their ephemeral nature, in terms of duration, actually leads to negative externalities regarding sustainability, as large quantities of materials, people, and goods generate a high carbon footprint in a very short time.

This paper, which also includes case studies and research conducted by the authors, aims to highlight how the field of design - from communication to integrated product and service design - plays a fundamental role in mediating between sustainability and commercial and industrial interests, thanks in part to recent specific regulations regarding sustainable event design.

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Sustainable museum showcases

Modular and Sustainable Design of museum display cases

Keywords: Eco-design, Circular and sustainable design, Design for modularity and durability, Museum showcases, Cultural heritage enhancement

Museums, guardians of cultural heritage, use display cases that not only display objects, but also enhance them, creating empathy with visitors and ensuring their protection and preservation. Made from a variety of materials, showcases today are highly complex products that integrate lighting, security and microclimate monitoring systems. With the introduction of the new European Ecodesign Directive in 2024, sustainability is also becoming a central issue in the design of museums. Practices such as design for modularity, repairability, and regeneration can promote the durability and reduced environmental impact of these products. This is the context of the “Innovative design of Showcases” project, coordinated by EcodesignLab, a Unicam spin-off, and carried out by the company DACA-Vetrina d’Autore, which has led to the conception of two display systems, developed according to ecodesign criteria and principles, customizable and with high environmental performance, favoring material reduction, modularity, easy disassembly and simplifying transport, maintenance and repair.

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Building by Walking

Verso Casa: Performative Walk and Interactive Installation

Keywords: installation, co-design, performativity, reuse, legacy

The sustainability of a temporary installation is usually measured by what it consumes and what it discards. Verso Casa proposes to widen this view across the whole arc of the project: to what precedes it, to what happens while the work is present, and to what remains after-wards. It is a performative walk that culminates in the collective construction of an inhabitable iron sculpture, realised in Lombardy (Italy) in autumn 2025 within two art and culture festivals, as part of the author's research on the Transdisciplinary Performative Co-Design (TPCD) of public space. Read as a temporary installation, the project shows that there is often little that is truly temporary about it. The iron is second-choice material, recovered and turned into a participatory artwork, assembled with reversible joints, made to travel from place to place, and finally recycled. Its sustainability is also social and begins before the work itself, in engagement and participation: co-design with inhabitants, associations, and places builds relationships that last beyond the event. The performance then leaves behind an atmospheric transformation of places that keeps acting once the work is gone, a process the research calls the decay of the work. It is in this interweaving of performance, atmosphere, and sustainability, from the initial relationship to the final legacy, that the contribution locates its core: treating temporariness as a resource and recognising value both in what the project prepares and in what it leaves behind.

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What happens when exhibition design ceases to be a technical problem and becomes a cultural issue? This volume explores the cutting edge of sustainable exhibition design: not the materials chosen, but the decisions that make them necessary.

Part of the NSBVN series - Non Si Butta Via Niente (Nothing Goes to Waste) - it brings together contributions from researchers and designers at the Politecnico di Milano, the IUAV University of Venice, and the University of Camerino. The first section examines the metaproject and curation as infrastructures of sustainability: tools for translating regulatory principles into design choices, reuse practices as interpretive acts, and exhibition systems designed to last. The second explores concrete cases: from the meta-reflective exhibition *Waste Age* at the Design Museum in London to the Civic Museums of Padua, from trade shows to modular museum display cases.

For those who design exhibitions, manage museums, and train future designers: sustainability is not a constraint to be respected, but a paradigm from which to start anew.

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