Exploring Life-Centered Design through a bottom-up analysis of case studies

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Abstract. This paper explores Life-Centred Design (LCD), an emerging concept aiming to overcome anthropocentric approaches by addressingall forms of life in the design process. Through a bottom-up analysis of case studies, it identifies the distinctive traits of LCD compared to other post-human approaches. The findings highlight the strong integration of foundational LCD principles, such as sustainability and systemic thinking, while revealing challenges in implementing co-design practices, non-human agency, and prioritising non-human interests. Addressing these complexities is essential for advancing LCD into a practical framework capable of tackling Anthropocene challenges.

Keywords: Life-Centred Design; Posthuman Design; More-than-human Design; Ecosystemic Design; Non-human agency.

Introduction: beyond the anthropocentric era

The dominance of humans over nature, characteristic of the anthropocentric era, has led to the current situation, succinctly captured by Monteiro, who asserts that the world operates as if it were designed, and because it does not function well, a collective effort is required to redesign it (Monteiro, 2019). Over the years, movements advocating for the transcendence of the Anthropocene have gained momentum, as reflected in the 17 global Sustainable Development Goals outlined by the UN Agenda 2030. In parallel, proposals aimed at overcoming the Human-Centred model have recently emerged in the field of design. Indeed, reversing the anthropocentric concept necessitates a shift in humanity's approach to its interaction with the ecosystem and its responsibilities in this regard. Design, understood as the human ability to shape the environment, can play a crucial role in modifying human relationships with non-human entities, thus positioning design as the discipline capable of leading the anti-anthropocentric transition.

The human capacity to harness energy, coupled with an incessant creative drive, has shaped the Anthropocene – an era in which humanity faces unprecedented challenges in ensuring a sustainable future, not only for its own species but for all life forms on the planet (Lovelock, 2020). The suffix "-cene," derived from the Greek *kainos*, has traditionally been used to denote geological epochs. The introduction of the term Anthropocene into scientific discourse is attributed to ecologist Eugene Filmore Stoermer of the University of Michigan in the early 1980s. During this time, society began to express specific needs and develop a distinct identity, characterised by a way of life markedly different from that of prior eras. In this context, the concept of Human-Centred Design (HCD) was developed by Donald Norman to address the emerging needs of his time (Norman, 2019). Although this period may appear simpler than the present, it was marked by profound social, economic, and cultural transformations, the effects of which continue to shape our society today.

It was within this framework that Stoermer coined the term Anthropocene, emphasising the transformative power of human activity and the damage it was causing the planet. Globalisation further accelerated this process, intensifying interconnections between human communities and amplifying anthropogenic impacts on a global scale. Since 2008, the term Anthropocene has been increasingly adopted by scientists to describe the rapid extinction of numerous species and the resulting ecological instability caused by human actions. This concept soon transcended the scientific domain, becoming a key reference in the humanities, arts, and social sciences, offering a lens through which to interpret global challenges affecting both the Earth's ecosystem and humanity itself (Haraway, 2016). The Anthropocene defines an era in which human activities have altered natural balances so profoundly that they threaten the very foundations of life on Earth. This awareness has prompted critical reflection on humanity's collective responsibility toward the planet and future generations, urging society to seek genuinely sustainable solutions to the global ecological crisis.

Humanity has shifted from a phase of coexistence with the environment to one where its capacity to transform nature has become dominant (Burlando and Nevoso, 2022). Technological progress and social development have transformed humans into key agents capable of significantly altering landscapes, exploiting resources on a large scale, and modifying entire ecosystems. This growing influence necessitates an increasingly conscious responsibility toward the environment, highlighting the need for an ethical and sustainable approach to planetary management (Pozzi, 2022).

Several approaches aimed at overcoming the anthropocentric paradigm have emerged in the field of design in recent years. These approaches are categorised under various definitions, such as post-human or more-than-human, each with distinct methodologies, goals, and theoretical foundations (Vacanti *et al.*, 2024).

This article focuses on the Life-Centred Design (LCD) approach, which seeks to transcend human needs by placing all life forms at the centre of the design process (Lutz, 2024). LCD advocates for biological ecosystems and non-user communities that have, until now, lacked representation in the design process (Paoliello *et al.*, 2025). Its long-term goal is to restore natural ecosystems

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by creating new relationships between nature and human society through design. By analysing case studies, this paper aims at highlighting the unique characteristics of the LCD approach, which distinguishes it from other theories focused on surpassing the boundaries of Human-Centered Design.
The problems arising from the Anthropocene are now universally recognised, and the movement to address these issues, supported by institutions like the UN and the EU, is active in both theoretical literature and applied projects. However numerous schools of thought have emerged during this disruptive transition, all moving toward the same objective but with notable distinctions. While these differences are well-defined in the literature, the same cannot be said for projects attempting to concretely move beyond the human-centred concept. This ambiguity can lead to confusion for designers, who, after rejecting clear and established HCD principles, may find themselves disoriented when seeking equally clear references in new paradigms. Clear boundaries and methods are essential for establishing these emerging design currents. This paper aims to define these boundaries through a bottom-up approach focusing not on the literature to define LCD characteristics but rather extrapolating them through analysis and exclusion of case studies framed within a post-anthropocentric perspective. By defining these elements, this contribution aims to demonstrate that LCD, more than other approaches, can offer the most effective responses to the current global challenges.

State of the art: more-than-human design directions

Scientific research is characterised as a process in constant evolution and expansion. The ability to transcend what has already been acquired is one of the distinguishing features that enables human beings to enhance the living conditions on the planet. Hence, progress signifies the birth and extinction of new and old theories, methods, and objectives that are redefined and updated (Kuhn, 2009). The theory concerning the onset of scientific revolutions is invoked in this context, specifically referring to the gradual and slow opposition to the Human Centered design approach. Indeed, we are witnessing the emergence of a trend that favours a more inclusive paradigm, aimed at involving and integrating not only human beings but all forms of life with which they interact into the design process.
This broad vision has gained traction thanks to the contributions of prominent researchers and thinkers. Haraway (2016) addresses this issue from an anti-speciesist perspective, inviting a reflection that extends beyond the needs of the human species to holistically embrace the needs of all living beings with which humanity interacts. The exclusive focus on human needs has often resulted in significant neglect of the demands of other non-human actors, causing large-scale environmental damage and enduring complexity (DiSalvo *et al*., 2010; Foth *et al*., 2021). Within this conceptual framework, it has been hypothesised that overcoming the anthropocentric view is not merely desirable but essential for ensuring sustainable adaptation and prosperity within the current ecological and social context (Harari, 2018). Although human-centred design has long been regarded as a cornerstone and undisputed principle in the field of design, the necessity for its continual renewal is becoming increasingly evident, so that it can accurately reflect the emerging challenges of our time and provide appropriate responses to such demands (Coulton and Lindley, 2019). Manzini shares the ideas of philosopher Latour, who, through Actor-Network Theory (ANT), proposes a relational ontological view that equates human beings with all other elements present on Earth. Manzini is thus dedicated to identifying ways to engage all actors, so that even those who have traditionally been excluded from design processes, such as non-human actors, can have a voice (Tassinari *et al*., 2021). Following this scenario, a series of related but distinctly different terminologies has been identified, which precisely delineate the interpretive nuances adopted by various researchers within this advancement beyond the anthropocentric view. In 2022, a literature review was conducted that sought to provide a lexical order to the topic, aiming to comprehend the various fields of design in which this new perspective is applied. The results of this investigation have revealed several significant issues. Among these, it is noteworthy that 23% of the examined contributions pertain to environmental concerns, particularly damages generated by a design approach focused exclusively on human beings (Vacanti *et al*., 2024). In such a context, thispaper intends to specifically focus on the potential for a radical transformation of the current situation, highlighting how a significant paradigm shift could occur if non-human actors are actively considered in the design process. This approach implies a recognition of their importance and agency, placing them at the centre of the design reflection. It is essential that these actors are acknowledged as co-protagonists in the design process. From this perspective, the ecosystem, understood as a complex web of relationships among the various players involved, must become the core of the design itself. This entails a substantial revision of traditional methodologies, which have historically favoured an anthropocentric view, often at the expense of the needs and necessities of other living actors. The idea is to develop a holistic approach that considers the interconnections and dynamics characterising ecosystems, so that each project can not only address human needs but also respect and enhance the complexity of ecological interactions. From this point forward, this concept will be referred to as Life Centred Design (LCD), a theme that has been previously addressed by many and nev-

ertheless still presents difficulties in identifying a specific and univocal definition. In fact, as early as 1972, Papanek referred to a more inclusive design, emphasising the importance of considering the ecological implications of design practices and how design should respond not only to the needs of human beings but also to those of all elements of the natural world (Papanek, 1972). Although the term Life Centered Design is not explicitly used, his ideas anticipate contemporary thought that encourages a more holistic and interconnected design approach.

With another connotation and from a slightly different perspective than the one presented here, although always exclusively oriented toward the human being, the same concept had been previously articulated in earlier years and in different contexts, such as engineering (Lau, 2004). This consideration prompts reflection on the fact that the theme has been felt for a long time and is finally emerging with sufficient momentum to define a new design approach. This conception of design does not merely focus on the utility or aesthetic value of a service, product, or intervention but recognises life – understood as a set of interconnected ecosystems that are essential to various design processes – as the central subject around which the entire project is articulated. Thus, LCD is not just a change in terminology but marks a profound innovation in the ways of conceiving and implementing projects, pushing towards greater ethical and environmental responsibility.

The adoption of this perspective is intended to encourage a more sustainable design practice that respects natural balances, creating spaces and solutions that not only meet human needs but also contribute to the well-being of all forms of life with which humanity shares the planet. In doing so, the aim is to initiate a process of coevolution between humans and nature, where design practices harmoniously integrate with the rhythms and rationale that underpinecosystems (Lutz, 2023). Subsequently, an analysis of a series of case studies that fall precisely within this specific design approach will be presented, characterised by an equivalent significance attributed to human beings and other living actors involved in the process, such as plants and animals.

Methodology: case selection and parameters definition

The methodology adopted for this research focused on analysing projects representing of the Life-Centred Design paradigm, selected for their distinctive contribution to sustainability and the integration of living systems. The selection was guided by the objective of solely exploring projects involving organic life forms, avoiding those centred on the relationship between humans and technology. This approach is inspired by the paradigm described by Borthwick *et al.* (2022), which advocates for moving beyond anthropocentric models toward a more holistic and multispecies perspective.

The case studies were identified through a review of projects - from 2008 to 2024 - labeled with terms such as *more-than-human*, *post-human*, and *multispecies*, analysing academic sources, online platforms, and design websites. Among these, we selected those that stood out for their virtuous contribution to environmental sustainability, the integration of living ecosystems, and respect for biological dynamics.

The selection of the projects was based on the following criteria (Fig. 1):

1. to involve living systems such as plants, fungi, animals, or microorganisms;
2. to demonstrate a positive impact on the environment for all agencies involved;
3. to raise relevant ethical or aesthetic issues;
4. to possess innovative and scalable potential.

The parameters used include the ten criteria proposed (light blue in Fig. 2) by lifecentreddesign.net (LifeCenteredDesign.Net, 2021), besidesan additional 9 criteria (pink in Fig.2) developed by the authors:

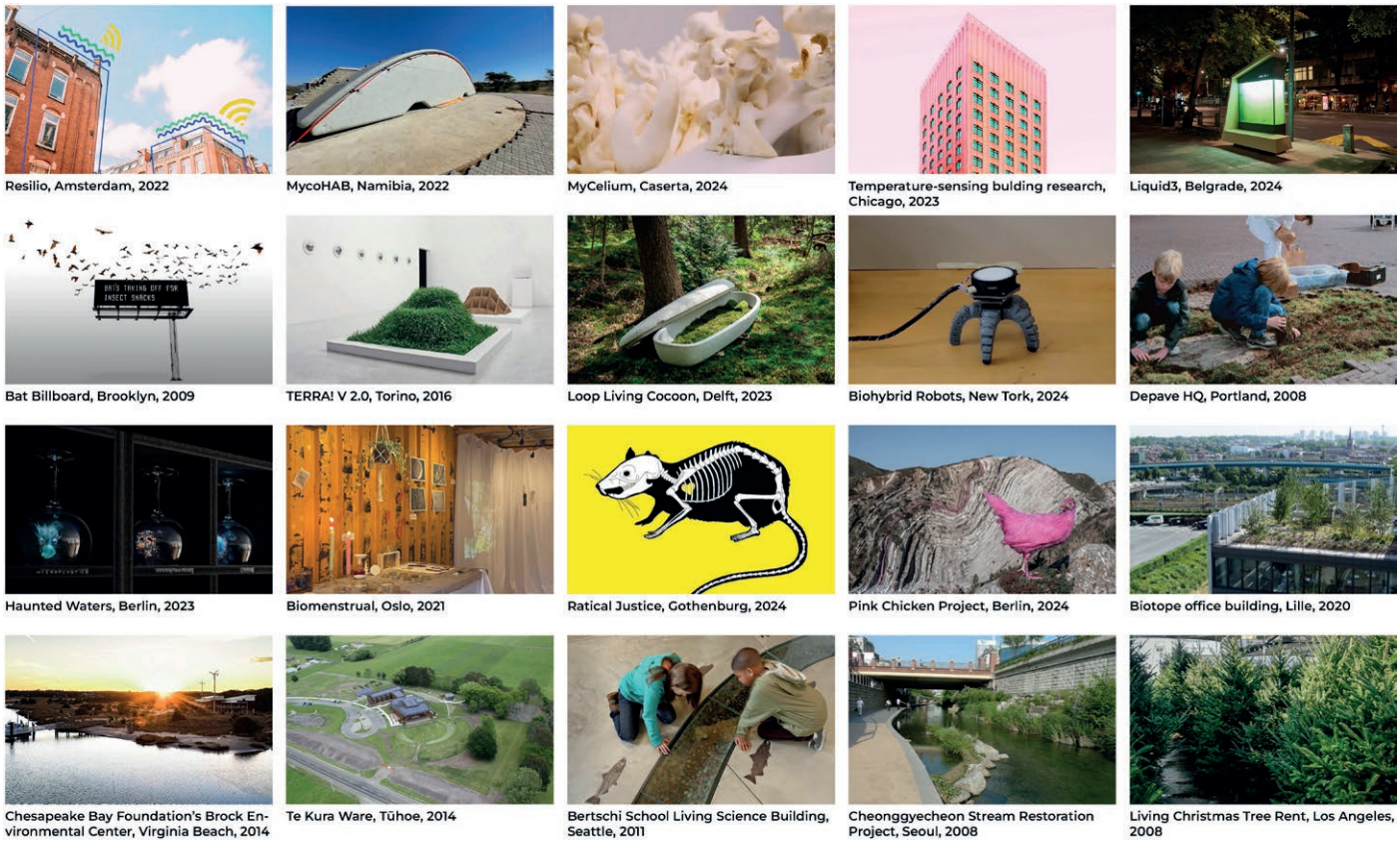
1. *purpose over profit*, prioritising ethical and sustainable goals over economic profit;
2. *inspired by nature*, encouraging imitation and learning from natural systems;
3. *interconnected system thinking*, adopting a systemic approach to understand the interconnections between project elements;
4. *lifecycle-aware holistic approach*, considering the complete lifecycle of materials and design solutions;
5. *long term thinking&doing*, promoting an intergenerational vision;
6. *sufficiency*, emphasising the responsible use of resources;
7. *equal and thriving*, aiming to ensure equity and prosperity for all species involved;
8. *de-centring*
9. *reimagining*, encouraging the rethinking of anthropocentric hierarchies;
10. *acknowledging all lifeforms*, recognising and respecting all forms of life.

To these parameters, we added further relevant dimensions that emerged during our research and were supported by the academic literature on the topic (Fig. 2). These include:

co-design with users, to evaluate the direct involvement of human stakeholders in the design process;

1. *non-human agency involvement*, to measure the presence and active role of non-human entities in the project;
2. *technology involved*, to describe the interaction between technological solutions and living systems;

01 | Summary of the case studies analysed (collage image edited by the authors)



3. *impact on local non-human agency* and *impact on the ecosystem*, to analyse the direct effects on local non-human entities and the broader ecosystem;
4. *priority to non-human interests*, assessing the project's ability to centre the needs of other species;
5. *promoting bio/ethical behaviours*, verifying whether the project fosters actions aligned with ecological and ethical principles;
6. *connecting people to nature*, understanding how the design facilitates meaningful relationships between humans and the environment;
7. *retrofitting existing situations*, identifying projects that reinterpret previouslyexisting contexts;
8. *measurable impact*, assessing whether the project has clear and tangible metrics for success or change.

A methodological framework integrating these parameters was developed for analysing the projects, as represented in our table (BLANK UNTIL FINAL ACCEPTANCE, 2024). The analysis was structured in two main phases. In the first phase, the cases were mapped and categorised based on emerging themes, such as environmental sustainability, habitat regeneration, and the use of biological materials. Subsequently, a critical and comparative evaluation was conducted to identify trends and significant differences among the projects, with particular attention to their practical applications and theoretical implications (Fig. 3). Despite the accuracy of this approach, we acknowledge that the selection of cases may be influenced by biases related to the availability of documentation or the cultural perspective of the team. Furthermore, the lack of quantitative data for some projects limits the generali validityof the results.

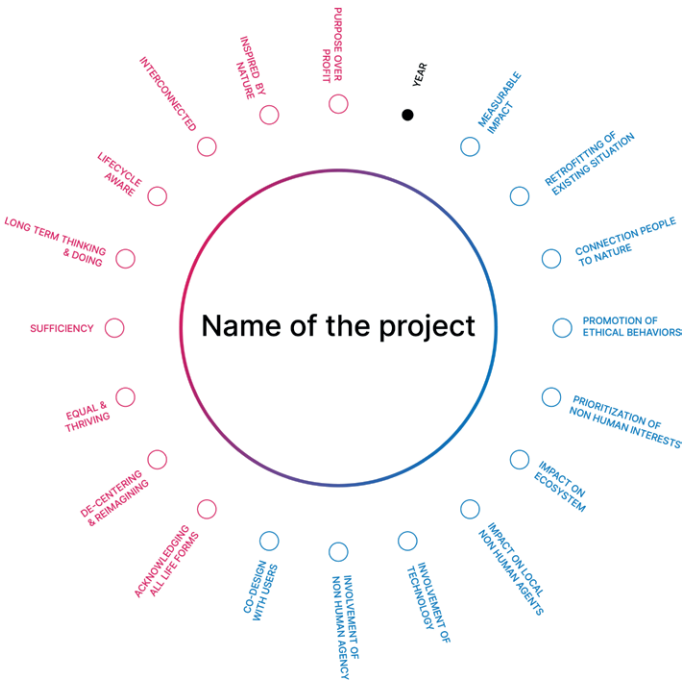
Case study analysis: taking inspiration from nature

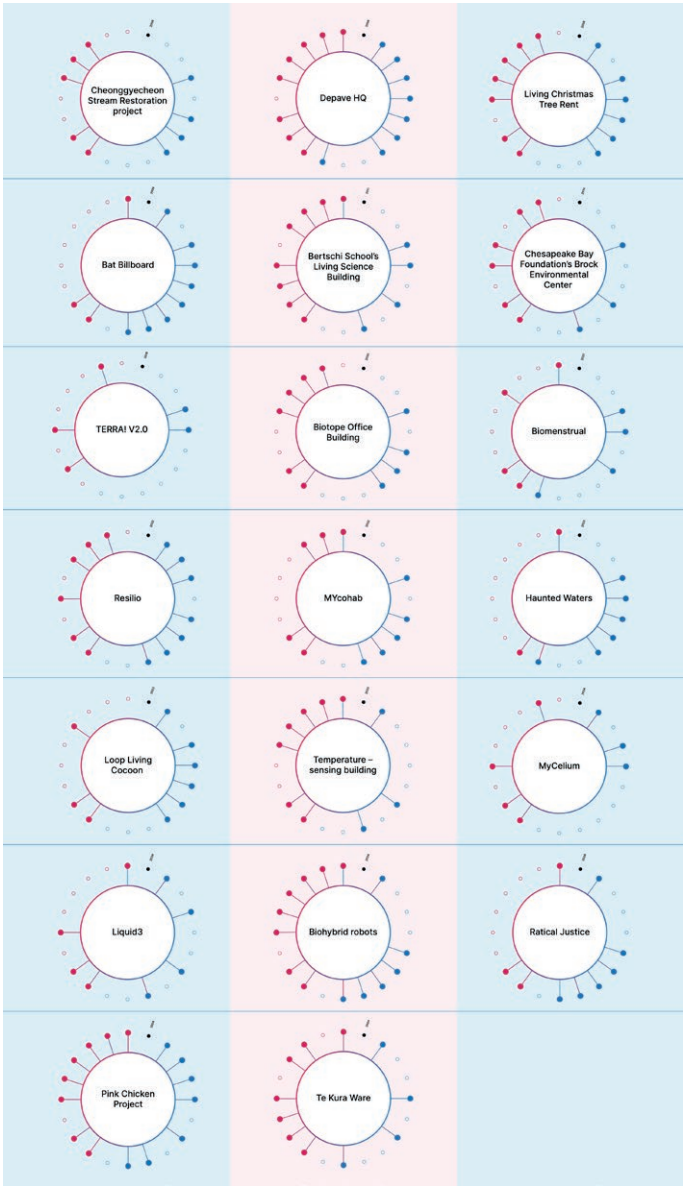
The analysis of the selected case studies highlights both the potential and the complexity of implementing Life-Centred Design principles. Most of the projects analysed (about 60%) have reached the stage of concrete implementation, while 15% are still in the prototyping phase and 25% remain speculative. This distribution reflects the exploratory nature of Life-Centered Design, which often operates at the boundaries of technological and conceptual innovation.
A further interesting aspect concerns authorship and the type of organizations involved. Although most of the projects can

02 | Key to parameters taken into account for the case study analysis (illustration by the authors)

03 | Infographic of selected case studies and their compliance with the analysis parameters (illustration by the authors)

02 |





03 |

be attributed to independent initiatives, often carried out by design studios or individual designers, cases linked to academia underscore the crucial role of universities and research institutes in promoting frontier experimentation. Other projects are linked to companies or community entities, highlighting a diversification of the actors involved in the field and the importance of active community participation as a cardinal principle of this design approach. More generally, such heterogeneity reflects the interdisciplinary and collaborative nature that characterises the field, where the sharing of resources and expertise appears to be key to addressing complex challenges.

Certain trends emerge from the parameter analysis. Frequently activated principles, such as "inspired by nature" and "impact on ecosystem", reveal their centrality to this paradigm. Conversely, parameters like "co-design with users" and "non-human agency" are less often addressed, suggesting significant challenges in integrating human stakeholders and non-human entities into the design process. A strong correlation is observed between "purpose over profit" and "impact on ecosystem", indicating that ethically driven projects often achieve a positive environmental impact. Similarly, projects that emphasisze "long-term thinking & doing" tend to involve more active roles for non-human agencies, highlighting the alignment between long-term strategies and multispecies collaboration. However, the simultaneous activation of multiple parameters remains relatively rare, suggesting that most projects focus on specific priorities rather than adopting a fully holistic approach.

Recurring themes among the projects include environmental sustainability, community involvement, and the integration of living systems and technology. For example, initiatives such as waterway regeneration, low-impact housing, and the use of innovative biomaterials reflect a commitment not only to reduce environmental harm but also to foster synergies between human and natural systems. These trends suggest a strong correlation between Life-Centred Design, technology use, and user engagement. Life-Centred Design thus emerges not only as a design practice but also as a theoretical framework that challenges traditional anthropocentric design conventions. The diversity of the cases analysed also demonstrates the wealth of pathways that Life-Centered Design can offer. Indeed, projects implemented as concrete interventions highlight the transformative potential of design, while the presence of unfinished or experimental initiatives reveals the importance of specula-

tion as an engine for innovation. This balance between pragmatism and experimentation is one of the field's most distinctive features and an essential element in understanding its impact and prospects.

Discussion and takeaways One of the most interesting emerging topics in the field of Life-Centred Design is the integration of living systems and technology, an area that is redefining the boundary between the natural and the artificial. This theme emerges in projects that use biological organisms or living materials as active components of design solutions, often in combination with advanced digital or technological systems. The integration of living systems into design is a response to global challenges, such as climate change, biodiversity loss, and depletion of natural resources. This approach moves away from traditional practices that see biological materials as passive, focusing instead on dynamic and sustainable processes. Projects in this area aim not only to create functional products or spaces but also to foster a more harmonious coexistence between humans and the natural environment. Examples such as MyCelium, Biohybrid Robots, and Living Cocoon perfectly embody this theme. MyCelium explores the use of the filamentous structure of fungi as a sustainable material for products and infrastructure, reducing the environmental impact of synthetic materials and promoting a speculative idea of design as a "cultivable" process. Biohybrid Robots are an even more advanced frontier, where living organisms are combined with robotic components, which can use signals from living organisms such as fungi to generate motion, effectively being commanded by natural elements beyond human control. Although this type of project raises ethical and philosophical questions, it is undeniable that it opens extraordinary possibilities for robotics and bioengineering by decentralising the role of humans over the control of technology. Living Cocoon uses living materials to create a biological coffin that promotes natural decomposition and enriches the soil, exacerbating the cyclical relationship between humans and nature, as well as between death and life, speculating on how ecosystem care, the concept of zero waste, and the downsizing of man's role must necessarily also lead to the transformation of cultural rituals and practices.

In conclusion, the case study analysis highlights that the foundational parameters of Life-Centred Design retrieved from LifeCenteredDesign.net are frequently activated, demonstrating their strong presence in current projects. However, secondary parameters like "co-design with users", "non-human agency", and "prioritisation of non-human interests" present significant challenges for integration. "Co-design with users" shows weak or even negative correlations with the foundational principles, likely due to tensions between engaging human stakeholders and decentring anthropocentric priorities. This highlights the complexity of maintaining user collaboration without reintroducing human-centric biases into the design process. Similarly, the inclusion of non-human agency remains challenging, requiring a fundamental shift in design practices to actively involve non-human entities in decision-making processes. While this parameter shows a moderate correlation with long-term strategies, its overall activation is less frequent, emphasising the need for methodologies that better incorporate non-human actors as co-protagonists. "Prioritisation of non-human interests" is another critical frontier for Life-Centred Design. Despite its conceptual alignment with the paradigm, operationalizing this parameter in practice is inherently difficult. Designers face significant ethical challenges in balancing human and non-human priorities, especially in cases of conflict, and lack clear metrics to evaluate success in prioritising non-human needs. These difficulties underscore the need for speculative and experimental approaches that push the boundaries of traditional design paradigms.

Projects analysed in this study illustrate that Life-Centered Design is making significant strides in embedding its core principles, while also laying the groundwork for more holistic and inclusive design methodologies. Addressing the challenges associated with co-design practices, non-human agency, and the prioritisation of non-human interests will be essential for advancing Life-Centred Design from a theoretical framework to a fully actionable approach capable of responding to the multifaceted challenges of the Anthropocene. This could lead to radical rethinking of design, where the role of the designer becomes more like that of an ecologist or cultivator, a professional engaged in designing the conditions for the growth of complex systems that integrate technology and biology by behaving like living forms.

In conclusion, this research highlighted persistent challenges in fully embedding LCD principles, particularly in fostering non-human agency and prioritizing non-human interests in design processes. Future research should explore strategies to operationalize these aspects, potentially drawing from disciplines such as ecology, ethics, and artificial intelligence. Expanding the scope to include a more diverse range of case studies, both geographically and across different design domains, could further refine our understanding of LCD's potential. Moreover, although this study provides valuable insights into the principles and applications of Life-Centred Design (LCD) through a bottom-up analysis of case studies, the qualitative nature of the analysis limits the ability to generalise findings across broader contexts, as many of the projects examined remain speculative or in early development stages. Therefore, the integration of quantitative methodologies, such as environmental impact

assessments or user engagement metrics, could enhance future studies. Additionally, interdisciplinary collaborations with scientists, policymakers, and industry professionals may help bridge the gap between theory and practice, facilitating the transition of LCD from an emerging paradigm to an actionable framework for tackling Anthropocene challenges.

ATTRIBUTION, ACKNOWLEDGMENTS, COPYRIGHT

The paper is overall the result of the joint work of the authors. Specifically, the initial definition of the framework of the investigation is by F. Burlando, the preparatory state of the art analysis is by I. Nevoso, the definition of the methodology is by A. Vacanti. The research, identification, classification and analysis of the case studies is by C. Porfirione, A. Vacanti, I. Nevoso and F. Burlando. The research was carried out under the supervision of N. Casiddu.

REFERENCES

BLANK UNTIL FINAL ACCEPTANCE (2024), *Life-centered case study analysis [Data set]*, Zenodo, available at: https://doi.org/10.5281/zenodo.14308302.

Borthwick, M., Tomitsch, M. and Gaughwin, M. (2022), "From human-centred to life-centred design: Considering environmental and ethical concerns in the design of interactive products", *Journal of Responsible Technology*, Vol. 10, 100032, available at: https://doi.org/10.1016/j.jrt.2022.100032

Burlando, F. and Nevoso, I. (2022), "(Metodi HCD x Approcci More-than-human) = Design Inclusivo^3", *DAI | Il Disegno per l'Accessibilità e l'Inclusione*, pp. 252–265, available at: https://www.publicapress.it/wp-content/uploads/2022/11/DAI_PUBLICA.pdf (accessed 3 April 2025).

Coulton, P. and Lindley, J. G. (2019), "More-Than Human Centred Design: Considering Other Things", *The Design Journal*, Vol. 22(4), pp.463-48, available at: https://doi.org/10.1080/14606925.2019.1614320.

DiSalvo, C., Sengers, P. and Brynjarsdóttir, H. (2010), "Mapping the landscape of sustainable HCI", *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*, 1975-1984, available at: https://doi.org/10.1145/1753326.1753625.

Foth, M., Mann, M., Bedford, L., Fieuw, W. and Walters, R. (2021), "A capitalocentric review of technology for sustainable development: The case for more-than-human design", in Finlay, A. (Ed.), *Global Information Society Watch 2020: Technology, the environment and a sustainable world: Responses from the global South,* Association for Progressive Communications (APC), pp. 78-82, available at: https://eprints.qut.edu.au/203186/.

Harari, Y. N. (2018), *21 lessons for the 21st century* (First edition), Spiegel & Grau, New York, US.

Haraway, D. (2016), *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.

Kuhn, T. S. (2009), *La struttura delle rivoluzioni scientifiche*. Einaudi.

Lau, A. (2004), "Life Centered Design – A Paradigm for Engineering In The 21st Century", *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, pp. 9099-9108, available at: https://peer.asee.org/13851.pdf.

LifeCenteredDesign.Net. (2021), *LifeCenteredDesign.Net,* available at: https://lifecentereddesign.net (accessed 3 April 2025).

Lovelock, J. (2020), *Novacene l'età dell'iperintelligenza*, Bollati Boringhieri, Torino, Italy.

Lutz, D. (2023), *The Non-Human Persona Guide: How to create and use personas for nature and invisible humans to respect their needs during design (Life-centred Design Guides)*. Damien Lutz.

Lutz, D. (2024), *What is life-centred design?,* Medium, available at: https://uxdesign.cc/life-centred-design-96965acdcbf4 (accessed 3 April 2025).

Monteiro, M. (2019), *Ruined by design: How designers destroyed the world, and what we can do to fix it*, Mule Design, San Francisco, California.

Norman, D. A. (2019), *La caffettiera del masochista: Il design degli oggetti quotidiani*, Giunti Psychometrics S.r.l., Florence, Italy

Paoliello, C., Li, B. and Metzdorf, E. (2025), *Toward a Nature-Centered Design. diid,* Vol. 1(83), available at: https://doi.org/10.30682/diid8324h

Papanek, V. (1972), *Design for the real world*, Thames & Hudson, London, UK.

Pozzi, F. (2022), *Digital Nudge*, Ledizioni, Milano, Italy.

Tassinari, V., Manzini, E. and De Rosa, A. (2021), The Politics of Nature. Introducing re-worlding. *DESIS Philosophy Talk# 7.5. Proceedings of the 9th Nordic Design Research Conference*, Vol. 9, pp. 473-477, available at: https://doi.org/10.21606/nordes.2021.53.

Vacanti, A., Burlando, F., Nevoso, I. and Menichinelli, M. (2024), "The More-Than-Human Trend in Design Research: A Literature Review", *Diid Disegno Industriale Industrial Design*, DSI 1, pp. 80-89, available at: https://doi.org/10.30682/diiddsi23t1s.