



Delft University of Technology

Document Version

Final published version

Licence

CC BY-NC

Citation (APA)

Fourquier, A. C., Van Ditmar, D. F., & Nicenboim, I. (2026). An exploration into the value of 'gap system' within regenerative design. In *Proceedings of DRS* (Proceedings of DRS; Vol. 2026). Design Research Society. <https://doi.org/10.21606/drs.2026.1520>

Important note

To cite this publication, please use the final published version (if applicable).
Please check the document version above.

Copyright

In case the licence states "Dutch Copyright Act (Article 25fa)", this publication was made available Green Open Access via the TU Delft Institutional Repository pursuant to Dutch Copyright Act (Article 25fa, the Taverne amendment). This provision does not affect copyright ownership.
Unless copyright is transferred by contract or statute, it remains with the copyright holder.

Sharing and reuse

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

Takedown policy

Please contact us and provide details if you believe this document breaches copyrights.
We will remove access to the work immediately and investigate your claim.

This work is downloaded from Delft University of Technology.

Jun 8th, 9:00 AM - Jun 12th, 5:00 PM

An exploration into the value of 'gap system' within regenerative design

Ariane Camille Fourquier
Centre of Applied Research for Art, Design and Technology

Delfina Fantini van Ditmar
Centre of Applied Research for Art, Design and Technology

Iohanna Nicenboim
TU Delft

Follow this and additional works at: <https://dl.designresearchsociety.org/drs-conference-papers>



Part of the [Art and Design Commons](#)

Citation

Fourquier, A., Fantini van Ditmar, D., and Nicenboim, I. (2026) An exploration into the value of 'gap system' within regenerative design, in Simeone, L., Gray, C. M., Verhoeven, A., de Götzen, A., Bakırlioğlu, Y., Zohar, H., Stead, M., and Buwert, P. (eds.), *DRS2026: Edinburgh*, 8–12 June, Edinburgh, United Kingdom.
<https://doi.org/10.21606/drs.2026.1520>

This Research Paper is brought to you for free and open access by the DRS Conference Proceedings at DRS Digital Library. It has been accepted for inclusion in DRS Biennial Conference Series by an authorized administrator of DRS Digital Library. For more information, please contact library@thedrs.org.

An exploration into the value of 'gap system' within regenerative design

Ariane Camille Fourquier^a, Delfina Fantini van Ditmar^a, Iohanna Nicenboim^b

^aCentre of Applied Research for Art, Design and Technology (CARADT)

^bTU Delft

*Corresponding author e-mail: ac.fourquier@avans.nl

<https://doi.org/10.21606/drs.2026.1520>

Abstract: This paper explores the possible contribution of 'gap system' within the context of regenerative design, highlighting how 'gaps', as overlooked, unexplored, and unrecalled dimensions of creative practice, can provide critical opportunities for regeneration. Drawing on ongoing research into weave structures conceptualised through the holes in between yarns, and by presenting the outcomes of a workshop, we illustrate the potential of thinking through 'gaps' as a nuanced perspective for regenerative design. Here, 'gaps' become sites of reflection, emergence, and transition. We show how this approach reshaped participants' ways of mapping systems by focusing on 'gaps' rather than existing linear knowledge, enabling them to rethink disciplinary futures and, through a regenerative lens, reshape both the boundaries of their own practices and their reflection on those practices. Drawing on participants' reflections, we argue that such spaces, often overlooked and unnoticed, constitute an unstructured generative site for rethinking design as a regenerative practice.

Keywords: regenerative futures; gaps; weaving; planetary boundaries

1. Introduction

This study brings together the field of textiles and the regenerative design paradigm by foregrounding the 'gaps', that is, the neglected, undervalued, depleted and often unseen areas, within creative design practices as a lens for advancing regenerative design approaches. This study stems from ongoing research into woven textiles that aims to challenge the systematic, binary model on which weaving is based by investigating weave structure visualisation from the perspective of the empty space in-between yarns. To date, the relevance of these holes has largely been disregarded. Yet without them, woven textiles would be a mere succession of loose vertical and horizontal yarns (Fourquier, 2024, 2025).



This work is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International Licence](https://creativecommons.org/licenses/by-nc/4.0/).

In a similar way, the regenerative design paradigm urges us to attend to the often-ignored spaces within social, ecological, and material systems. It calls for a shift beyond incremental adjustments: a deep rethinking of how we understand ourselves as human beings within an interdependent web of life, and how we conceive and enact design on the planet (Wahl, 2016). Adopting a regenerative paradigm in design urges us to go beyond a mere shift in practice. In line with questioning long-established modes of constructing and thus thinking, it becomes critical to move away from fragmented, mechanistic ways of seeing and being in the world, and instead embrace more holistic, integrated understandings of living systems (Wahl, 2016). Within this context, addressing planetary boundaries becomes fundamental.

Planetary boundaries define the ecological limits within which humanity can safely operate, highlighting thresholds in Earth's systems that, if crossed, could lead to irreversible environmental damage (Richardson et al., 2023). Regenerative design directly responds to these boundaries by seeking not only to minimise harm but also to actively rethink systems, restore, and enhance the vital properties of natural systems through design. In this way, the planetary boundaries framework provides the urgency and the scientific foundation for toxic practices that have to be undone, which is key to regenerative design's mission to envision resilient systems supporting living processes.

From this, we developed a proposal for a practice-led research approach to regenerative design; one that foregrounds 'gaps', i.e. the overlooked/unexplored and neglected/underseen areas within and in-between creative disciplines. A workshop that aimed at exploring the notion of 'gap system', that is, envisioning ideas through 'gaps' rather than known linear forms of mapping, was conducted in 2025 and presented at the Hugarflug 2025 - Unstable Systems symposium. It invited participants to rethink and redraw the limits of their creative practice in relation to planetary boundaries and regenerative ways of thinking and making.

Reflecting on that, we propose 'gap system' as a potential regenerative design approach that challenges the primacy of conventional system mapping by enabling spaces of uncertainty, absence, and transition within design processes. Rather than seeking completeness or closure, this approach encourages the use of overlooked 'gaps' to surface what is unnoticed or underexplored in creative practices, developing alternative ways of doing and thinking and shaping emergent sites for regenerative design practices. Furthermore, it could be critical to design research more broadly, as it could potentially elicit and nurture less rigid and more nuanced modes of thinking and making. While often disregarded, holes (in knowledge and practice) offer critical sites for rethinking design as relational. We argue that such areas operate as generative, interconnected and situated spaces of possibilities, enabling alternative ideas and processes to emerge.

This perspective positions 'gap system' as a promising approach to support regenerative design by moving beyond entrenched modes of knowing and making. We argue that this approach could help designers to better engage in regeneration by enabling *radical openness* (Hooks, 1989), rather than constraining design practices within fixed variables: using uncertainty as transformation, working with the unpredictable, unstable, and irregular character of 'gaps' to generate alternative forms of reflective, experimental, and regenerative practices.

2. Background

This section develops the theoretical framework that informed the workshop, providing the foundation for participants' practical explorations of visualising 'gaps', as well as the subsequent analysis and reflections that accompanied the activity. First, we introduce the current landscape of regenerative design research and highlight the need for an alternative paradigm of practice. Then, we present the textile context, that is, weaving as a technique and concept. Through Fourquier's practice-led PhD research on the role and value of empty space in visualising weave structures (2025), we highlight how this perspective inspired the development of the 'gap system' approach.

2.1 The needed field of regenerative design: Towards a new paradigm of practice

When it comes to how design should respond to the environmental crisis, doing "less bad" is not enough (Reed, 2007). Sustainability, as currently practiced, is primarily an exercise in efficiency, but mitigating or neutralising harm is insufficient to address the accrued ecological and social debts of human activity (Camrass, 2020). Instead of causing less damage to the environment, it is necessary to learn how to participate with it by using the health of ecological systems as a basis for design (Reed, 2007).

Regenerative design is an emergent field seeking to move beyond the mere mitigation of environmental harm and actively engage with ecological systems, leveraging their inherent vitality and capacity to renew, restore, or regenerate themselves, through a deep understanding of ecological principles of ecosystems (Reed, 2007; Cole et al., 2012; Cole et al., 2013; Camrass, 2020; Wahl, 2016; Mang & Reed, 2020). By doing so, it aims to restore the damaged habitat, sustain interdependencies, and nurture life for humans and more-than-human beings alike (Karana et al., 2023).

Drawing on Wahl (2016), this paper situates regenerative design within a whole-systems, place-based framework for design. Wahl argues that the necessary cultural shift (from fragmented worldview to relational understanding) requires designers to frame and engage with ecological interrelationships holistically. According to Wahl, the design process should begin by seeking to understand how living systems function within their unique locality. In this view, designers must cultivate an integrated web of mutually beneficial relationships that enhance resilience.

Responding to this ambition requires a profound shift in how design is understood and practised. Regenerative design therefore calls for a fundamental ontological and operational transformation, involving a deep affective commitment to care, conceptual openness to complexity, and the practical readiness to work with eco-social literacy in slow, collaborative, and context-sensitive ways that support systemic change (Fantini van Ditmar et al., 2025).

Textiles, as material systems (Tandler, 2016), whether knotted, braided, knitted, or woven, reflect this notion. Yarns' pattern of interlacement not only forms a complex network of textile elements but also generates empty space. These two systems coexist both independently and together, forming a fluid, interconnected whole. As a result, because empty space constitutes a significant part of the material system; one can propose that the absence, here, is additive.

This perspective forms the foundation of the proposed ‘gap system’ approach to regeneration. Here, ‘gaps’ have the potential to provide a critical generative lens for rethinking design as a relational practice, bridging situated and systemic perspectives within the regenerative design paradigm.

2.2 Challenging the systematic way of approaching weaving

Weaving is thought to be the oldest form of textile, dating back at least 8000 years (Barber, 1991) and one of the most basic systems of assembling material ‘things’ together (Broudy, 1979). Ancient weaving techniques required only minimal tools: weavers’ hands, bodies, and branches to create cloth (Broudy, 1979). But the automation mania of the First Industrial Revolution, originally orchestrated by spinners, rapidly spread through the development of mechanised looms to increase cloth production and reduce labour workforce. Such a drastic shift led to a reliance of weavers on the loom and reduced their proximity to yarns, thereby lessening embodied material engagement.

Contrary to other textile constructs, including knitting, knotting, or braiding among others, weaving embodies a singular paradox: an inflexible perpendicular construction methodology produces a pliable material surface able to fold and curve in particular ways (Albers, 1946; Pajączkowska, 2015). This antithetical character is present in the modern notation of weave structure: a static checkerboard-like model in which black and white squares identify yarns’ pattern of assembly and their movement on the loom.

Today, textile practitioners, designers, and researchers continue to see fibre and yarns as foundational elements for textile creation (Hengge & Krauthausen, 2023), thus maintaining yarn’s primacy in weaving engineering. However, woven cloth solely exists through the presence of the empty space in-between yarns; an observation that highlights their inherent role and value within a woven material system.

2.2.1 Investigating empty space in weave structure visualisation: A practice-led research

The ‘gap system’ approach stems from a practice-led PhD research that explored the role and value of empty space in-between and within yarns (Fourquier, 2025). As a ‘material’ element, one in an opposite physical state than that of yarns, i.e., airy rather than solid, the research considered holes as inherent surface-interfaces of a woven textile’s scaffold.

Practice-led experimentation included four method-media, namely weaving, drawing, microscopy and X-Ray CT scanning. While appearing empty, the thesis argued that these holes contain unknown elements interacting with each other. This relationship is dual: as a shape, with its own border-boundaries; and as a surface, with everything that is within, around, and outside itself (Heinzel, 2012). The study identifies that holes’ non-identity is a distinctive characteristic, highlighting that their inaccurate repetition as part of a complete weave structure shapes a harmonious topology of empty spaces.

Weave geometries are illustrated as holistic systems in which two opposing matrices, i.e., occupied (yarns) and empty (holes) space, symbiotically exist because of their interconnection and their relationship to the whole structured material system. By considering holes as unstable, organic, unpredictable shape-spaces, their inclusion shifts and challenges the current weave structure notation binary tenets, adopting instead a more nuanced perspective.

3. Case study: Exploring the 'gap system' approach through a practice-led workshop with creative practitioners

3.1 Workshop's Methodology

The workshop was designed to guide reflective and practice-led inquiry into the potential of identifying 'gaps' within regenerative design practice. Participants were briefed with a two-part exercise (Part I and II) and presented with weaving's construction principles, and an outline of the weave structure visualisation developed during Fourquier's PhD. Part I invited participants to develop their own *gap visual language*, encouraging intuitive and exploratory responses before engaging with the second phase. Part II introduced the concepts of planetary boundaries (Richardson et al., 2023) and the regenerative paradigm (Reed, 2007; Wahl, 2016; Mang & Reed, 2020), framing their reflections within broader ecological and systemic contexts. As part of the exercise, participants were invited to reflect on the 'gap system' approach and its regenerative potential through the following four guiding questions:

- (i) Identify and articulate the 'gaps': The overlooked, neglected, or depleted areas within their creative practice.
- (ii) Consider how their practice might respond to respecting the ecological limits of our planet.
- (iii) Explore ways their practice could become more regenerative.
- (iv) Reflect on whether developing a *gap visual language* enabled them to reconsider the limits of their discipline and the potential of art & design practices for regenerative futures. Participants were prompted to identify and illustrate identified 'gaps', whether conceptual, material, relational, or systemic.

Participants documented their reflections and responses using a template with these questions, which facilitated an analysis across and beyond creative disciplines.

3.2 Participants

The study involved sixteen participants representing a diverse range of disciplines, including photography, art, ceramics, architecture, textiles, puppetry, design, fashion, biodesign, and graphic design. This diversity was intentionally sought to capture multiple perspectives on regenerative design and creative practices. Participants came from varied cultural and geographical backgrounds, representing Ghana, the United States, Chile, the United Kingdom, the Netherlands, France/Vietnam, the Czech Republic, Spain, Ecuador, and Croatia. This international composition provided a rich basis for exploring how cultural context and

disciplinary orientation influence understandings of regeneration, creativity, and ecological awareness within design practices.

4. 'Gaps' as regenerative spaces of possibilities

The following sections present different opportunities for exploring the 'gap system' approach within regenerative design: Finding novel gap visualisations, surfacing planetary boundaries for creative practitioners, and envisioning regenerative practices.

4.1 *Gaps' visual representation outputs*

During part I, participants were presented with some outcomes of the above-mentioned proposed weave structure visualisations, comprising initial sketches of holes as 'structure units' and within a complete repeat, along with the proposed alternative weave structure visualisation. The latter is a series of drawings in tonal grey scale depicting the empty spaces within and in-between yarns, aiming to illustrate weave structure as holistic systems (Figure 1).

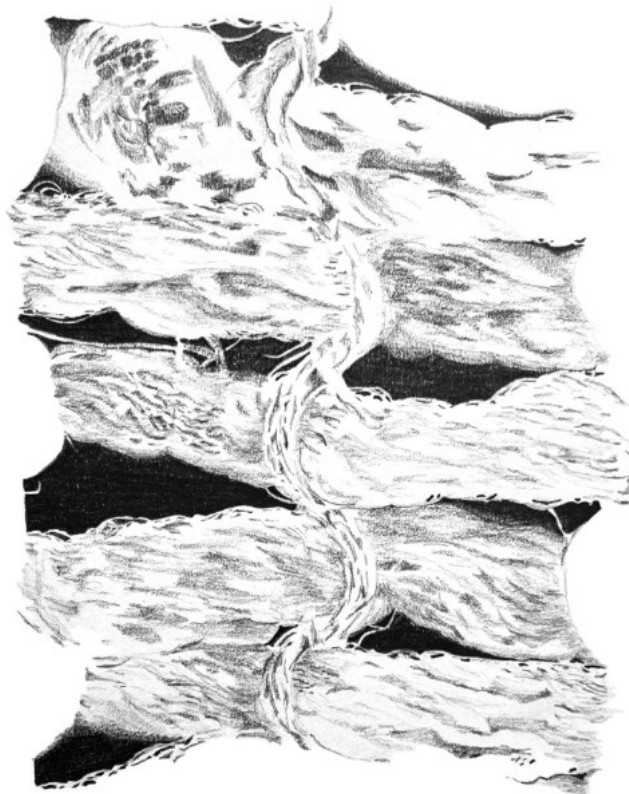


Figure 1 Drawing of weave structure in tonal scale from a woven textile sample. In this example, the light to dark gradients depicts the empty spaces within yarns and the darker shapes illustrate the holes in-between yarns, Ariane C. Fourquier, 2024

Participants were asked to create their own *gap visual language* through the medium of their choice, encouraging them to think beyond the one presented. Resulting from Part I, the

gap lexicon generated by each participant ranged from knitted textiles (participant A—textiles) and wood off-cuts (participant B—visual artist) to digital 3D visualisation of negative moulds (participant C—architect) and multilayered flora-inspired garments (participant D), among others. The outcomes collectively formed an extensive library of 'gaps', demonstrating the diversity of interpretative and experimental perspectives across disciplines. The materials and techniques employed were closely aligned with each participant's field of practice, yet together they produced novel interdisciplinary insights into how creative processes can embody the visual, conceptual, and spatial qualities of 'gaps'.

For instance, an architect whose process deals primarily with “sculpting gaps” (participant E—architect) in building walls, proposed a 3D digital visualisation of a mapping of gaps in one of the façades of Lina Bo Bardi building SESC Pompeia, São Paulo. The visuals featured an abstract layering of curvy shapes, each with outlines of varying thickness (Figure 2).

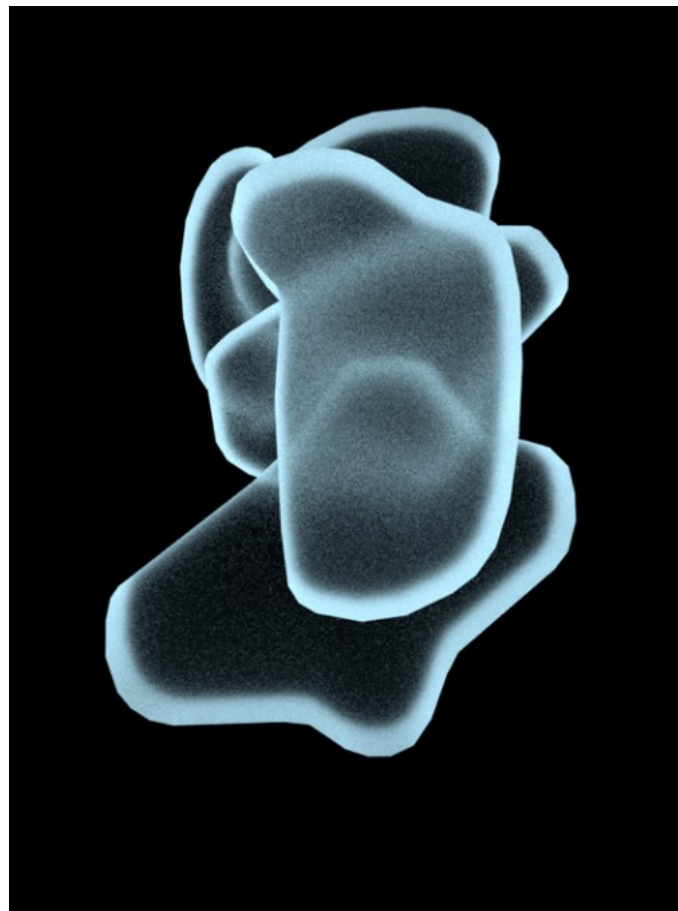


Figure 2 3D visualisation of a mapping of gaps in one of the façade of Lina Bo Bardi building SESC Pompeia, São Paulo, Participant E (architect), 2025

As surfaces, the shapes' colour change from border-outline to centre through either rapid or slow colour fade. The juxtaposition of each shape offers the viewer the possibility to discern the 'underneath' shapes through transparency/opacity play. Together, this layering brings

depth, movement, and in turn, possibilities for interpretation. From a material perspective, it proposes questions such as: what lies within these spaces? Is it air, water, concrete, or other intangible and invisible particles?

Another participant (B—visual artist) explored the difficulty of sourcing eco-responsible materials during making process. These specifically concerned woodworking glue, sandpaper and varnish. We clustered the participant's outputs in three material visual 'gap vocabularies'. The technique of 'engrudo' — a homemade paste made from flour, water and sugar, sodium bicarbonate, vinegar to enhance its sticking power — Linseed gel — more appropriate for paper and binder — and animal glue — an ancestral glue derived from animal tissues and widely used in conservation and restoration — were experimented with through an application of each paste on paper. These generated a wide range of irregular and random shapes, all in muted brownish tones. These surfaces visually explored the ecological 'material gaps'; sometimes forming a thick layer applied in straight, linear brush strokes, and at others identifying an extremely fine and bubbling surface (Figure 3 & 4). One in particular (Figure 5) pictured a rectangle-like shape with darker irregular edges, within which shapes inside the shape occur, forming shadows and disordered light to dark gradients. These material characteristics strikingly highlight the ecological boundaries faced by the maker, bringing fluidity and identifying the unpredictability of both the application of the glue and the ecological issues it represents.



Figure 3 & 4 Experiments with eco-responsible wood-working glue paste, the left is made with pumice powder and egg white, and the right is made with quartz and coffee husk (G. arábica), Participant B (visual artist), 2025



Figure 5 Experiments with eco-responsible wood-working glue made with pumice powder, quartz, flaxseed gel and coffee husk (G. arábica), showing various folds, curves and shadows, Participant B (visual artist), 2025

Essentially, each participant's lexicon (Figure 6) articulates a constellation of conceptual, experiential, practical, and technical 'gaps', reflecting unknowability, unpredictability, rhythm, metronomy, abundance, lack, transparency, movement, and depth. Together, they reveal how the notion of 'gap system' operates as a visual language and a research lens; a means to think, make, and reflect through absence and relation within design practice.



Figure 6 Participants gap lexicon: a. Participant L (artist and biodesigner), b. Participant J (performance artist, puppetry), c. Participant B (fashion designer), d. Participant D (architect), e. Participant P (knitwear designer) and f. Participant M (architect)

4.2 Disciplinary Reflections on Planetary Boundaries

The reflections gathered from participants revealed how planetary limits are experienced and negotiated. Regarding material choices, participants acknowledged that unsustainable material use persists due to economic pressures, accessibility, and speed. Practitioners often relied on synthetic materials, reflecting a limited socio-ecological material literacy and a lack of awareness or access to ecological alternatives. Even where such knowledge exists, cost and time constraints reinforce practices where convenience outweighs responsibility. Participants also questioned the instrumentalisation of living systems such as mycelium or algae. This anthropocentric approach overlooks reciprocity and care, with little attention to organisms' life cycles. A shift toward relational, life-centred ethics in design is needed.

Concerning boundaries in practicing regeneration, participants reflected on their experience teaching exercises, which seemed challenging given the cultural diversity. This revealed the need for design education to adopt plural and situated approaches accounting for both global interconnection and bioregional specificity. Participants also described structural barriers (e.g., client expectations, regulations, industry norms) that restrict regenerative experimentation. This, in combination with insufficient time and resources allocated to regenerative research and experimentation, which is often perceived as non-essential within commercial practice, illustrates the systemic obstacles to embedding regenerative principles in practice.

These reflections suggest that addressing planetary limits demands more than technical fixes; it requires a systemic and regenerative reorientation of creative practice. By examining how disciplinary habits, materials, and cultural frameworks shape design, practitioners and educators can cultivate the literacies and values needed for regenerative design.

4.3 Making Creative Practices More Regenerative: reflections and approaches

The following presents participants' reflections on making their creative practices more regenerative. These insights cluster around five interconnected themes, highlighting both shared values and disciplinary distinctions, together offering a composite view of how creative practitioners are reimagining key aspects and roles within the regenerative paradigm.

4.3.1 Embracing Craftsmanship, Traditional Knowledge, and the Bricoleur Ethos

Craftsmanship was highlighted as a vital repository of ecological wisdom and material resilience. Adopting a *bricoleur* ethos, i.e. working with what is at hand through repair and adaptation, was seen as a regenerative stance that values care and continuity over efficiency and novelty, reframing creative practice as an act of resourcefulness, and maintenance rather than extraction or reinvention.

4.3.2 Working with Nature

Reflections revealed a desire to move from mastery over nature to reciprocal relationships with ecosystems, adapting expectations, timelines, and aesthetics to ecological realities and limits. Reviving vernacular and ancestral material knowledge (e.g. natural fibres, pre-oil processes) was seen as essential to working with rather than against ecological systems.

4.3.3 Creating alliances, Collaborating and Communicating Value

Embedding regeneration requires cross-sector collaboration among designers, craftspeople, architects, and industry. Beyond material innovation, regeneration depends on alliances, social coordination, and communicating its long-term value to clients and institutions, redefining success beyond efficiency or profit.

4.3.4 Aesthetic Shifts through Plural Engagements

The need for a regenerative paradigm that interlaces aesthetic and ethical values emerged. Participants viewed pluralism rooted in diverse cultural knowledge and practices as central to regeneration, calling for design education that embraces difference, and multiplicity.

4.3.5 Rethinking Disciplines and Education

Regeneration also implies a profound rethinking of disciplinary boundaries and educational paradigms. Participants envisioned the rise of "anti-architects" and "anti-designers"; those who question the necessity of building or producing anew, choosing instead to restore, adapt, or unmake. Within fashion and design education, the regenerative paradigm has the potential to entail a shift from trend-driven production to practices rooted in responsibility, longevity, and care. Design must be reframed as a field of long-term ecological and ethical stewardship rather than as a vehicle for consumption or aesthetic novelty.

5. Discussion: Shifting from inflexible systems of thought and practice towards regenerative spaces of emergence

Repositioning the insights gathered from section 4, this section discusses more precisely how 'gaps' can become conceptual, material, and experimental spaces, presenting the identified values of the 'gap system' approach.

5.1 Knowledge Re-/Generation

The notion of 'in-betweenness' emerged as a site in which possibilities for knowledge generation and ways of knowing are infinite. As Ingold (2015) conceptually identifies, 'in-between' refers to a liminal space in which 'things' are not yet established but on their way to become. He marks a clear separation with 'between', which he considers as a finite relationship with "two terminals" (Ingold 2015, p. 148); one that divides and opposes two elements (conceptual or physical) in finite ways. 'In-between' is thus continuously in flux and imparts differentiation rather than division.

In the context of 'gap system', such spaces, together and alone, form a holistic system. As interconnected spaces, 'gaps' identify a spectrum of practices of knowing, one in which various forms of knowledge exist independently and inform each other. For instance, participant A's (material researcher) practice involves measuring water ecosystems at the macro-, micro-, and nano-scales. Through an animated digital rendering, the participant visualised the relationships that exist within each ecosystem and broadcasted the interaction in-between these 'water worlds' (Figure 7). Understanding in-betweenness thus reveals an opportunity to see relationships and dimensions rather than fixed and static layers. This perspective, identified by participant K (designer) as a 'pluripolar space,' also proposes to adopt a more-than-human perspective that connects ecosystems, materials, and living entities to question fixed systems of thought.

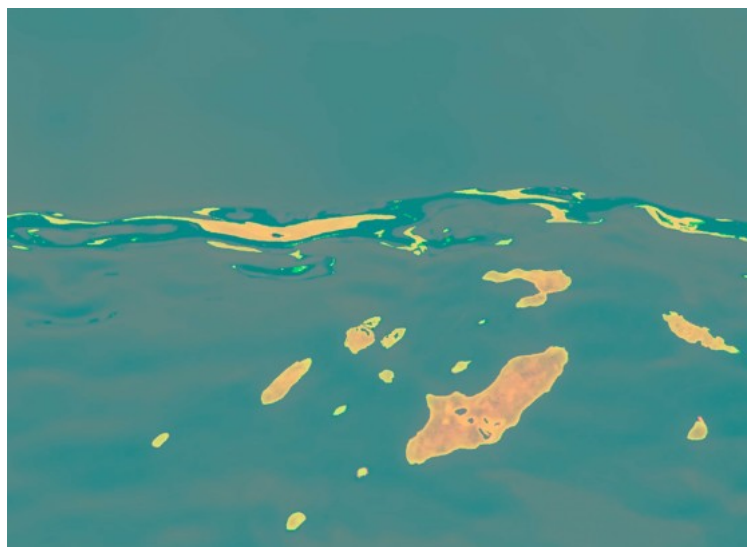


Figure 7 Still from an animated digital rendering picturing the interaction in-between water

ecosystems at the nano, micro and macro-scales, Participant A (material researcher), 2025

In line with this, the notion of 'fertile gap' was identified by participant B (fashion designer/educator), whose practice proposes to look at fashion pedagogy from the perspective of flora. An approach that explores flowers as fluid systems that respect the disobedience of their blooming state and the chaotic order of their genetics. It relates to tacit and intuitive ways of knowing (Polanyi, 1966; Albers, 1965), encouraging "growth overflow". In the context of regeneration, this means that holes in knowledge can be shaped through dynamic 'gaps', which encourages layering, multiplicity, and fluidity to challenge rigid notions of beauty, identity and form in fashion design, and beyond.

Here, the 'gap system' approach has value for generating knowledge and rethinking inflexible systems of thought and practice by encouraging interplay *in-between* thinking and doing. Thus, we identify 'gaps' as spaces in which new knowledge can emerge but make the regeneration of established systems of knowing possible.

5.2 'Gap' as a Regenerative Tool

Sennett questions the notion of tools as apparatuses that hold a specific mechanical function:

Getting better at using tools comes to us, in part, when the tools challenge us, and this challenge often occurs just because the tools are not fit-for-purpose. (Sennett, 2008, p. 194)

In the context of 'gap system', this suggests that, as a potential design tool, 'gaps' help prioritise process over outcome; hence encouraging a holistic way of thinking through making (Igoe, 2010; Dormor, 2020; Nimkulrat, 2025), away from known results. As participant M (architect) points out, in mould making, thinking and making through 'gaps' enable considering what is inside and outside, and build designs that can be undone, reshaped, and rethought.

In her (quantum) philosophical reflection on measuring a vacuum, Barad (2012) identifies measuring as a performative practice that sees tool as a measuring instrument with agency and as an entity part of the measurement taken. This proposes to see the 'gap' as a regenerative tool, one that is part and a part of a holistic system, that goes beyond the limits of ethnographic documentation. Instead, as a material element, it enables documenting what is hidden, unknown, disregarded, and forgotten. Participant F, a graphic designer shifting their design practice towards auditive modes of visualisation, proposes to employ silence as a way to reconfigure attention, illustrating mapping with 'gaps' as intentional emptiness to shift perspectives. In this context, the "*deep focus*" and practiced patience involved in materialising the visual, tactile, and auditory dimensions of silence informed the development of eco-responsible materials and techniques responding to ecological and social urgencies. This reflective insight is mirrored in participants' emotional response to the task. Participant C (artist) noted that "*it definitely feels lighter for existence and in better alignment with the urgent problems we are facing*".

5.3 The Value of Messiness

In the context of regenerative design, stepping into the gap (physically and conceptually) and embracing uncertainty and messiness allows design to be guided by processes that nurture caring and resourceful outcomes. Rather than following a linear, product-first mindset, being guided by the unpredictability and unknowability of materials could shape new interpretations of thinking and designing that have yet to be unearthed. Participant J (puppetry) identifies the value of such an attitude by placing studio work both inside and outside. This allows them to practice puppetry, from creation to performance, within the space in-between locations. This place-based approach embraces making where the materials at hand drive the design process. By adopting a *bricoleur* methodological approach (Lévi-Strauss, 1966; Kincheloe, 2001, 2005; Bremmer & Yee, 2011), it creates conditions for imaginary narrative possibilities to be shaped.

Thus, the messiness of 'gaps' opens possibilities for alternative ways of seeing and interpreting. Participant L (artist and biodesigner) identifies the value of shifting language when describing the properties of the living entities with which they create, that is, understanding light-sensitive materials as 'dark-resilient' ones; in turn forming biocultural relationships where authorship is shared through respect and difference.

5.4 Fracture, Repair & Care

Mapping through 'gaps' also has value in exploring the ecological boundaries individuals face through design practice. Participants' reflections and visual lexicon all converge towards the notions of value and care when working with materials: the importance of cultivating awareness and responsibility through attentive engagement with materials. Architects (participants D, E, G, I) identified the importance of looking at what has already been done for a more caring future. While their reflection is concerned with designing the built environment, it applies to many other disciplines and highlights the need to break away from current industrial modes of production. 'Gaps', here, take on opposing yet related meanings. They identify the need to fracture established frameworks of thinking and designing while illustrating the repairing and caring possibilities of such an action.

In the face of the climate catastrophe, it is crucial to explore the fragility of the biosphere, understand material cycles, reflect on the scale of emissions, and encourage local cultural relationships. Looking at the landfill from an aesthetic perspective can also provide fertile grounds for examining traces and remnants of once-produced and now-discarded materials. Likewise, 'gap' as a leftover space proposes to investigate what remains after extraction and reflect on the consequences of such an action. These practices, requiring patience, make ecological limits audible and propose embracing uncertainty by exploring the interstices in-between repetition and rupture, rather than resolving these tensions.

5.5 'Gap system' reflections

Through the workshop, the paper investigated how mapping with 'gaps' could become a valuable design approach to support creative researcher-practitioners in moving toward regenerative futures. Regenerative design literature calls for a re-envisioning of design practices, emphasising living systems principles and a salutogenic approach as the foundation for design (Wahl, 2016). As minimising damage proves insufficient, established

modes of design practices demand reframing; ones that adopt situated, relational engagement with culture and ecology of place. The 'gap system' approach supports this shift by envisioning and positioning 'gaps' as spaces for critical creative regenerative opportunities through which thinking and making can be re-/generated, messiness embraced, and care prioritised. For regenerative design, 'gap system' can provide space for cultivating conditions in which alternative forms of knowing and thus doing can arise, prioritising place-based, symbiotic and more resilient practices.

Stemming from research for weaving, which positioned the woven hole as an irregular, unpredictable shape-space in weave structure visualisation, the proposed 'gap inclusion' highlights its potential role within the regenerative design research approaches.

Understanding complex material systems in relation to regeneration emphasises close engagement with their place-based properties and their interconnections within a larger ecosystem.

We therefore proposed 'gap system' as a distinctive regenerative design approach by foregrounding the overlooked and unexplored areas within and in-between disciplines to develop alternative ways of doing and thinking, shaping critical and creative futures. We argued that such intermediate areas operated as generative, relational spaces of possibilities, bridging situated practice and systemic perspectives within regenerative design research.

Participating in a workshop on planetary boundaries and regenerative design holds significant value for practitioners, especially as many participants have never encountered these critical frameworks or the regenerative paradigm before. Introducing the concept of planetary boundaries helps participants grasp toxic disciplinary practices, the finite limits of Earth's systems, and the urgent need to design within safe ecological thresholds. Such an exposure expands their perspective from harm minimisation to health restoration and simultaneously foregrounds the need to acknowledge perspectives that are frequently overlooked, including more-than-human and diverse human viewpoints (Nicenboim et al., 2025).

This onboarding not only builds scientific and ecological design literacy but also equips professionals to realign their work with principles of resilience and long-term planetary wellbeing. By exploring 'gaps', here the disconnects between current practices and regenerative potential, practitioners can identify where systemic transformation is most needed.

Participants highlighted the importance of embedding environmental material knowledge and regenerative thinking into everyday professional design practice, reinforcing the transformative capacity of reflective and creative approaches within design education and practice. Several participants expressed that the process prompted them to think differently about their roles as designers and makers, with comments such as, *"I found your proposal very inspiring"* (participant J—puppetry) and *"It [...] really made me think about how to evolve my practice"* (participant D—architect). For some, it was their first exposure to concepts such as 'gaps', planetary boundaries, and the regenerative paradigm, highlighting the relevance of introducing these notions to practitioners unfamiliar with them. As one participant (D—architect) remarked, *"I will discuss it with my colleague and see how to implement some changes at the office,"* while another noted, *"I will definitely think about*

this exercise further and see how it could make my practice more regenerative. Not only in the building, but throughout the process.” These reflections point toward the potential of regenerative design research as a form of continuing professional development, particularly within architecture and design fields, although more research is needed to understand how such engagement translates into long-term change.

As introduced above, weaving incorporates a perplexing paradox. Although woven cloth is ruled by a perpendicular interlacement of yarns, its systematic engineering principle generates a soft and fluid material surface that behaves in unbridled ways. This fundamental tension illustrates the contradiction within weaving as a system of thought and practice, that is, an inherently inflexible construction methodology can provide fertile grounds for irregular ways of thinking and doing.

As a result, the open and chaotic nature of the ‘gap system’ approach prompts to embrace uncertainty and unknowability in the design process. However, it could be difficult for researchers, designers and practitioners who follow an efficiency-driven “high-road” mindset and operate at large-scale processes, to shift behaviours from industrially-minded to ecologically-aware. Likewise, adopting a nuanced attitude towards creative processes could be challenging for those whose practice is deeply rooted in traditional know-how, which could be less aligned with regenerative principles.

6. Conclusion: Positioning ‘gap system’ as a regenerative design approach

What appears most promising about the ‘gap system’ approach for regenerative design is its epistemological potential, as illustrated by workshop reflections highlighting its potential value in considering the regenerative paradigm in design practices. This resides in opening new epistemologies in several ways: by encouraging and inspiring practices through interplay *in-between* thinking and doing, by embracing messiness as a space for possibilities, by prioritising process over outcome, by surfacing and considering ecological limits. This is echoed in the work of Ranulph Glanville (2010) who sees design as a space ‘in-between’. Visiting the Mayan site of Palenque, Glanville (2010) recounts learning from a Mayan architectural guide that the number zero marks the space in-between positives and negatives, yet belongs to neither. Rather, it forms a “class of its own, with very peculiar behaviours” (Glanville, 2010, p. 97). Drawing on this idea, Glanville describes his notion of ‘zero space’. Taking the example of the delineating wall, he explains that such a space is a site that is neither inside nor outside itself, but instead an in-between area that separates interior and exterior realms while connecting through their boundaries. In other words, it is a fluid liminal space of connection and separation. Here, ‘gaps’ in connection to ‘zero space’ in design practice can be seen as dynamic sites of change and exchange, which in a regenerative way can translate as opportunities for renewal.

Glanville (1999) emphasised that design research is not about enforcing scientific repeatability, but about recognising the designer’s influence and creative inquiry, treating design as its own domain of generating knowledge in action. Glanville (2019 [2007]) argued that while science seeks to describe and verify what *is*, design concerns itself with what *could be*, guiding action and enabling transformation. In this way, design research prioritises

the situated judgement, creativity, and responsibility of the designer, emphasising exploration and emergence of possibilities. This approach resonates with the potential value of 'gaps', by inviting the unanticipated.

The 'gap system' approach also offers a way to move further than line-based system mapping toward more nuanced forms of documentation. In doing so, thinking through 'gaps' helps articulate unstructured processes. They create spaces for possibilities rather than outlining finite problems, as linear mapping systems often do.

This approach brought to light the urgent need to depart from what was 'then', i.e. the environmental impact of careless use of materials and irresponsible modes of production, to embrace what should be considered 'now'. That is to say, the opportunities that exploratory and experiential processes can offer for designing regenerative futures, ones that are led by material ethics of care (Puig de la Bellacasa, 2017) for their forgotten/overlooked qualities while respecting their limitations. Here, a 'gap system' perspective in the context of practicing regenerative design has the potential to *"now become part of"* researcher-practitioners' imagination and studio practice (participant C—artist).

Ultimately, pointing at the unseen repairing possibilities of 'gap system' invites a reframing of design agency through questions such as: What am I not doing, rather than what should I do? How might limitations be transformed into meaningful design opportunities? And how can a creative practice be re-envisioned to align with planetary boundaries and the regenerative paradigm?

The 'gap system' approach, by framing messiness as generative rather than problematic, prioritising process over fixed parameters, and surfacing ecological limits within creative practice, holds significant potential as a theoretical framework to inform regenerative design methodological approaches. Such a methodology is not yet formulated in this work and remains a direction for prospective development. Future directions also point to the need for continuous professional development that would enable practitioners to engage with and learn from the regenerative paradigm, advancing new capacities for system thinking and ecological responsiveness. Additionally, the implementation of 'gap system' workshops within different creative and educational contexts could further advance the understanding of regeneration in practice. Such initiatives would encourage reflection, dialogue of new ways of thinking, making and learning that align creative processes with the regenerative design paradigm.

Acknowledgements: We would like to thank the organisers of the Hugarflug 2025 - Unstable Systems conference, held at the Iceland University of the Arts (Listaháskóli Íslands), for the opportunity to present our workshop and for inspiring us to set this ongoing project in motion and exciting new line of research. We also would like to express our heartfelt thanks to the participants for the time they devoted, for sharing their practical outcomes and reflections, and for their inspiring feedback.

7. References

Albers, A. (1965). *On Weaving*. Woodstock, Oxfordshire: Princeton University Press.

Barad, K. (2012). What is the Measure of Nothingness? *Infinity, Virtuality, Justice, 100 Notes – 100 Thoughts* N.099, 4–17.

Barber, E. J. W. (1991). *Prehistoric Textiles: The development of cloth in the Neolithic and Bronze Ages with special reference to the Aegean*. Princeton University Press.

Bremmer, C., Yee, J. (2011). Methodological bricolage: What does it tell us about design?, *Doctoral Design Education Conference At: Hong Kong Polytechnic* (pp. 1–9). Hong Kong Polytechnic.
https://www.researchgate.net/publication/265592002_Methodological_bricolage_What_does_it_tell_us_about_design

Broudy, E. (1979). The Book of Looms: A history of the handloom from ancient times to the present', in Tandler, L. The Role of Weaving in Smart Materials Systems. PhD Thesis. Northumbria University.

Camrass, K. (2020). Regenerative futures. *Foresight*, 22(4), 401–415.

Cole, R. J., Busby, P., Guenther, R., Briney, L., Blaviesciunaite, A., & Alencar, T. (2012). A regenerative design framework: setting new aspirations and initiating new discussions. *Building Research and Information*, 40(1), 95–111.

Cole, R. J., Oliver, A., & Robinson, J. (2013). Regenerative design, socio-ecological systems and co-evolution. *Building Research & Information*, 41(2), 237–247.

Dormor, C. (2020). *A philosophy of textile: between practice and theory*. (Ed) Bloomsbury Visual Arts.

Fantini van Ditmar, D., Pfeiffer, K., & Frost, L. (2025). Becoming regenerative. *Global research in action: Selected papers from the World Design Congress London 2025* (pp. 29–36). World Design Organization.

Fourquier, A. C. (2025). *W(hole): An alternative perspective on weave structure visualisation* [Doctoral thesis, Royal College of Art]. Royal College of Art Research Online <https://researchonline.rca.ac.uk/6695/>

Glanville, R. (1999). Researching design and designing research. *Design Issues*, 15(2), 80–91.

Glanville, R. (2010). A (cybernetic) musing: Architecture of Distinction and the Architecture of Distinction. *Cybernetics & Human Knowing*, 17 (3), 95-104.

Glanville, R. (2019). Try again. Fail again. Fail better: The cybernetics in design and the design in cybernetics. In T. Fischer & C. M. Herr (Eds.), *Design cybernetics: Navigating the new* 25–63. Springer.

Heinzel, T. (2012). *Textiles électroniques et réactifs: fondements et textures*. [PhD Thesis, Université Paris 1 - Panthéon – Sorbonne Ecole Doctorales D'Arts Plastiques, Esthétique et Sciences de l'Art]

Hooks, B. (1989). Choosing the Margin as a Space of Radical Openness. *Framework: The Journal of Cinema and Media*, 36, 15–23.

Igoe, E. (2010). The tacit-turn: textile design in design research, *Duck Journal for Research in Textiles and Textile Design*, 1, 1–11.

Ingold, T. (2015). Material, gesture, sense, and sentiment. In (1st ed) *The Life of Lines* (pp. 18-22). Routledge.

Karana, E., McQuillan, H., Rognoli, V., & Giaccardi, E. (2023). Living artefacts for regenerative ecologies. *Research Directions: Biotechnology Design*, 1(e16), 1–28.

Lévi-Strauss, C. (1966). *The savage mind*. Chicago: The University Of Chicago Press.

Mang, P., & Reed, B. (2020). Regenerative Development and Design. In *Sustainable Built Environments* (pp. 115–141). Springer US.

Nicenboim, I., Karana, E., McQuillan, H., Devendorf, L., Kakehi, Y., Bell, F., Speed, C., Oogjes, D., Yao, L., Søndergaard, M. L. J., Helms, K., & Withers, S. (2025). Regenerative Material Ecologies in HCI. Extended Abstracts, CHI.

Nimkulrat, N. and Groth, C. (2025). *Craft and Design Practice from an Embodied Perspective*. Routledge, Taylor and Francis Group. ISBN 9781032356815

Pajackowska, C. (2015). 'The thread and the line', *Journal of Visual Art Practice*, 14 (1), 18–25.

Polanyi, M. (1966). *The Tacit Dimension*. The University of Chicago Press.

Puig de la Bellacasa, M. (2017). *Matters of care: Speculative ethics in more than human worlds*. University of Minnesota Press.

Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., Drüke, M., Fetzer, I., Bala, G., von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., ... Rockström, J. (2023). Earth beyond six of nine planetary boundaries. *Science Advances*, 9(37), eadh2458.

Reed, B. (2007). Shifting from “sustainability” to regeneration. *Building Research and Information*, 35(6), 674–680.

Sennett, R. (2008). *The Craftsman*. Yale University Press.

Tandler, L. (2016). *The Role of Weaving in Smart Textiles Systems*. [PhD Thesis, Northumbria University]. Royal College of Art, Archive of research processes and output produced by RCA

Wahl, D. C. (2016). *Designing regenerative cultures*. Triarchy Press.

About the Authors:

Ariane Camille Fourquier is a weaver-researcher at the Regenerative Art and Design group (CARADT). Her practice sees empty space as a tool and lens to explore weave structure visualisation. She investigates the value of ‘gaps’ for system mapping to illustrate unexplored/overlooked dimensions within fixed systems.

Delfina Fantini van Ditmar is a Professor at the Research for Art, Design & Technology (CARADT) and Senior Researcher at the Royal

College of Art, co-directing the Becoming Regenerative Lab. With a background in biology and a PhD in design, her work explores regenerative design and material ethics of care.

Iohanna Nicenboim is a Professor of More-than-human Design and Regenerative AI at IT:U Linz, a researcher at TU Delft's Center for Regenerative Material Ecologies, and a Microsoft Fellow. She currently chairs two DRS track about More-than-human design and Regeneration.