

LEARNING TO REORGANIZE: REGENERATIVE NETWORKS AND THE SYSTEMIC REDESIGN OF HIGHER EDUCATION

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Abstract

Contemporary higher education has come to embody what Zak Stein has called the "metacrisis" in its reproduction of the very logics it claims to challenge: transactional, credential-driven, extraction-oriented, and structurally resistant to the relational onto-epistemologies that sustainability demands. From a systems science perspective, this represents a recursive failure of institutional autopoiesis. The educational system reproduces its own operational boundaries precisely by excluding the feedback loops and relational dynamics that might transform it. This talk draws on the development of regenerative learning networks both within and at the margins of existing higher education structures, framing institutional disruption as a systemic design problem and sustainability education as a complex adaptive challenge.

Authentically regenerative education requires an institutional imagination rooted in co-worlding (*mitwelten*) and being-of-the-world (*être du monde*): relational ontologies that position the learner as constituted through relation rather than pretending to stand apart from a system to be studied. In systems terms, this is a shift from first-order to second-order approaches, moving from observing systems to designing conditions in which systems can observe and reorganise themselves. Place-based, distributed, and relationally constituted learning environments are better understood through this lens as alternative organisational frameworks rather than institutional alternatives that treat the network as both the medium and the message of regenerative pedagogy.

The methodology is generative and applied. Drawing on systems thinking, network praxis, and regenerative design, this work involves prototyping alternative credentialing and learning models, partnering with programmes grounded in place-based and relational knowledge traditions, and connecting learning centres across continents through a distributed coordination architecture. The Regenerative Learning Network (RLN), a consultancy and design lab operating at the margins of accredited higher education, serves as the primary case and testbed. Its development foregrounds entropy as a design condition in itself: uncertainty about accreditation, political will and public trust, financial viability, and the capacity of distributed networks to hold accountability and care are treated as generative constraints. In this framework, relationality and emergence are seen as the foundations of institutional design.

The emerging findings are instructive for systems practitioners. Coordination under disruption requires the capacity to think ecologically about institutional forms and to hold networks as simultaneously organisational structure and pedagogical practice. The symposium's core tensions of urgency, care, inclusion, and credibility are irreducibly relational and cannot be resolved at the level of individual institutions or curricula. Systems science provides both the analytical vocabulary and the design orientation to take that work seriously. The hardest work is redesigning the conditions under which regenerative learning can actually occur, and this talk offers a practitioner's account of what that redesign looks like from inside the process.

Keywords

regenerative learning, systems thinking, sustainability education, institutional disruption, distributed networks

1 | Introduction: The Crisis is the System

Higher education is at an inflection point. There is a clear, felt, and diversely articulated need for a root-and-branch reorganization of higher education: in the sense that complex adaptive systems reorganize when the energetic demands of maintaining a dominant configuration exceed that configuration's capacity to sustain itself. This paper is a Copyright, Cenkl (Creative Commons), 2026

n invitation and a roadmap to such a reorganization that considers its systemic causes, its theoretical conditions, and the distributed, place-based learning networks already operating in the gaps it produces. The paper introduces the concept of *regenerative turbulence* as a disturbance that does not consume the conditions of its own generation but instead renews them, leaving the generative field richer than it was originally. Drawing on systems thinking, process ontology, and ecologically grounded relational pedagogy, this paper argues that the current crisis in higher education is a failure of closed-system institutional autopoiesis, and that the appropriate response is the deliberate cultivation of conditions in which a different kind of learning and a different kind of institution become possible.

The numbers tell a story that institutions have been reluctant to fully engage with. A century ago, half of the approximately 1,000 colleges in the United States were considered liberal arts institutions; today, barely 5% of the roughly 4,000 qualify (Ferrall, 2011). Overall, the number of degree-granting institutions has declined by thirty percent since 2000. Between 2023 and 2025 alone, more than 60 institutions closed or merged, with the pace accelerating to nearly 1 closure per week in 2024 (Villeneuve & Sanchez, 2024). A Federal Reserve study projects as many as eighty further closures between 2025 and 2029 (Kelchen et al., 2024). By mid-2025, total student loan debt had reached \$1.8 trillion, with average individual debt at \$42,673 when federal and private loans are combined (Federal Reserve, 2025; SoFi, 2025), and twenty percent of institutions listed on the Department of Education's nonpayment reporting site risk losing federal funding entirely. Financial analyst Kevin Thompson names the structural mechanism plainly: the consolidation of repayment options "pushes people to stay in the workforce longer, keeping them tied to repayment well into their lives," functioning as "a tool to keep labor in the system" (Thompson, as cited in Blake, 2025). Public trust has followed the same trajectory. Where 57% of Americans once reported having a great deal or quite a lot of confidence in higher education, that figure has fallen to 35%, while those reporting very little or no confidence have more than doubled, from 10% to 24% (Gallup, 2024).

Calls for reform have been perennial and often politically contradictory. Eugene Lang observed in 1999 that colleges rarely engage social issues "in ways that meaningfully prepare students for active roles as citizens" (Lang, 1999, p. 145). The Martin Center for Academic Renewal's 2025 report insists the remedy is a curriculum grounded in Western civic culture (Martin Center for Academic Renewal, 2025). That these two critiques pull in opposite directions is itself diagnostic: the crisis is real, but there is no consensus on what it is a crisis of, and little appetite for examining higher education as a system rather than a collection of fixable institutions.

From a systems perspective, higher education reproduces its own operational boundaries precisely by excluding the feedback loops and relational dynamics that might transform it. For example, in Luhmann's terms, each institutional operation, the credit hour, the accreditation review, the credential, produces the conditions under which the next operation becomes possible and necessary, while foreclosing the alternatives that might interrupt the sequence (Luhmann, 2013). The system resists change because its operational recursion is working exactly as designed, reproducing the conditions of its own dysfunction at every cycle.

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This paper draws on the development of regenerative learning, a holistic, distributed, deinstitutionalized approach to higher education, to argue that the appropriate response is not reform of existing institutional structures but the design of alternative operational conditions. Regenerative learning foregrounds entropy as a design condition: uncertainty about accreditation, financial viability, and the capacity of distributed networks to hold accountability and care is treated as a generative constraint rather than a problem awaiting institutional solutions. The concept of *regenerative turbulence*, developed in the sections that follow, provides the theoretical frame for understanding how distributed learning networks can occupy and sustain the gaps that the dominant system both produces and requires, and invites providers to reorganize learning by exploring (and enacting) a regenerative systems approach.

The invitation that regenerative learning extends is to consider (and ideally enact) what becomes possible when the system's operational recursion is interrupted by design:

- What would it mean to lead with practice rather than credentials?
- What effect would it have to lead with relationship rather than compliance?
- And what would it mean to take ecological framing seriously as an ontological and relational claim about what learning is and where it lives?

2 | Regenerative Turbulence

The challenges facing higher education in the United States and globally have been increasingly characterized as “existential,” from Bryan Alexander's (2025) forecast that American higher education has passed its high-water mark, to the Association of Governing Boards' (2025) warning that declining enrollment poses an existential threat to tuition-dependent institutions, to de Wit, Altbach and Glass's (2025) assessment in *International Higher Education* that universities face an existential crisis as mounting geopolitical, technological and demographic pressures converge.

To address such existential meta/poly-crises, or, as discussed in this paper, the *turbulence* or *disruption* introduced into the educational system, should be examined not as an impediment to progress but as an opportunity for a root-and-branch re-enactment of higher education as a system that is more robustly distributed, deinstitutionalized, and fully democratic in its engagement with communities both human and more-than-human.

One helpful framing for disruptive regeneration is the Kármán vortex street (KVS), which describes the pattern of alternating, staggered vortices that forms in the wake of a bluff body in fluid flow — stable, periodic, self-organizing, and produced entirely by the interaction between an obstacle and the surrounding medium.

Exhibit 1. Von Kármán vortex street formed by the volcanic islands of Cabo Verde, captured December 20, 2020. Image by Lauren Dauphin using MODIS data from NASA EOSDIS/LANCE and GIBS/Worldview. Credit: NASA Earth Observatory.



The pattern emerges from turbulence; nothing inside the vortices themselves directs their formation. What makes it compelling as a model for a regenerative framework is that it shows how coherent, repeating structure can emerge from conditions that look (and often feel) like chaos. *The thing resisting the flow is what generates the productive pattern*, meaning that institutional resistance to centralization and commodification can generate a distinctive, coherent, and iterable form of distributed learning.

A further, tangible and (albeit celestially) grounded, analogy helps to clarify what regenerative turbulence looks like in practice. First discovered by the Cassini Imaging Science Team in 2005, Daphnis is one of the smallest of Saturn's 146 moons and orbits within the Keeler Gap of Saturn's A ring (Porco *et al.*, 2005). Its gravitational influence on the ring particles at the gap's edges produces a regular, three-dimensional wave pattern: radial ripples that extend inward from the gap edge and vertical corrugations measurable by Cassini's cameras. The moon was theorized before it was seen, its existence inferred from the wave structure it generated in surrounding matter (Porco *et al.*, 2005). The pattern of turbulence, then, is not incidental to Daphnis's presence; it is its very presence.

Wave mechanics in the Keeler Gap are predictably asymmetrical and directional: material on the inner edge of the gap orbits faster than the moon, so the inner waves lead its orbit; material on the outer edge moves slower, so those waves trail behind. This creates two distinct wave signatures, produced simultaneously by the same small body moving through a differentially moving medium. Crests of diminishing amplitude follow in the moon's wake, each slightly different from the last as ring particles collide within them. The pattern is structurally coherent but not identical, producing patterned becoming as a manifestation of relationality between moon and ring edge.

Exhibit 2. Daphnis orbits within the Keeler Gap, generating three-dimensional wave structures in Saturn's A ring. Image taken January 16, 2017, by NASA's Cassini spacecraft at approximately 28,000 km from the moon. Credit: NASA/JPL-Caltech/Space Science Institute.



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What distinguishes this as *regenerative* rather than merely *generative* is that the wave pattern does not consume the medium that produces it. Ring particles are perturbed, displaced into crests and troughs, and then returned to the gap edge through the same gravitational and collisional dynamics that generated the wave. The medium is perpetually reorganized. The gap itself is maintained by Daphnis's ongoing presence: without the moon's gravitational shepherding, the gap would close as ring particles drifted inward. *Turbulence is what keeps the conditions open to further turbulence.* This is a key distinction between generative and regenerative: *the action reproducing the conditions of production* rather than simply participating in a repeated pattern.

Generative turbulence is visible in the present; regenerative turbulence is only verifiable across iterations, because what it must demonstrate is not pattern production but the renewal of the conditions for pattern production. This demand for temporal accountability distinguishes regenerative turbulence from adjacent concepts. Disruption produces novelty in a system, and sustainability stabilizes without necessarily renewing. Regenerative turbulence demonstrates that the disturbance itself leaves the generative field richer than previously found.

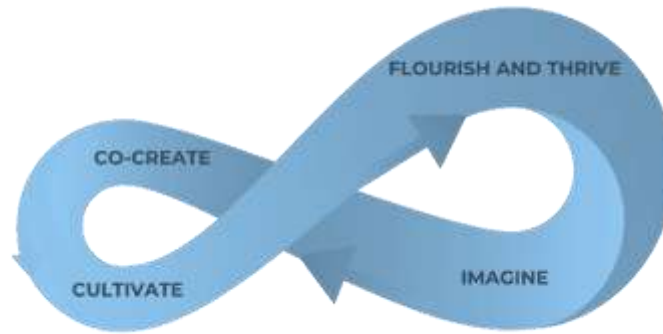
For a regenerative learning framework, this means that distributed, co-creative, place-based learning must demonstrably renew the relational, ecological, and epistemic conditions, including human and more-than-human communities, ecological and ecosystemic relationships, and onto-epistemological diversity that make such learning possible.

What Daphnis offers is visible proof of concept: turbulence that is structurally self-sustaining, condition-preserving, and productive across the age of the solar system. Ultimately, the project regenerative learning poses the question of *how such conditions can be actively designed for.*

The panarchy model provides the temporal and scalar vocabulary that helps to frame ongoing work in experience-led learning. Developed by Holling and Gunderson (2002) in *Panarchy: Understanding Transformations in Human and Natural Systems*, the adaptive cycle moves through four phases: growth, conservation, release and reorganization. Essential to this paper's argument are both the cycle's rootedness in ecological adaptation and the place of higher education within it. The system is currently deep in a conservation phase trending toward release: overcapitalized, credential-dense, epistemically brittle, and increasingly unable to absorb the feedback loops its own operational recursion excludes.

As noted earlier, the epidemic of institutional closures, erosion of trust, and untenable debt indicate that the system has reached a release threshold. The panarchy model holds that the release and reorganization phases are precisely where novelty and diversity enter the system. Diversity that was suppressed during the conservation phase, held at the margins by the energetic demands of maintaining a dominant configuration, becomes available again when that configuration releases. Regenerative learning operates in the conditions that follow release, prototyping the organizational forms and relational pedagogies that become viable and necessary in the reorganization phase.

Exhibit 3. A panarchy model for regenerative systems. Illustration by the author.



A regenerative framework invites reconsideration of what might appear to be institutional precarity as a positional advantage. Distributed architecture, lack of fixed accreditation, dependence on relational rather than bureaucratic coherence are all design features suited to a reorganization phase in which the stable model no longer holds. Regenerative turbulence, in panarchy terms, is what keeps the reorganization phase generative and not merely chaotic, producing an emergent pattern from prior release.

3 | Learning in the Gap

The pedagogical practices of experience-led, distributed, place-based learning are the processes through which the learner and the learning environment *constitute each other* (like moon and rings), shifting the question of educational design from what content is delivered and by what means to what conditions of relation make learning possible in the first place.

Whereas conventional pedagogy frames learning transactionally, as the transmission of knowledge from an authoritative source to a receiving subject, Ingold proposes that knowing emerges through a process of co-responsiveness between a being and its environment in which both the knower and the known are changed by the encounter (Ingold, 2011). This co-responsiveness is evidenced through what are often called High Impact Practices in higher education (AAC&U, n.d.) and is interwoven through pedagogy across deeply experience-led institutions such as Schumacher College (UK), Sterling College (Vermont, USA), Prescott College (Arizona, USA), Western Colorado University (Colorado, USA), and more. Through an experience-led, place-grounded regenerative learning environment, the learner comes to know by dwelling in and moving with a place over time. This is why regenerative, field-based, somatic, and community-embedded pedagogy is not simply a tick-box ‘high impact practice’ but one that produces a qualitatively different kind of knowing that is inherently relational, situated, and non-transferable out of the conditions that generated it.

The qualitative outcomes of these ways of knowing, however successful, remain to be fully integrated into more quantitative assessments of learning. Our current metacrisis in higher education (Stein 2019) and institutional closures must be both an inflection and a leverage point to change the very tenets of assessment and evaluation to which current models of education remain anchored.

Where Ingold focuses on the temporal unfolding of relationships between human and more-than-human communities, Karen Barad's agential realism insists that the very entities involved in relationships do not pre-exist them at all (Barad, 2007). Barad's framing of *intra-action* identifies the process through which phenomena, including subjects and objects of knowledge, emerge as distinct through their entanglement

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rather than entering that entanglement as already-formed entities. Applied to pedagogy, this means that the learner, the curriculum, the place, the community, and the more-than-human environment are co-produced through the pedagogical encounter itself: relationality is the pedagogical core. What a learner becomes during a distributed, place-based learning experience is not separable from where and with whom that experience occurs, and learning becomes an ever-emergent process of sympoiesis (see Haraway, 2016).

Together, correspondence and intra-action ground a pedagogy whose organizational form is always situated and co-evolves with relationship to place. If knowing is constituted through relation rather than transmitted across it, then the institutional structures that frame learning (the campus, the classroom, the accreditation framework, the credential) are themselves intra-active and contribute to the shaping of what kinds of knowledge, what kinds of knowers, and what kinds of relations are possible within them. A regenerative learning network, distributed across places and rooted in ongoing relations with specific communities and ecologies, creates space for a pedagogy constituted through entanglement with a particular more-than-human world rather than positioned above it as an observer or analyst.

This has direct implications for what a regenerative learning framework can provide. The network's distributed architecture, its distributed campus, its dependence on local ecological and community relations, and its resistance to standardized credentialing are the very core of its pedagogy. Entropy, vulnerability, uncertainty, and distributed accountability are part of the apparatus through which the learning is produced. In brief, these include:

- **Grounded learning** that is rooted in the lived experiences of students, teachers, community members, and the human and more-than-human communities and ecosystems of which they are a part. Often this rooting is literal, through the shared practice of growing food and restoring riparian ecosystems, and often it is metaphorical, through the building of deep connections to communities of practice.
- **Transdisciplinary learning** that not only bridges disciplines, but de-centers disciplinarity entirely in ways that empower learners to engage with seemingly intractable complex problems.
- **Integrative learning** emerges from the realright cognition that the learner is already embedded in webs of relation with place, community, and the whole of the living world. A holistic education honors and deepens those webs and actively connects theory, practice, and community at every turn.
- **Systems thinking** trains learners to understand the interconnected rhizomal webs of influence through which social and ecological challenges emerge. Empowering students (as well as faculty, staff, and higher education leaders) to think in systems weaves learning communities into feedback loops, thresholds, and highlights the often-invisible structures that reinscribe inequity and injustice.
- **Leveraging change** emphasizes where the learning community can find the threads of narrative, consciousness, inner capacities, and community engagement to make meaningful change. Drawing on systems thinking to turn insight into strategic action.
- **Meaningful action** is an essential element of regenerative learning where action arises from an authentically experience-led pedagogy has the capacity to become truly transformative.

Taken together, these six dimensions describe the living, breathing conditions of a co-creative curriculum: the relational, ecological, and epistemic ground within which regenerative learning becomes distinguishable from merely experiential learning. What connects them is the shared onto-epistemological commitment that the learner is always already entangled with the world being studied, and that the quality of that entanglement is itself the primary educational outcome.

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This is why the institutional form of a regenerative learning network cannot be separated from its pedagogical content. The distributed architecture, the place-rootedness, the resistance to standardized credentialing all constitute the conditions through which a particular kind of knowing becomes. The question section four takes up is what it would mean to deliberately design institutions that hold these conditions, and what stands in the way.

4 | Toward a Regenerative Institution

To unfix traditional, static educational frameworks requires a recognition of the fields of relation already in motion. Form, as Thomas Nail observes, "has no existence independent from the kinetic activity of its material conditions" (Nail, 2018, p. 56). The institution, on this reading, is never a settled form but a provisional resolution of forces and relations that precede and exceed it: "the material conditions for the emergence of things are *not things*" (Nail, 2018, p. 56). This is the ontological starting point for thinking about how distributed learning networks achieve coherence while remaining open to emergence.

Gilbert Simondon's ontology of individuation provides a precise philosophical grounding for this claim. For Simondon, being does not rest in stable identity but in a pre-individual field of tensions and potentials that precedes any individuated form (Simondon, 2020). Rather than asking what a thing is, Simondon asks what conditions support the emergence of anything at all. The pre-individual field is charged with potentiality, structured by irresolvable incompatibilities, gradients, and disparate scales of reality. Individuation, when it occurs, is always partial, always leaving a residue of pre-individual potential that keeps the field alive to further becoming. It is this metastable condition that makes individuation possible, and that keeps it from hardening into identity.

Within regenerative learning design, this metastable field becomes the ground of creative emergence: the condition in which nodes shift, relations reconfigure, and agency takes shape through movement rather than through structure. To extend Nail's assertion that "knowledge does not represent anything but rather moves and coordinates with other patterns [and] as a kinetic act, knowledge is part of the entropic spreading out of the world" (Nail, 2024, p. 103), the learner who moves through a place, attends to its patterns, and responds to its perturbations is not applying knowledge to a context: *The movement is the knowing*.

To build the bridge from vortices and perturbations to regenerative systems, I am indebted to Iain McGilchrist's reading of Schelling's notion that "we are simply more advanced whirlpools, more clearly articulated expressions of the absolute" (McGilchrist, 2021, Vol. 2, p. 967) which offers a physical image of exactly Simondon's dynamic. In Schelling's *Naturphilosophie*, the whirlpool models identity constituted through continuous throughput: the form persists because matter flows through it. This connects directly to how Kriti Sharma defines interdependence. The whirlpool has no independent existence; Sharma re-orient us from seeing "things in interaction" to understanding "things as mutually constituted" (Sharma, 2015, p. 2). The institution, like the whirlpool, is not a container of activity. It is the pattern that activity makes as it flows through a relational field.

Exhibit 4. Leonardo da Vinci, *Studies of turbulence* (c. 1510–1512). Ink on paper, RCIN 912660. Royal Collection Trust, Windsor. Public domain. Via Wikimedia Commons.



For regenerative learning, this reframing has direct (de)institutional implications. A regenerative learning network achieves coherence by unfixing its boundaries and by *maintaining the quality of its relational field* as the ongoing responsiveness between learners, places, communities, and ecologies that constitutes the network as a network. Its distributed architecture, de-institutionalized approach, and resistance to standardized credentialing are the structural expressions of this commitment. They keep the institution metastable precisely because of its inbuilt resilience through its engagement with turbulence.

This is the sense in which regenerative turbulence, as developed in this paper, moves beyond a theoretical frame toward a principle of institutional design. Daphnis does not maintain the Keeler Gap by asserting its boundaries. It maintains the gap through the ongoing gravitational responsiveness that keeps the relational field, including the differential velocities, the ring particles, and the wave pattern, in productive motion. The question regenerative learning frameworks pose is whether an institution can be designed to do the same: to hold its relational field open, to remain responsive to perturbation, and to renew the conditions of its own generativity rather than enclosing them.

An authentically regenerative institution, then, reaches beyond reforming the existing structures of higher education. It is a different kind of entity altogether: one that holds its relational field open rather than enclosing it, that achieves coherence through ongoing responsiveness rather than through fixed organizational form, and that treats the metastable conditions of distributed, place-based learning as the source of its generativity rather than as risks to be managed. Regenerative learning occupies the gap that

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higher education's conservation-phase brittleness has produced, and it generates, in that gap, the wave patterns that make a different kind of *living-systems learning community* legible. Whether those patterns prove durable across iterations and whether the turbulence remains regenerative rather than merely disruptive is the question that the limitations of current practice make unavoidable, and that only time, sustained relation, and honest accountability can answer.

5 | Learning to Reorganize

The three questions posed at the end of section one are not rhetorical:

- What would it mean to lead with practice rather than credentials?
- What effect would it have to lead with relationship rather than compliance?
- And what would it mean to take ecological framing seriously as an ontological and relational claim about what learning is and where it lives?

Throughout its discussion, this paper has not answered these questions so much as changed the conditions under which they can be asked. The framework of higher education as an autopoietically closed system reproducing its own dysfunction shifts the questions from matters of policy or pedagogy to matters of systemic design, and systemic design, as Meadows (2008) insists, operates most powerfully at the level of the goals and paradigms from which structures arise.

The institutional turbulence of our time requires specifiable conditions for a regenerative paradigm to remain viable; for instance in the case of assessment and evaluation (where accreditors and legislators continue to tie learning outcomes narrowly to graduate incomes), labor protections (for faculty and staff often working outside mainstream academia), pedagogical sustainability (and a recognition that such teaching is high-touch, resource-intensive work), economic viability (readily underscored by the recent closures of many experiential, place-based, and ecologically focused colleges), openness to shared governance networks (and thus rethinking more monolithic, competitive tuition-driven models of education).

Regenerative learning offers more than a new paradigm; it provides a framework and an already field-tested prototype. What experience-led learning in a regenerative framework is testing is whether a distributed, place-based, relationally constituted learning network can operate in the reorganization phase of higher education's panarchy cycle without either collapsing into the conservation-phase structures it is attempting to move beyond, or dissolving into the precarity it treats as a design condition. That test is ongoing, and its outcome is genuinely uncertain.

What Daphnis makes legible, finally, is a particular kind of question. The moon does not know it is generating the wave. It persists in its orbit, in the Keeler Gap, in its gravitational relation to a differentially moving medium, and the motion of the wave is what results. The question regenerative learning poses is whether learning can be redesigned to both know what it is doing and to be openly responsive and adaptive to systemic changes. This institutional self-awareness is essential to developing the capacity to observe and reorganize its own conditions of production. Ray Ison (2017) calls this second-order systemic practice designing conditions in which systems can observe and reorganize themselves. That is the horizon toward which regenerative learning networks are oriented, and toward which, in the turbulent gap between what higher education has been and what it might become, they continue, uncertainly and generatively, to move.

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