SYSTEM

DRIVEN

INNOVATION

Politecnico di Torino

UC | Chile

SYSTEM-DRIVEN INNOVATION (SDI)

The Value of Systemic Design in the Development of Innovation Ecosystems.

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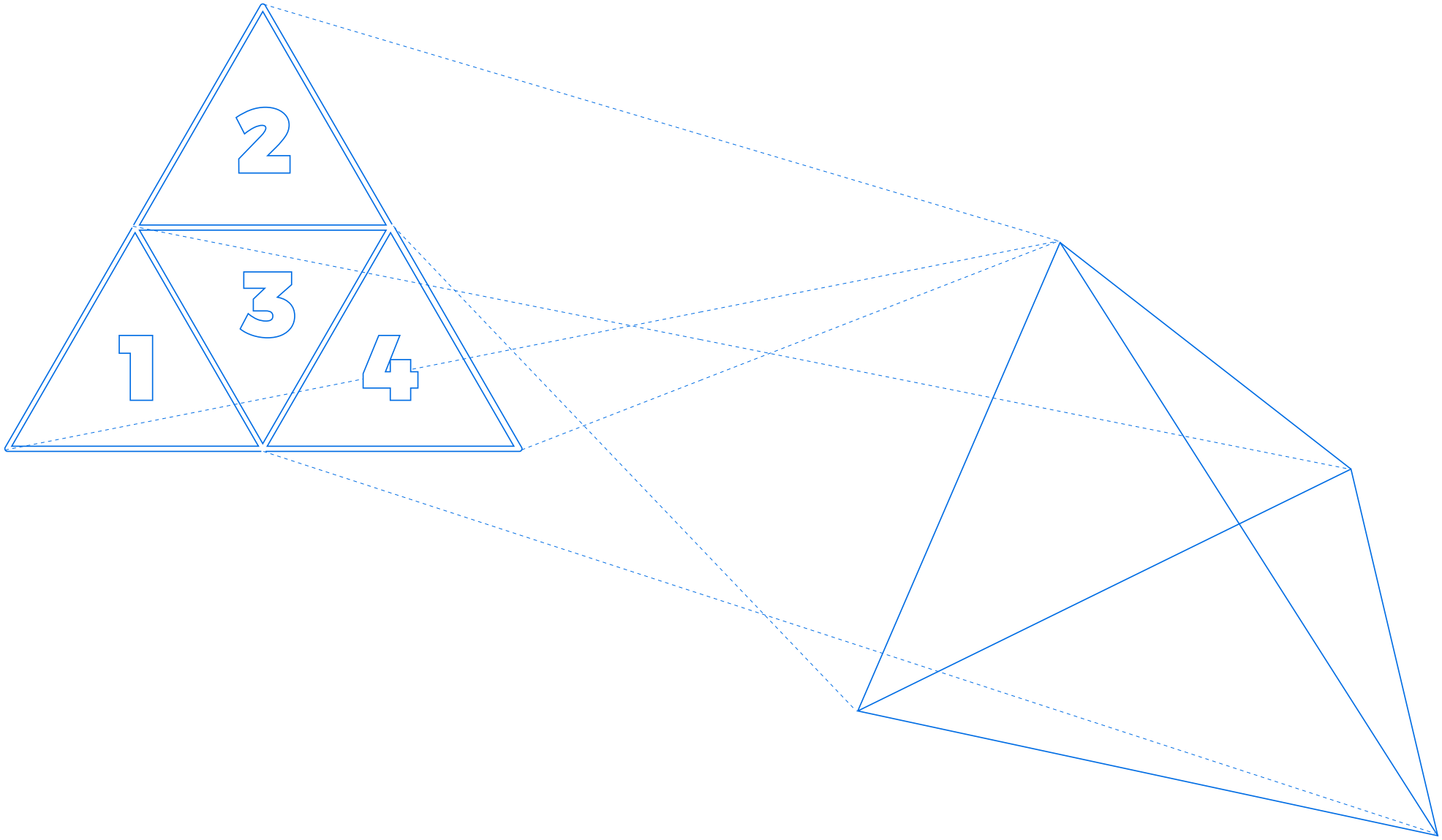
Abstract

In the context of the unprecedented global challenges of the 21st century, this thesis addresses a fundamental crisis of perception that perpetuates the ineffectiveness of traditional innovation models. It introduces the concept of Wicked Dynamic (WD), a systemic pattern of failure where a linear and reductionist view of systems leads to Wicked Systems (WS). These WS generate Wicked Problems (WP), which are then "solved" with Wicked Innovations (WI) that reinforce the original dysfunction. This research reveals how design, often instrumentalized in superficial roles, possesses a vast, underestimated transformative potential.

The thesis proposes the System-Driven Innovation (SDI) Model as a theoretical-practical framework to counteract the WD. SDI integrates systems thinking with the generative capacity of design, redefining innovation as a continuous and collaborative process. It is grounded in principles of self-organization and the transition from economic value to systemic value, seeking not only efficiency but also multidimensional resilience and sustainability.

The research methodology is developed iteratively, diagnosing the complexity of the innovation ecosystem and designing an actionable roadmap for SDI implementation. The intervention focuses on Micro, Small, and Medium-sized Enterprises (MSMEs) and, particularly, on B Corporations, which are considered catalysts for a new paradigm. SDI seeks to empower these organizations to transition from a reactive management of failure to a proactive stewardship of resilience, cultivating internal capabilities and promoting collaboration for holistic value creation. In essence, this thesis demonstrates how design, elevated to a transversal strategic capability, is the imperative for co-creating systems that learn to design better futures for themselves.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Introduction

This thesis project is situated within the historical dynamic of innovation and the value of design as a discipline that guides the reconfiguration of possible futures through its intrinsic capacity for synthesis and its projective orientation.

Throughout this research, we will understand innovation not as an isolated event or a mere incremental improvement, but as a continuous, collaborative, and fundamentally systemic process, whose central purpose is to address and counteract the structural dysfunctions that limit the adaptive capacity of systems.

Design will be approached not only as the creation of artifacts but as a transversal strategic capability to shape the interactions, flows, and structures of complex systems, acting as a catalyst for transformation. An ecosystem will be conceptualized as a network of interdependent actors that, collectively, generate, diffuse, and apply novelty, operating through particular logics and contributions.

Systems thinking, for its part, will be explored as a crucial discipline and mindset capable of conceiving life and organizations as interconnected "networks of networks" (Capra, 1996), offering an indispensable way to understand and act effectively in the face of uncertainty.

This approach is nourished by the understanding of the work and framing of authors such as Fritjof Capra, who teaches us to see life as a web of relationships, and Donella Meadows, who emphasizes the capacity to visualize the totality of interrelationships and patterns of change in systems. Their contributions have nourished the space for systemic interventions that seek to deeply impact the construction of resilience, the promotion of multidimensional sustainability, and the generation of collective knowledge.

Born from a personal question about the persistent gap between the vast transformative potential of design and its practical impact on solving complex problems, this project delved into discovering how and why design is systematically limited.

This journey of awareness revealed that, despite decades of advances in innovation management, its fundamental approach has often remained anchored in optimizing what exists, rather than in its fundamental transformation.

This observation, which will be explored in detail in Chapter 2, led to the understanding that inefficiency and wasted potential are not just bad business, but a structural barrier to development and well-being, especially from the perspective of the Global South.

The thesis is born from the conviction that a foundational mindset is essential to question orthodoxies and that the value of proactivity in a dynamic world lies in the ability to envision and proactively cultivate diverse possible scenarios, transcending mere reaction to symptoms.

The research underpinning this thesis was developed through an iterative and reflective process, which will be detailed in Chapter 1. This chapter will lay the foundations of systems thinking and reclaim the inherent potential of design as an agent of change.

Next, Chapter 2 will delve into the identification of the "Wicked Dynamic" (WD), a recurrent pattern of systemic failure manifested in Wicked Systems (WS), Wicked Problems (WP), and Wicked Innovations (WI). It will be argued that this dynamic is the result of a mistaken understanding of systems as static and immutable linear interconnections, and that traditional innovation models are insufficient to address it.

Chapter 3 will present the central proposal of this thesis: the System-Driven Innovation (SDI) Model. This model will be presented as a theoretical-practical framework that integrates the analytical rigor of systems thinking with the generative capacity of design, offering a way to navigate complexity,

manage the WD, and build resilience and multidimensional sustainability. Its fundamental principles, its methodological phases designed to directly intervene in the components of the WD, its multilevel impact, and the redefinition of the designer's role will be detailed.

Finally, Chapter 4 will address the practical application of the SDI model, translating it into an actionable roadmap for organizations. It will confront the reality that innovation is inherently inefficient and prone to failure, arguing that forcing its emergent complexity within the limits of linear efficiency is a recipe for stagnation. This chapter will demonstrate how SDI can be a tool for managing complexity without eliminating it, allowing organizations, especially Micro, Small, and Medium-sized Enterprises (MSMEs) and B Corporations, to transition from managing failure to stewarding resilience.

The thesis will conclude that, to escape the Wicked Dynamic, a fundamental paradigm shift is required, a qualitative leap that is, in its essence, an act of conscious, second-order design, redefining what we understand by "value," "organization," and "innovation."

Chapter 1:
The Systemic Approach and the Transformative Power of Design.

"Embracing and Uncovering Complexity through Systemic Design intervention"

At the dawn of the 21st century, humanity faces a crossroads defined by challenges of unprecedented complexity. Global factors such as the climate crisis and economic instability, social inequality, and technological disruptions suggest that contemporary problems are characterized by deep interconnectedness, constant dynamism, and resistance to simplistic or fragmented solutions.

In this context, the need for conceptual and methodological frameworks capable of navigating this complexity emerges with renewed urgency (United Nations, n.d.), not as an insurmountable obstacle, but as an inherent characteristic of living systems and human organizations (Bertalanffy, 1968).

This chapter delves into systems thinking as a crucial discipline and mindset for this era, exploring how its capacity to conceive life and organizations, as described by Capra (1996) as interconnected "networks of networks," offers an indispensable way to understand and act effectively in the face of uncertainty.

In parallel, the role of design is analyzed, an inherently projective discipline with a profound capacity for synthesis, approached from a critique of its frequent instrumentalization, often subordinated to commercial interests and superficial expressions, pivoting towards its vast transformative potential when freed from these constraints and oriented towards the creation of social and environmental value (Papanek, 1971; Manzini, 2015).

The fundamental thesis articulated in this chapter is that the synergy between systems thinking and design, represented by Systemic Design, is not only possible but essential. This convergence offers a path to build resilience, foster sustainability, and generate collective knowledge, positioning systemic design intervention as a privileged means to "embrace and discover complexity."

Throughout the following pages, the fundamentals of systems thinking will be broken down, the potential of design as an agent of change will be argued, the nature and principles of Systemic Design and its intervention will be explored, and the evolution of the designer's role towards a manager of systemic transformation will be anticipated.

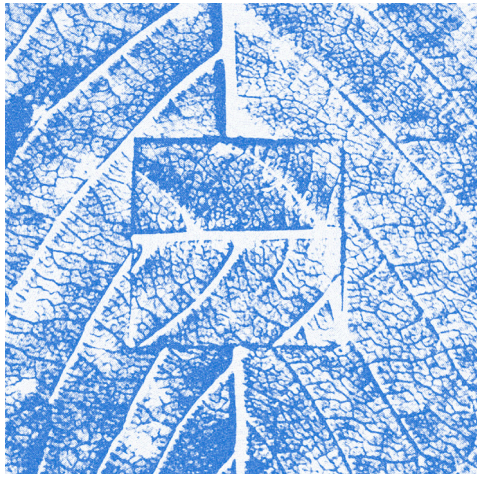
1. Introduction to Systems Thinking

"In what way has the intricate network of interactions in ecosystems sustained itself over time, and how has human activity, in its diverse manifestations, modulated this dynamic?"

The open-ended nature of questions like the one posed demands answers of similar breadth. If one were to address a question of such magnitude, it might seem evident to assume that the answer lies in a debate merely constructed through opinions and personal (frequently isolated) experiences.

However, the effectiveness of the answer to this type of question resides in the implications that the very formulation raises in the actor seeking to elucidate them; When attempting to grasp the vast complexity of planetary and human history, as well as the systems that make up our intricate network of interactions, linear thinking (of a reductionist or strictly personal nature) does not provide the capacity to answer such a question with the required depth.

Analysis, then, becomes necessary; an analysis of actions, their consequences, and the actors involved in situations that demand understanding, something that Morin (2007) emphasizes when advocating for complex thought capable of addressing interconnections and uncertainty.



Nota. Adaptada de una fotografía de una intervención artística sin título, por S. Visan, 2020, This Is Colossal (https://www.thisiscolossal.com/2020/06/stefan-visan-interventions/).

Authors like Fritjof Capra, from a scientific perspective, use systems thinking to unravel the inherent structural complexity of vital phenomena, proposing a vision in which interactions between system components are crucial for their sustainability (Capra & Luisi, 2014). Others, like Peter Senge, employ this worldview to develop methodologies and structures applicable to entrepreneurship and business sustainability, conceiving it as a tool to optimize the allocation of time, capital, and resources, and to avoid decision-making with an exclusively short-term focus (Senge, 1990).

Within the framework of this thesis, systems thinking will be employed as a tool for constructing answers, but also as a perspective for contemplating the context, facilitating the understanding of the inherent complexity of the innovation and design ecosystem, and exploring ways to positively influence it. Given its nature as a holistic approach and an intellectual discipline, systems thinking is, therefore, fundamental for investigating the factors and interactions that shape the manifest actions and consequences in said ecosystem.

This condition of fundamentality and its proven effectiveness in various fields (exemplified previously by Capra and Senge, and which we will delve into in the next paragraphs) underscore that, more than a simple prescriptive methodology, systems thinking is configured as an essential mental paradigm (mindset) for addressing the intricate dynamics of the contemporary world. Its multiple interpretations facilitate its application both in the personal sphere and in the professional and organizational realm. In this context, and regardless of the diversity of its applications and interpretations, systems thinking operates transversally as a discipline that, according to Meadows' (2008) perspective, allows for the visualization of the totality of interrelationships instead of isolated elements, as well as the identification of patterns of change instead of static configurations.

This breadth of application underscores its value as a robust conceptual framework for deep understanding and effective action in a global environment characterized by increasing complexity, interconnection, interdependence, and an accelerated dynamic of change. In such a scenario, systems thinking acquires particular relevance, being fundamental for understanding and addressing crucial problems (such as political governance, climate change, and the economy), given that these constitute complex systems originated and sustained by human activity, a perspective already advanced in the influential works of the Club of Rome (Meadows et al., 1972).

In the so-called "era of interdependence" (Iriye, 2014), systems thinking stands as a resource to counteract the perception of powerlessness in the face of the magnitude of contemporary challenges, inasmuch as it facilitates the identification of the fundamental causes of problems and the potential discernment of new opportunities.

1.1. Fundamental Principles of Systems Thinking

In synthesis, systems thinking is configured as a comprehensive approach that, overcoming the fragmented visions of linear-reductionist and mechanistic-positivist paradigms (which often lead to superficial solutions and unforeseen consequences), addresses problems as manifestations of broader dynamic systems. This critique of traditional approaches and the proposal of a more holistic vision is a pillar advocated by various key authors of systems thinking (Bertalanffy, 1968; Capra & Luisi, 2014; Morin, 2007).

This perspective prioritizes a deep understanding of the interconnections, relationships, and patterns of behavior that give rise to the emergent properties of these systems, thereby allowing for a more effective conceptualization and framing of the complexity inherent in any system, be it an organization, an ecosystem, or a social problem, as highlighted by Meadows (2008) when detailing how systems operate.

To materialize this understanding and facilitate transformative intervention, systems thinking is articulated through a series of fundamental principles and concepts. The application of these principles not only provides clarity for acting in the face of complexity but also fosters situational awareness **(Awareness)** to identify emergent opportunities and intervene in a timely manner. Likewise, it serves as a guide for designing strategies aimed at structural change **(Transformation)**, managing the transition between phases **(Transition)** collaboratively with system actors **(Co-created)**, and relies on activities that help visualize and organize complexity and its key points **(Data visualization)**.

The following are the key principles underpinning this approach, formulated from the bibliographic analysis of this thesis:

1. **Focus on Wholeness and Interrelationships:**

   Considered a cornerstone of systems thinking, this principle establishes that the components of a system do not exist in isolation but are intrinsically connected. This fundamental interconnection implies that actions or changes in one segment of the system necessarily affect others. Therefore, it emphasizes the imperative need to address the system in its entirety (holism/wholeness), focusing the analysis on the network of connections, interdependencies, and how these shape the overall nature and behavior of the system, as opposed to the fragmented study of its elements.

   This concept is central to General Systems Theory (Bertalanffy, 1968) and is extensively developed by contemporary authors who explore the systemic view of life and the understanding of complex systems (Capra & Luisi, 2014; Meadows, 2008).

   Generating the holistic phenomenon that leads to the inherent and distinctive property arising from this approach: the:

   - **Emergence:** This refers to the manifestation of properties, behaviors, or patterns at the global system level that are not present in its individual components and cannot be inferred from the simple summation of their characteristics. These properties 'emerge' as a result of the interactions and relationships among the components, constituting a fundamental concept in the understanding of complex systems (Capra & Luisi, 2014; Meadows, 2008).

2. **Understanding Dynamics and the Role of Feedback Loops:**

   This principle underscores the importance of analyzing systems not as static entities but as inherently evolutionary processes (Meadows, 2008). It emphasizes the need to observe and comprehend how behavior, structures, and interrelationships within a system unfold, interact, and transform over time, thereby revealing evolutionary trends and patterns.

   Central to this dynamic understanding is the recognition and analysis of feedback loops (both reinforcing and balancing). These circuits operate as the fundamental mechanisms driving system dynamics, decisively influencing its stability, growth, adaptation, and the behavioral trajectories it manifests over time, forming the basis of circular causality (Sterman, 2000).

   According to Meadows (2008), the two main types of feedback loops are:

- **Reinforcing Loops (Positive):** Characterized by amplifying change or growth in a particular direction. A small initial change can generate progressively larger effects, and these loops can, in turn, generate emergence and novelty within the system.

- **Balancing Loops (Negative or Compensating):** Seek to maintain system stability and tend to counteract deviations from a desired state or goal, acting to keep the system within certain operational limits.

3. **Encompasses the Influence of Structure on Behavior:**

This principle posits that the observable behavior of a system, rather than being exclusively attributable to external events or merely individual factors, is primarily a manifestation of its underlying structure. This structure is understood as the organization of its components, their interconnections, and the policies or rules that govern them.

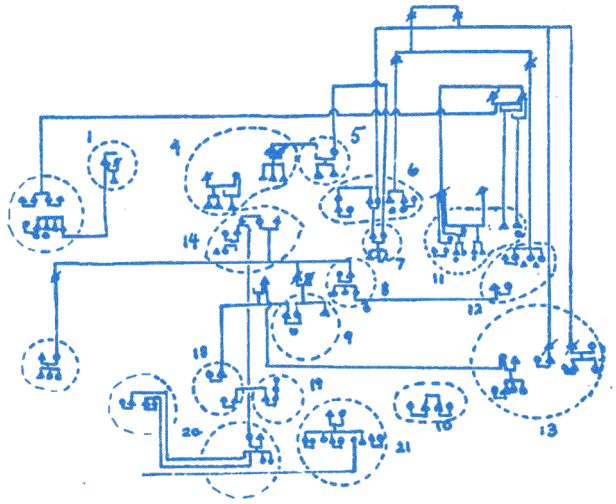
Consequently, the system's overall behavior not only acts as a representation of its totality but is fundamentally an emergent property, originating precisely from this structural configuration and the interactions it facilitates. This perspective is a cornerstone of systems thinking and system dynamics (Sterman, 2000; Meadows, 2008).

4. **Viewing the System Through Different Lenses and Scales:**

This principle encourages adopting multiple perspectives and analyzing the system at various scales, from the micro-level of individual components to the macro-level of the system within its environment, and vice versa. This approach aims to reveal different facets of its complexity and functionality. Such a multi-scale and multi-perspective examination necessarily involves considering:

- **The Hierarchy of Systems:** Recognizing that systems often exist within larger systems (suprasystems) and, in turn, are composed of interconnected subsystems. This allows for an understanding of how different levels mutually influence each other (Bertalanffy, 1968; Beer, 1972).

- **System Boundaries:** This involves the conscious and reflective delimitation of the scope of the system under analysis, defining which elements are considered internal and which are part of its environment. These boundaries are not necessarily fixed and can be redefined according to the lens or scale of observation for different analytical purposes (Meadows, 2008; Senge, 1999).



Nota. Adaptada de "Figure 15. Genealogies of All Gwe, Arranged as to Household", por A. Perey, 2017, Perey Anthropology (https://www.perey-anthropology.net/aesthetic-social-organization/Oksapminchapt3C.html).

5. **Recognizing Complexity and Uncertainty:**

This principle asserts that complex systems are inherently non-linear, dynamic, and often counter-intuitive, demanding the acceptance and management of uncertainty and unpredictability as inherent realities in their study and intervention.

This acceptance, far from leading to paralysis, redefines the nature of effective action.

By abandoning the illusion of control (Langer, 1975), systems thinking enables a transformative approach to "doing": the precise prediction of the future gives way to the capacity for proactively envisioning and cultivating diverse possible scenarios. The desire for total control over systems transforms into a focus on their adaptive design and redesign.

Similarly, the pretense of a world free from surprises is replaced by the anticipation of unforeseen events, continuous learning from them, and their potential strategic utilization.

Consequently, imposing an external will on the system is superseded by active listening and a deep understanding of the signals and dynamics the system itself emits, thereby guiding more resonant and sustainable interventions.

6. **Intervention Through Leverage Points:**

This principle focuses on identifying leverage points: specific areas or elements within a system's structure where strategic, often small-scale, interventions have the potential to generate significant and sustained changes in the system's overall behavior.

The purpose of such interventions extends beyond simply modifying behavior, consequently aiming for a reconfiguration of the systemic structure itself and the potential establishment of new "attractors" or states of dynamic equilibrium (Meadows, 1999).

7. **Uncovering Mental Models:**

This principle highlights how deeply ingrained beliefs, assumptions, and generalizations held by individuals (which constitute their mental models) shape their understanding of a system and, consequently, their decisions and actions concerning it, with the potential to both limit and enable change.

Hence, it is fundamentally important to make these models explicit in order to subject them to critical analysis and eventual restructuring. This process is indispensable for understanding the root causes of significant problems. This concept is one of the cornerstones of the learning organization (Senge, 1990).

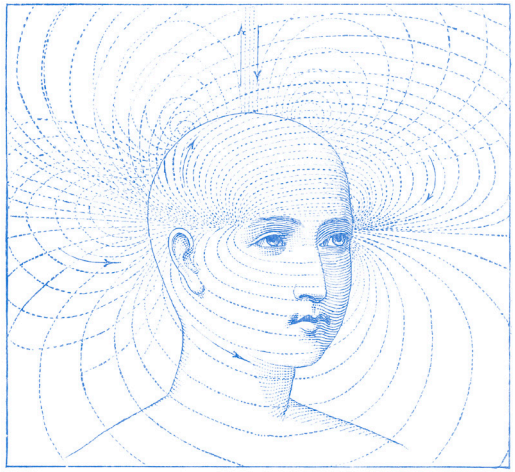


Fig. 187. The Psycho-Magnetic Curves.

Nota. Adaptada de "Fig. 187. The Psycho-Magnetic Curves", en The Principles of Light and Color, por E. D. Babbitt, 1878 (https://publicdomainreview.org/collection/principles-of-light-and-color/). La obra se encuentra en dominio público.

8. **Utilizing Synthesis as a Product of Analysis:**

This principle advocates for the complementarity of analysis (decomposing a whole into its parts for detailed study) with synthesis (understanding the whole from the interaction and organization of its parts, and the emergence of properties not present in isolated components).

While analysis provides specific knowledge about individual components, it is synthesis that offers a systemic understanding of the whole and its dynamics.

Nota. Adaptada de El Toro, por P. R. Picasso, 1946, Museu Picasso Barcelona (https://museupicassobcn.cat/es/coleccion/obra-de-arte/el-toro).

This is crucial because a system, when merely decomposed through analysis, "loses" its emergent properties, which require interaction among its parts and are not present in isolated components (Ackoff, 1974; Gharajedaghi, 2011)..

9. **Maintains an Adaptive and Pluralistic Methodology:**

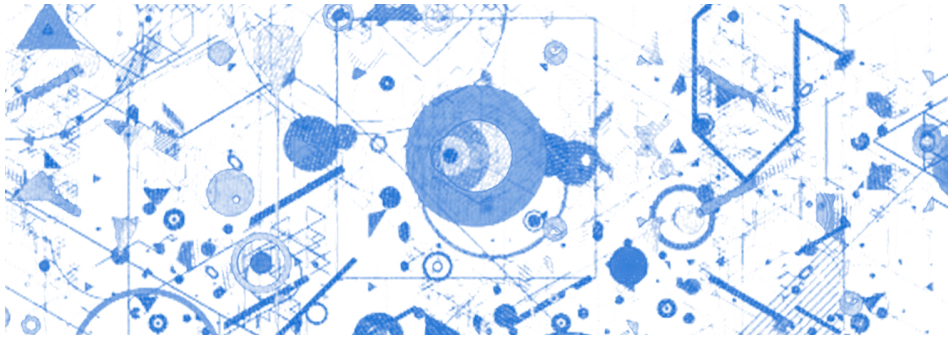
This principle highlights the methodological plasticity of systems thinking, which integrates a broad spectrum of tools, techniques, and approaches (both qualitative and quantitative). These are adapted to the specific nature of the system and the problem being addressed, rather than prescribing a single rigid procedure.

This flexibility is the result of a rich historical evolution, where initially more mechanistic and descriptive perspectives have transitioned towards progressively more interpretive, participatory, and action-oriented approaches.

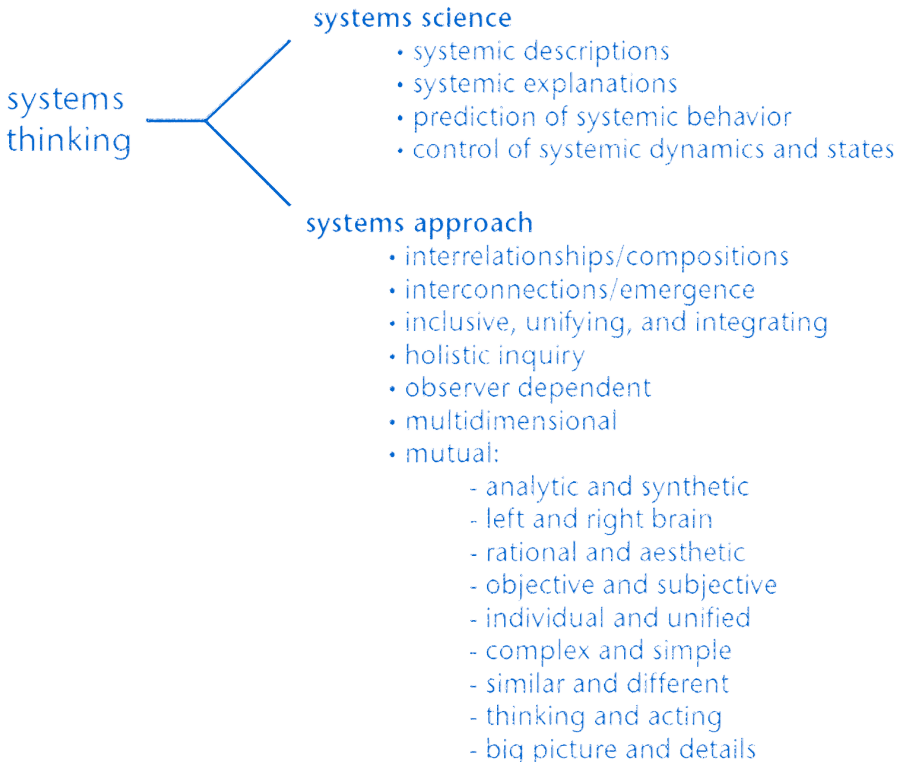
Thus, the pragmatic and reflective use of diverse perspectives is promoted to address the inherent complexity of systems and facilitate effective interventions (Jackson, 2003).

In the context of this thesis, the distinguishing characteristics of systemic thinking establish its conceptual foundation as a metadiscipline, understood as "one that integrates diverse disciplines" and operates by weaving the "web of life" (Capra, 1996). Based on this conception, the present research defines that the metadisciplinary nature of systemic thinking enables a series of crucial cognitive and operational processes, empowering the actor who integrates them to:

- **Organize and Evaluate Information:** It facilitates the grouping, structuring, and critical analysis of information, laying the groundwork for identifying and understanding complexity.
- **Visualize and Comprehend Systemic Perspectives:** It facilitates the visualization and interpretation of diverse perspectives, allowing for analytical transitions between micro and macro levels (zooming in-out), as well as the identification of patterns (fractals) that reveal self-similarity across different scales of the system.
- **Transition between Identification, Distillation, and Translation of Essential Knowledge:** It enables the identification of recurrent patterns, the distillation of information to extract its essential components, and its subsequent translation into a common and accessible language. This process fosters an approach to objective thinking, minimizing individual biases.
- **Communicate and Connect Effectively:** Finally, it promotes clear communication and the effective transmission of knowledge (thereby enhancing the teaching of this new information), in addition to fostering networking and interconnection among various actors or nodes within the system.



Nota. Adaptada de Virtual chaos, por D. Bellorin, s.f., EMPK (https://www.empk.net/).



Nota. Tomado de "Figure 3.3 Systems thinking", de The design way: Intentional change in an unpredictable world (2.. ed., p. 60), por H. G. Nelson y E. Stolterman, 2012, The MIT Press. Copyright 2012 por The MIT Press.

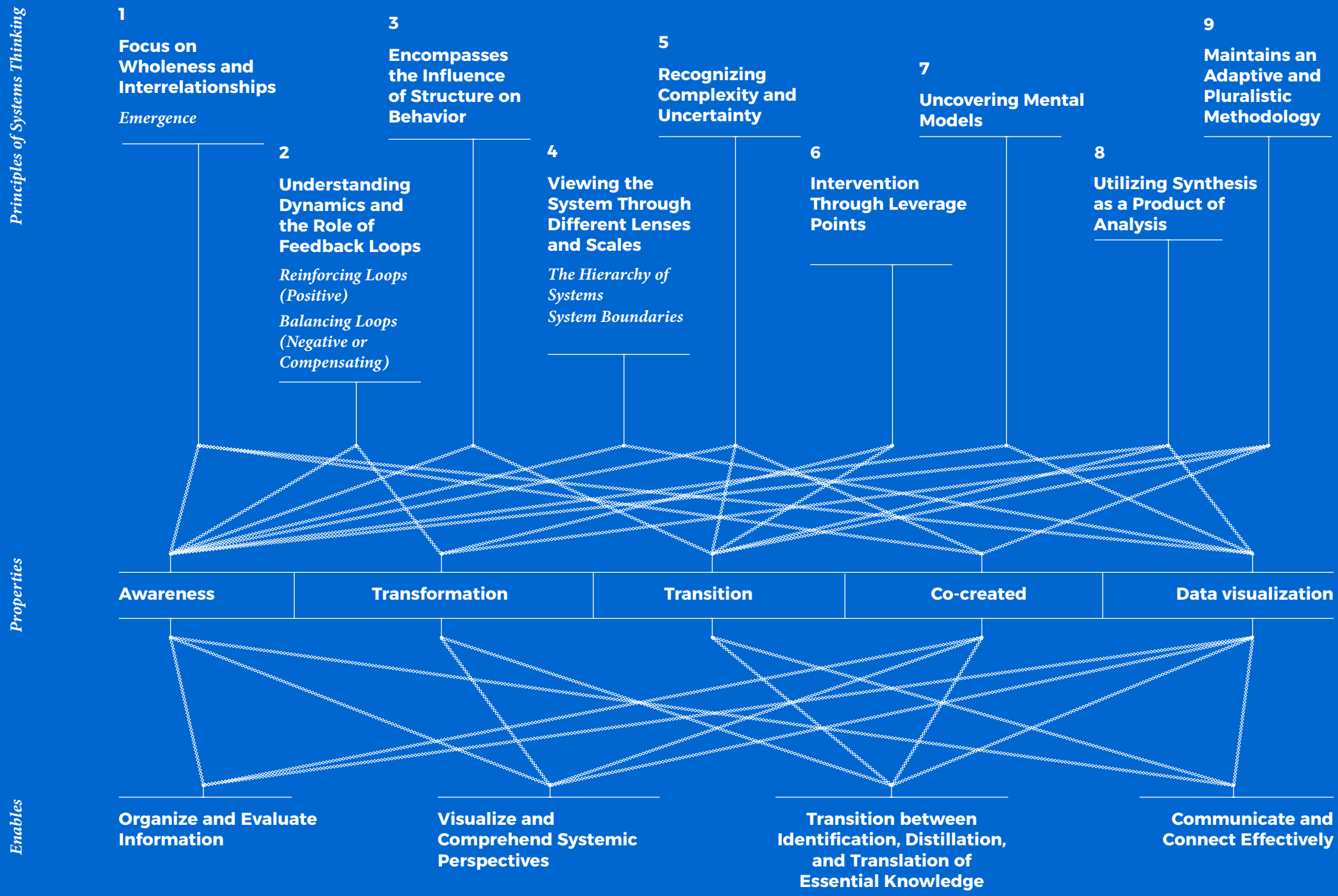


Figura 1, Principios, conceptos y facultades del pensamiento sistémico, Nota. Elaboración propia.

1.2. Evolutionary Dynamics and Its Academic Relevance

The origins of modern systemic thinking aren't linear but reflect a historical "pendular dynamic" that oscillates between mechanistic views (focused on parts) and holistic approaches (centered on wholeness and interrelationships) (Capra & Luisi, 2014; Morin, 2007; Gould, 2002). While classical scientific reductionism offered an understanding of the world as a predictable machine, the 20th century witnessed a decisive shift toward comprehending systems as dynamic, interconnected wholes.

Examples of this evolution include Ludwig von Bertalanffy's General Systems Theory, which laid the groundwork by seeking universal organizational principles (Bertalanffy, 1968). Norbert Wiener's Cybernetics introduced the crucial concept of feedback (Wiener, 1948). Jay Forrester's System Dynamics expanded these foundations, enabling the modeling of temporal complexity (Forrester, 1961), and Peter Checkland's Soft Systems Methodology, which addressed "messy" social problems (Checkland, 1981). Added to these are Donella Meadows' influential analyses on the limits to growth, emphasizing the systemic nature of environmental and social problems (Meadows et al., 1972).

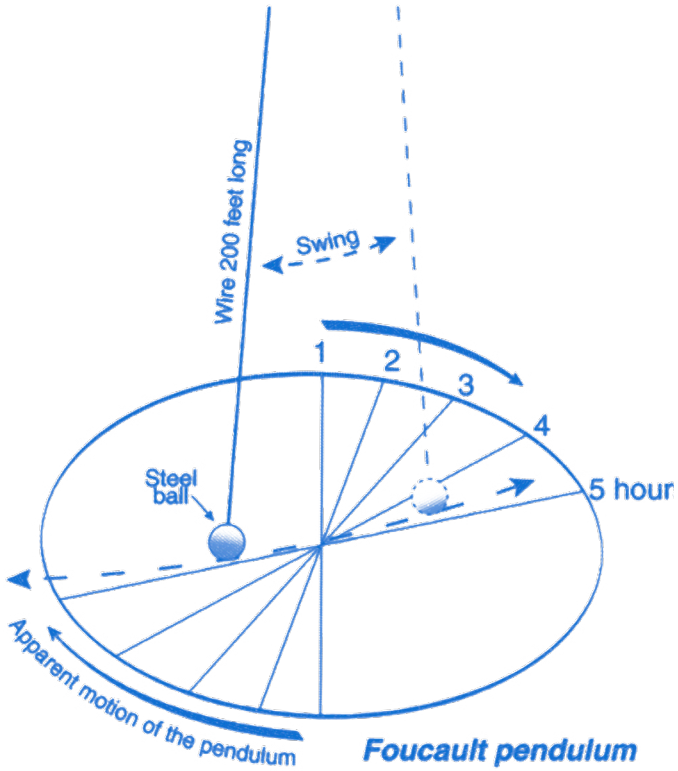
Later contributions from figures like Russell Ackoff, known for his focus on problem-solving and systems planning (Ackoff, 1974); Peter Senge, who applied systemic thinking to learning organizations (Senge, 1990); and Fritjof Capra, who explored the systemic view of life and ecology (Capra & Luisi, 2014); among many others, continued to diversify its tools and broaden its application to management, ecology, and the resolution of complex, interconnected problems, solidifying a field that values inherent complexity and dynamism.

While an in-depth review of the trajectory and dynamism of holistic-systemic thinking holds significant potential value for the academic purposes of this thesis by forming its theoretical framework, the understanding of the contemporary manifestation of the "cyclic mechanics" inherent in the human quest to apprehend complexity takes on greater relevance.

For this reason, the value of revisiting these origins lies not only in the historical background and theoretical construction of this research but in discerning that the tension between the analysis of parts and the synthesis of the whole, between the view of the world as a machine and as a dynamic network of interrelationships, is constant. Recognizing this pendular nature allows us to anticipate the inadequacy of purely reductionist solutions or, conversely, of excessive generalizations.

Therefore, the ultimate objective of this thesis section is the internalization of this historical evolution, as well as how the foundations of systemic thinking lead to a deeper appreciation of the dynamism inherent in any ecosystem or complex system. This understanding, nurtured by the academic experience of the current research period, constitutes the potential for the effective application of theory, enabling more conscious, adaptive, and sustainable interventions in the face of present and future challenges, which will predictably continue to manifest these cyclic tensions.

More than mere knowledge of the history and origins of the theory, understanding this evolutionary dynamic fosters the adoption of a positive predisposition toward constant change and the acceptance of an unpredictable future. This thesis anticipates that such a future, while oscillating between seemingly opposing views, will reveal in its development the inherent complementarity of this pendular dynamic; a perspective that this academic postulation considers essential for systemic intervention.



Oscilacion invisible, Nota. Adaptada de Foucault-pendulum-animated [Animación GIF], por Hellveticaneue, 2018, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Foucault-pendulum-animated.gif). CC0 1.0.

1.3. Embracing Uncertainty and Navigating with Anticipation

As discussed earlier in the chapter, consciously embracing the evolutionary dynamic identified within systemic thinking enables the individual who integrates it to develop capabilities (particularly relevant in this thesis's research context, which focuses on innovation as an inherently evolutionary concept). These capabilities are crucial for unraveling dynamic situations and providing fundamental analytical clarity in contexts of high uncertainty.

In this brief section of the thesis, we aim to demonstrate that precisely in these uncertain environments, systemic thinking allows us to discern that merely recognizing cause-and-effect relationships does not necessarily imply understanding their deferred impact in time and space. Therefore, in addition to integrating this vision, it's necessary to orient the theory towards precise and proactive interventions, in contrast to the "quick fixes" that emerge from linear or reductionist approaches. As Meadows (2008) pointed out, these quick fixes only address superficial symptoms.

In essence, this approach offers undeniable value, unlike reductionist methods, by addressing the root of problems rather than merely the sequence of their manifest consequences. It promotes the anticipation of changes and the development of adaptive strategies (Ackoff, 1974; Forrester, 1961; Meadows, 2008; Senge, 1990).

However, translating this strategic orientation into effective actions adapted to specific contexts requires methodological approaches to operationalize it tangibly.

Systemic thinking, by itself, does not guarantee the ability to implement effective transformative actions in practice. Such diagnostic depth, derived from this rich systemic understanding, while invaluable, poses a crucial question:

How can transformations be catalyzed and concretized so that they are not only effective but also contextually relevant and viable?

The fruitfulness of this question and the inherent need to translate theory into practice are evidenced by the vast proliferation of methodological adaptations that systemic thinking has inspired (Jackson, 2003; Midgley, 2000). Its application has extended to a wide spectrum of disciplines, each developing or adapting approaches to operationalize systemic principles according to their specific characteristics, anticipating the changes that the ecosystem's own dynamics present.

Table 1 illustrates, by way of example, this applied diversity, highlighting how different fields have sought to build their own "bridges" between systemic theory and "concrete" action (represented in an applicable framework).

General Application Category	*Systemic Methodology/Approach*	*Source*
Theoretical and Philosophical Foundations	*General System Theory (GST)*	*(Bertalanffy, 1968)*
	Cybernetics (especially 2nd order)	*(Wiener, 1948; Ashby, 1956; von Foerster, 1981)*
	Autopoiesis	*(Maturana & Varela, 1980)*
Management and Organization	*System Dynamics (SD)*	*(Forrester, 1961)*
	Learning Organizations	*(Senge, 1990)*
	Viable System Model (VSM)	*(Beer, 1979)*
Social and Complex Problem Solving	*Soft Systems Methodology (SSM)*	*(Checkland, 1981)*
	Critical Systems Thinking (CST)	*(Jackson, 2003; Ulrich, 1983; Flood & Jackson, 1991)*
Sciences (Natural and Social)	*Ecological Systems Theory*	*(Bronfenbrenner, 1979)*
	Social Systems Theory (Communication)	*(Luhmann, 1995)*
	Complex Adaptive Systems (CAS) Theory	*(Holland, 1995; Gell-Mann, 1994)*
Economy and Sustainability	*Industrial Ecology / Circular Economy*	*(Ellen MacArthur Foundation, s.f.; Braungart & McDonough, 2002)*
	Energy Systems Theory (Emergy)	*(H. T. Odum, 1983)*
Engineering and Technology	*Systems Engineering*	*(Hall, 1962; Sage & Rouse, 2009)*
	CMMI / SPICE (Process Improvement)	*(SEI, 2010; ISO/IEC, 2015)*
Public Policy and Planning	*Political System Model*	*(Easton, 1965)*
	Systemic Urban and Regional Planning	*(Forrester, 1969; Bossel, 1994; McLoughlin, 1971)*

Table 1: Applied Diversity and Methodologies of Systemic Thinking, Note: This table is an original creation.

This applied diversity, while demonstrating the inherent robustness and adaptability of systemic thinking, also highlights a crucial reality: translating its profound strategic orientation into effective actions tailored to specific contexts invariably demands the articulation or adaptation of methodological approaches that operationalize it.

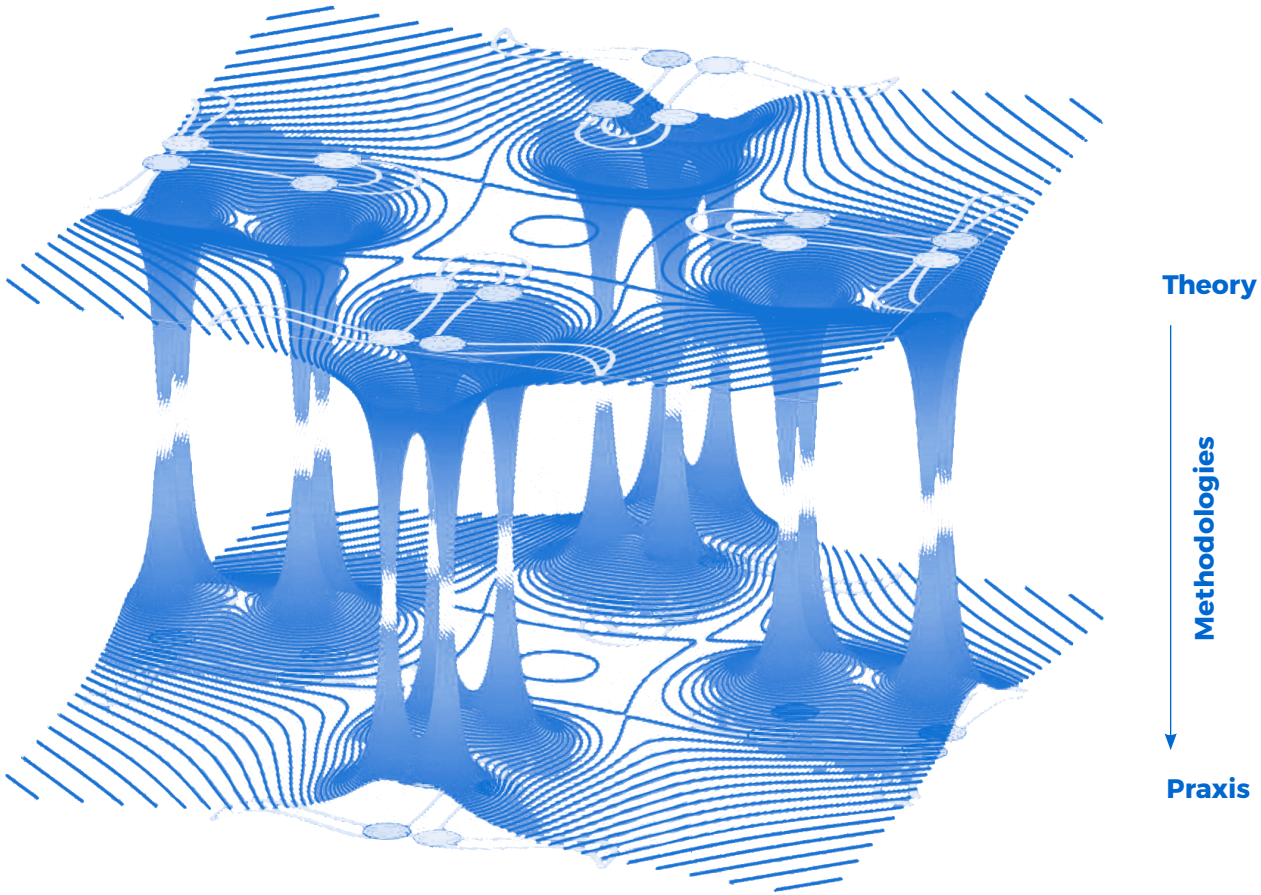
Nevertheless, beyond their instrumental particularities, these diverse methodologies share a fundamental core: all seek to transcend the observation of isolated events to comprehend the underlying structures, patterns of interrelation, and feedback loops

that govern system behavior. It is this capacity to discern the dynamic architecture of complexity that essentially allows them to anticipate the requirements and possible evolutionary trajectories of the system, thus facilitating more informed and proactive navigation in the face of uncertainty, rather than merely reacting to its manifestations.

In essence, although systemic thinking provides an extraordinarily rich theoretical framework for diagnosing complexity and guiding strategic intent, its conceptual breadth, by itself, does not guarantee direct and effective practical application. Therefore, to materialize its transformative potential and, crucially, to navigate complexity by "anticipating" dynamic uncertainty, it is imperative to prevent its theoretical depth from becoming a barrier to action. Consequently, it is indispensable for anyone intending to apply systemic thinking to consciously resort to specific "methodological bridges" that facilitate this transition from deep understanding to tangible and adaptive intervention.

This is why the work of those who undertake the challenge of developing and articulating the applicability of systemic theory is crucial. Their effort facilitates the co-creation of practices that are not only theoretically sound but also contextually relevant, viable, and coherent with the particularities of each territory.

Precisely in the exploration and consolidation of these methodological bridges lies a fundamental opportunity (which this thesis proposes to explore next through the integration of design) to enhance the full realization of systemic thinking in transformative action.



Tangible bridges, Nota. Adaptada de "Figure 1. Sketch of basic components of a pendulum clock with anchor escapement", por F. C. Moon y P. D. Stiefel, 2006, Philosophical Transactions of the Royal Society A, 364(1846), p. 2357 (https://doi.org/10.1098/rsta.2006.1839).

2. Superficial Design

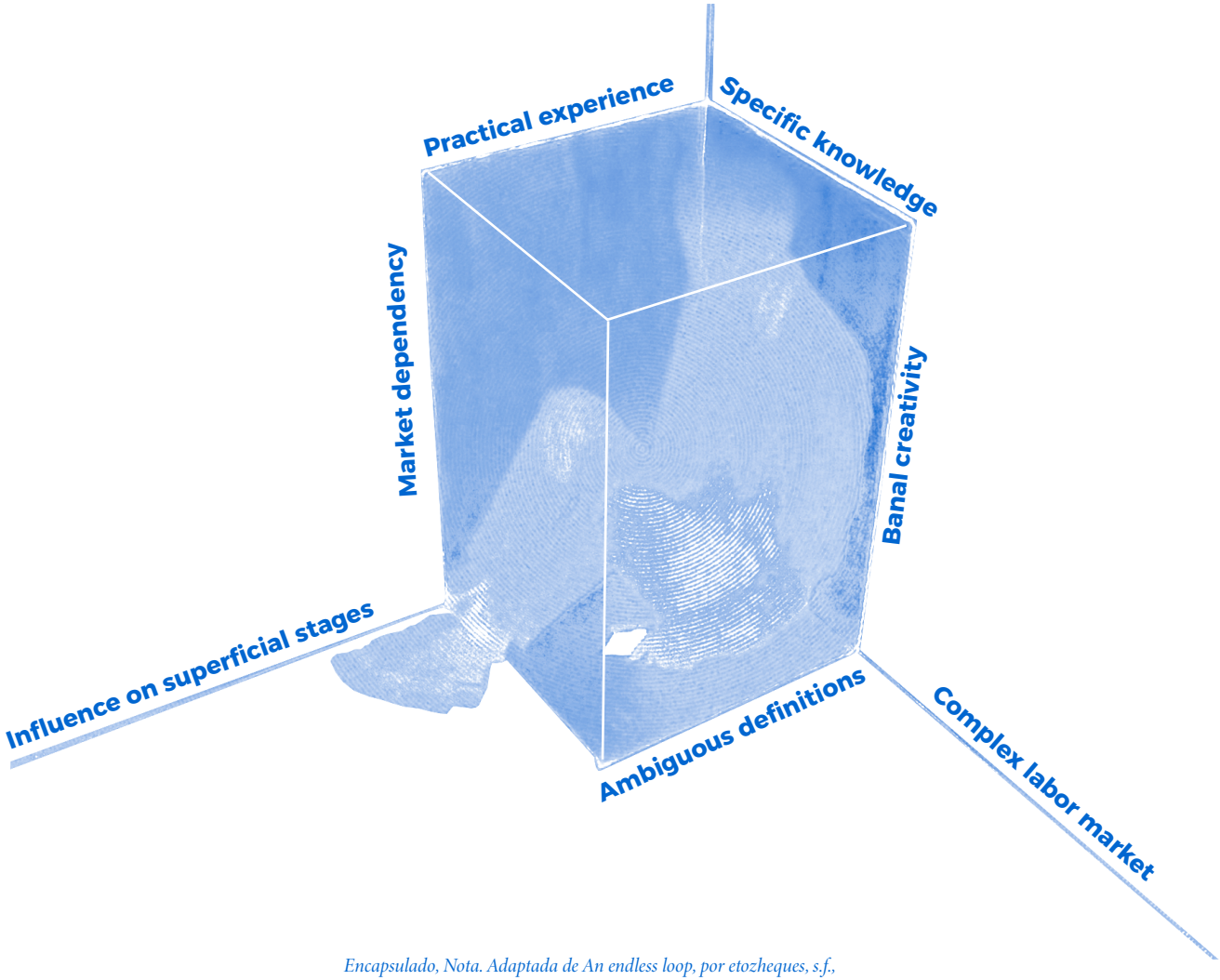
Before diving into design as a discipline and practice, and its potential integration with systems thinking, it's crucial to clarify the critical crossroads it currently faces.

This crossroads manifests as a fundamental tension: a dichotomy between understanding value as a systemic entity (comprehensively encompassing social, economic, and environmental dimensions) and a view of value predominantly reduced to its economic representation within market logic (short-term and largely limited to its economic cost) (Manzini, 2015; Fry, 2009).

The historical trajectory of design, especially since the Industrial Revolution, shows a progressive and persistent instrumentalization. In this constant cycle, its vast creative and projective potential has often been subordinated to market imperatives and mass production, with a recurring emphasis on superficial novelty and the stimulation of consumption.

Decade after decade, various authors have pointed out this same crossroads, where design remains confined to reacting to predominantly aesthetic or commercial demands, failing to fully unlock its inherent social, environmental, and systemic potential (Papanek, 1971; Margolin, 2015; Whiteley, 1993).

However, this dominant trend hasn't existed without significant counterpoints.



Encapsulado, Nota. Adaptada de An endless loop, por etozheques, s.f., Pinterest (https://it.pinterest.com/pin/935271047618852874/).

To illustrate this constant tension and the ongoing search for alternatives, the following section will present a selection of responses and approaches. While these may reflect the inherent limitations of operating within complex structures, they unequivocally demonstrate the unwavering commitment of leading designers and schools of thought to reclaiming a deeper, more transformative systemic value for the discipline:

19th Century - Early 20th Century (Precursors)

- *William Morris and the Arts & Crafts movement warned against the dehumanization and degradation of quality imposed by industrial production solely focused on profit. This represented an early critique of the emphasis on ephemeral novelty (Morris, 1888).*

1801 - 1900

Early to Mid-20th Century (Modern Tensions and First Alternative Models)

- *The Bauhaus, despite its initial social ideals (led by Walter Gropius), experienced the tension of industrialization. This led figures like Hannes Meyer to denounce its drift towards elitist commercialization, advocating for design that addressed popular needs (Gropius, 1919; Meyer, 1928).*
- *In contrast, the Ulm School (Max Bill, Otl Aicher, Tomás Maldonado) consciously attempted to establish a methodology and an ethical and social foundation for design that countered a purely commercial or stylistic approach, seeking greater responsibility. This influence is still visible today in new systemic design methodologies (Maldonado, 1961; Aicher & Krampen, 1979).*

1900 - 1960

Mid to Late 20th Century (Critique of Consumerism and Dependency)

- *Ken Garland's "First Things First" manifesto urged a reorientation of design priorities. He implored designers to dedicate less time and talent to consumer advertising and other trivial commercial activities, and instead focus on more socially useful and humanist projects, such as education and public communication (Garland, 1964)*
- *Victor Papanek, with his work Design for the Real World, issued an urgent call against design's complicity in irresponsible and socially harmful consumerism (Papanek, 1971)..*
- *Gui Bonsiepe, working from and for non-hegemonic contexts (the Global South), criticized the uncritical import of market-centric and formally aesthetic design models. He advocated for design that responded to real needs and specific contexts, denouncing the lack of socio-environmental and systemic consideration (Bonsiepe, 1978).*
- *Feminist voices such as Sheila Levrant de Bretteville, Cheryl Buckley, and Barbara Kruger also exposed how design, in service of commercial interests, perpetuated biases and exclusionary narratives (Levrant de Bretteville, 1990; Buckley, 1986; Kruger, 1982).*

1960 - 1990

Late 20th Century - 21st Century (Search for New Paradigms)

- *Victor Margolin, in The Politics of the Artificial and through his "Social Model of Design," insisted on the necessity of design centered on satisfying human needs unattended by market logic (Margolin, 2002).*
- *Ezio Manzini, with Design, When Everybody Designs, has tirelessly explored design for social innovation and sustainability. He questions the paradigm of well-being based solely on product consumption, proposing a design that activates social capacities and resilient ecosystems. He further strengthens this idea in his book Politics of the Everyday (Manzini, 2015; Manzini, 2021).*
- *Dunne & Raby, in Speculative Everything: Design, Fiction, and Social Dreaming, present Critical Design as a way to use design to question and provoke debate about the assumptions of consumerism and the status quo (Dunne & Raby, 2013).*
- *Tony Fry, with his concept of Defuturing, highlights the system's inability to maintain its vitality due to market-driven actions promoted by design that work against human sustainability (Fry, 2020)..*
- *Nathan Shedroff, in Design Is the Problem, modernizes Papanek's view, focusing on how design resorts to unsustainable techniques to facilitate industrial production (Shedroff, 2009).*

1990 - 2020+

21st Century (Persistence of Instrumentalization and New Forms)

In contemporary times, critiques of managerialism in design, the simplification of Design Thinking for purely corporate ends (Brown, 2009; Martin, 2009), and agile methodologies, alongside the current situation concerning technology (driven by advances in quantum computing and AI, analyzed by Hernandez-Ramirez & Batalheiro, 2024), demonstrate how, under new guises, the tendency to instrumentalize design persists, prioritizing efficiency and short-term commercial results.

- *Authors like Caroline Criado Perez, with Invisible Women, and sociologist Patricia Hill Collins, with her "Matrix of Domination," continue to show how design predominantly focused on the market still overlooks crucial needs and perpetuates systemic inequalities (Criado Perez, 2019; Hill Collins, 2000).*
- *Decolonial movements in design go beyond a simple aesthetic or functional critique; they offer a profound challenge to dominant design narratives, which have historically privileged Eurocentric perspectives and market logics. These approaches propose and actively advocate for culturally situated and contextually sensitive design methodologies and practices, seeking to dismantle imposed knowledge hierarchies and foster the creation of truly liberating solutions. Their work is crucial for making visible and validating local knowledge, ancestral worldviews, and ways of doing that have been marginalized by the hegemonic design paradigm (Demos, 2013; Escobar, 2018; Santos, 2014).*

This chronological sequence not only reveals the recurring nature of the problem but also the persistent call to reorient design.

Generation after generation, the same limitations are identified, and there's an aspiration for more responsible and comprehensive design, a solution that seems elusive or difficult to trigger on a large scale. It is in this context of constant searching that exploring new methodological approaches becomes necessary to finally begin overcoming this historical instrumentalization.

While one could argue that the instrumentalization of design has fostered its quantitative expansion, paradoxically, it has limited the depth and quality of its transformative impact. More iterations of existing things are generated in diverse contexts, but with a decreasing or directly negative influence on the fundamental reconfiguration of underlying systems (Fry, 2009).

The inherent function of designing, when dissociated (as often happens in the market sphere) from a profound reflection on its vast semantic, cultural, and socio-ecological implications, promotes its instrumentalization in service of the industrial and commercial logics that often shape and distort the current economy. In such a context, design is relegated to a mere tool for productive optimization or advertising persuasion.

This research argues that, in this dynamic, its efforts focus on what is defined here as the "superficial embellishment of visual facts, products, or experiences," without rigorous questioning of either the interaction of communities with these artifacts or the long-term consequences they generate.

El peso que carga el diseño. Nota. Adaptada de Stone Backpack, por J. Sternback, 1997 (https://www.swiss-miss.com/2016/09/unusual-backpack.html).

These kinds of criticisms deeply resonate with the problem of exacerbated consumerism and planned obsolescence derived from neoliberal models-strategies where design, consciously or unconsciously, has played a crucial role in perpetuating unsustainable cycles of production and discard, contributing to current systemic problems (Shedroff, 2009).

Instrumentalized design frequently operates under this logic, optimizing production or persuasion based on market objectives and relegating critical reflection on its systemic social, cultural, or environmental impact to a secondary role. This limitation in its reflective scope and its capacity to address the inherent complexity of these impacts largely defines the problem and the current crossroads of design (Fry, 2009; Manzini, 2015; Papanek, 1971).

Nonetheless, constant critical awareness across the discipline has kept the questioning of this paradigm alive.

One of this thesis's objectives, therefore, is to make space for these new configurations, advocating for a design that reorients its intrinsic capabilities toward generating genuine social and environmental value, recognizing its inherent potential as a powerful agent of systemic transformation.

2.1 The Transformative Potential of Design

Despite this critical landscape, instrumentalization isn't design's inevitable fate. On the contrary, there's a vast and potent transformative potential inherent in the discipline, one that activates and expands when design breaks free from its more superficial constraints and consciously reorients itself toward promoting social and environmental values. The critique of instrumentalized design, far from being a sterile lament, thus becomes the necessary starting point for exploring alternative paths.

This vision has deepened over time through contributions that understand design as a "liberal art" capable of tackling complex problems (Buchanan, 1992), "an engine for social innovation and sustainability" (Manzini, 2015), and "a force for large-scale change" that demands an ethical redefinition (Mau, 2004). This shift toward a purpose-driven design implies a redefinition of the designer's role, the objectives of design practice, and the criteria by which its impact is evaluated.

Table 2 presents a series of theoretical and practical movements that demonstrate and exemplify the tangible possibility of transforming the discipline and consolidating the foundations for a genuinely transformative design.

Design Movements/ Approaches	*Main Characteristics / Emphasis*	*Key Figures*
Social Design and Design for Social Innovation	*Human-centered and experience-focused: Emphasizes collaboration to create social value, socio-technical transformation aimed at social change, and the satisfaction of human needs.*	*(Manzini, 2015); (Margolin, 2015); (Sen, 1999); (Norman, 2013)*
Sustainable and Ethical Design	*Overcoming unsustainability: Addresses ethical, political, social, and ecological concerns; promotes responsible resource use; minimizes environmental impact; and encourages durability.*	*(Fry, 2009); (Papanek, 1971); (Whiteley, 1993); (Dilnot, 2018)*
Responsible Design	*Satisfying real human needs: Focuses on genuine (not manufactured) human needs; considers the social and moral impact of interventions; and critically reflects on consumerism and production.*	*(Illich, 1973); (Winner, 1986)*
Participatory Design	*Active involvement of users and communities: Promotes active involvement of end-users and communities at all design process stages; advocates for the democratization of design; and supports the right to decide on the conditions of one's own existence..*	*(Ehn, 1988); (Sanders & Stappers, 2008)*
Critical Design	*Speculative and provocative proposals: Uses speculative and provocative proposals to challenge established assumptions about the role of products and technologies; fosters critical reflection and public debate on social and ethical implications.*	*(Dunne & Raby, 2013)*
Regenerative Design	*Restoring and revitalizing socio-ecological systems: Goes beyond sustainability to restore, renew, and revitalize socio-ecological systems. Aims to create a net positive impact, improving the health of ecosystems and communities, with a focus on living systems.*	*(Lyle, 1994); (Wahl, 2016); (Benyus, 1997)*
Transition Design	*Addressing complex systemic problems: An approach for tackling complex systemic issues ("wicked problems") and guiding long-term social transitions toward more sustainable and equitable futures. Adopts a multi-level and multi-stage perspective.*	*(Irwin, 2015); (Buchanan, 1992)*
Circular Design	*Eliminating waste and pollution by design: Adheres to principles of eliminating waste and pollution from the design stage, keeping products and materials in use as long as possible, and regenerating natural systems. Decouples economic activity from the consumption of finite resources.*	*(McDonough & Braungart, 2002); (Ellen MacArthur Foundation, s.f.)*
Futures Design / Speculative Design	*Exploring possible, probable, and preferable futures: Uses systematic exploration of possible, probable, and preferable futures (foresight) to inform and enrich the design process and strategic decision-making in the present. Fosters anticipation and resilience.*	*(Candy, 2019); (Goodman & Dunagan, 2013); (Dator, 2009)*
Design for Degrowth	*Questioning unlimited economic growth: Challenges the paradigm of unlimited economic growth. Proposes designing for the equitable reduction of consumption and production, prioritizing social and ecological well-being over material accumulation.*	*(Latouche, 2009); (Hickel, 2020)*
More-than-Human Design / Interspecies Design	*Expanding design beyond human focus: Expands the human-centered design focus to include the needs, perspectives, and agency of other species and natural entities (animals, plants, ecosystems) in the design process.*	*(Avila, 2018); (Braidotti, 2013)*

Table 2: Transformative Design Movements, Note: This table is an original creation.

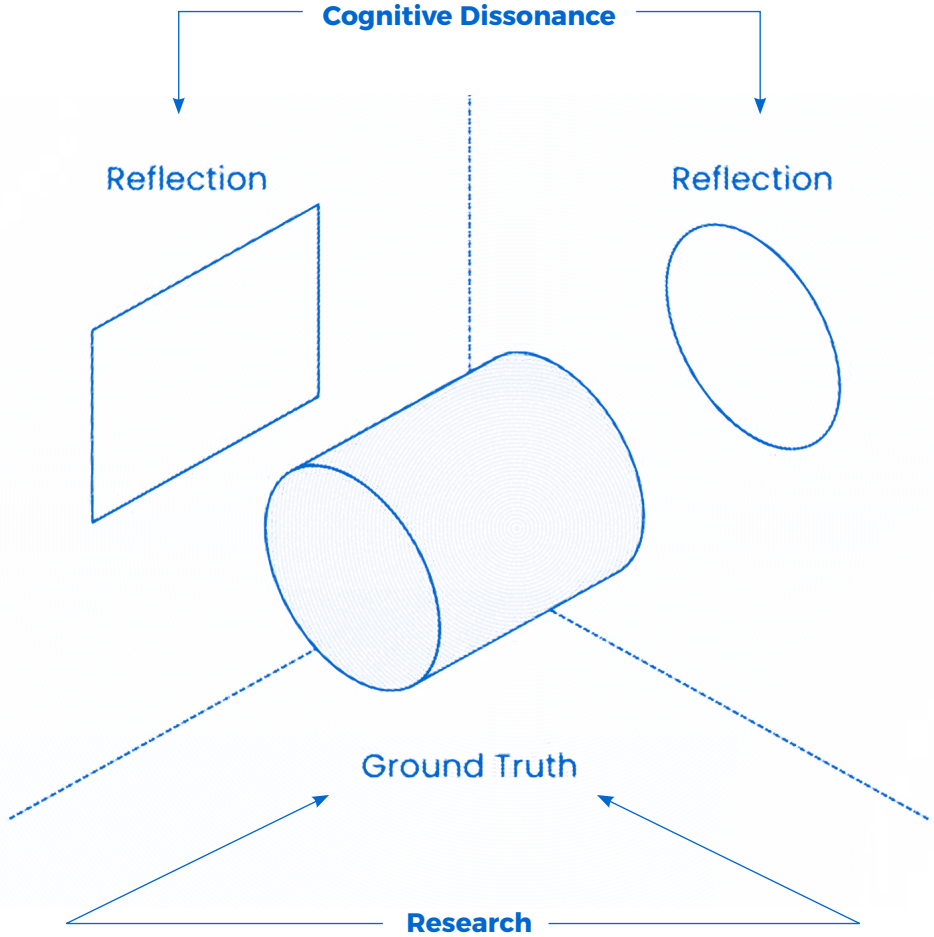
In emerging design approaches, the designer's role shifts: they are no longer mere technical executors but become process facilitators, collaboration catalysts, and proposers of alternative visions. This carries a profound ethical responsibility, where the commitment lies in transforming experience into social consciousness (Chaves, 1988). This thesis posits that this transformative potential is rooted in two inherent and powerful capacities of design: its projective nature and its intrinsic capacity for synthesis.

The projective dimension is design's compass, orienting it towards the conception and configuration of possible futures. It often confronts the "indetermination of the not-yet-realized" (Buchanan, 1992), activating a future configuration crucial for transcending unsustainable models (Fry, 2009). Even through the speculation of models and situations, it challenges assumptions and fosters reflection on the diversity of future alternatives (Dunne & Raby, 2013).

This capacity to project is not neutral; it implies a political dimension for the designer in ethically selecting "desired futures," guided by a "projective hope" (inherent to design) towards an improvable future (Maldonado, 1961). This makes the designer's personal vision and the method of projecting it onto the context and territory where design unfolds and impacts crucial.

In parallel, the capacity for synthesis allows design to operate as a field of confluence, integrating diverse knowledge, perspectives, and materialities to address problems and generate holistic solutions. These characteristics become especially valuable when there is a need for thinking that organizes complexity (Buchanan, 2001). This synthesis is vital in dynamic contexts, where design, through transdisciplinarity and the creation of effective "interfaces" for communication between various fields, generates crucial resources for transformative innovation through collaborative processes (Bonsiepe, 1978).

These powerful projective and synthesizing capacities, while intrinsic to design and fundamental to its impact, currently face challenges of unprecedented scale and interconnection. For design to fully deploy its potential and solidify itself as a "key strategy for the beneficial evolution of the system," this thesis believes it is imperative to adopt frameworks that allow for navigating and managing these complex dynamics. It is at this point that design's affinity with systemic thinking reveals itself not only as a natural evolution but as a necessary synergy, offering the scaffolding to amplify its impact in the co-creation of more resilient, just, and sustainable futures.



Desarrollar una disonancia cognitiva, Nota. Adaptada de Perspective matters [Ilustración], por hustle2passive, 2022, Instagram (https://www.instagram.com/p/Cia-2aYjH5i/).

3. The Synergy of Systemic Design

The convergence of systems thinking and design gives rise to Systemic Design, an inter- and transdisciplinary practice that's highly relevant for tackling today's complex challenges.

This synergy isn't just about combining two fields; it's a transformative fusion (as identified in this research) that aims to build resilience, foster multidimensional sustainability, and generate collective knowledge through participatory processes within a given territory.

Systemic Design emerges from the conscious and deliberate integration of systems thinking; with its ability to understand wholes and interactions, and design Knowledge (Know-How); with their focus on creation and human-centered action. It's crucial to understand that this integration goes beyond simply applying system theories to design; it's a space where both domains mutually enrich and transform each other.

Systems thinking provides design with a framework to overcome stagnation when facing complex problems. It helps us see interconnections, detect patterns, and identify leverage points. It makes modeling and simplifying complexity manageable, opening our minds to innovative perspectives that go beyond superficial situations. Furthermore, it encourages responsibility by helping us anticipate ramifications and consider unintended negative consequences.

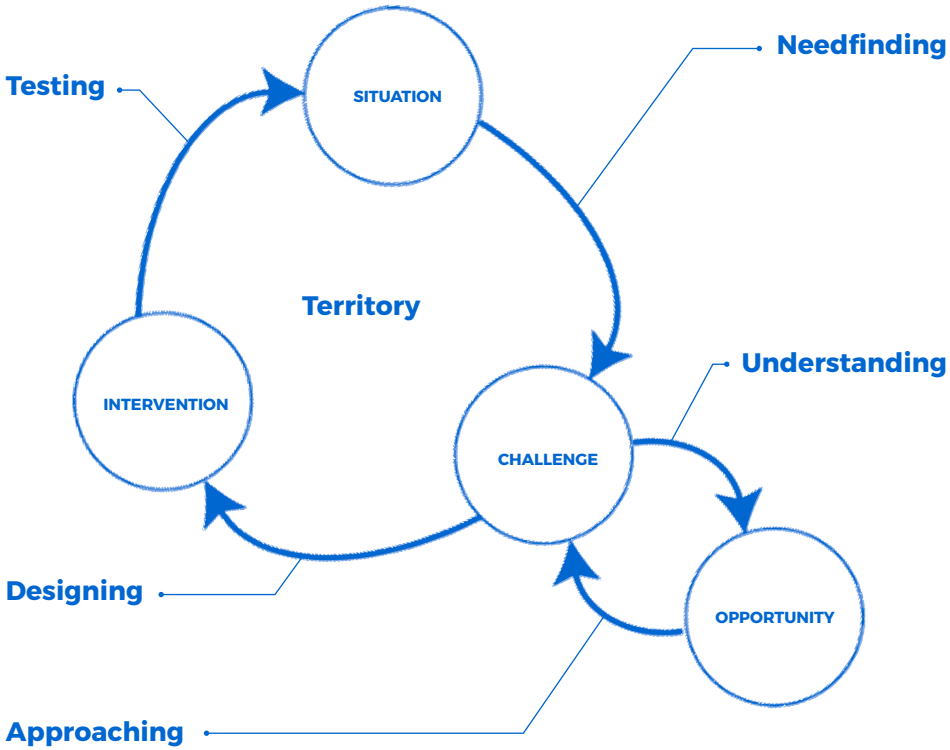
Design, through its theory and practice, contributes its intrinsic orientation toward action and creation to systems thinking. If systems thinking offers the diagnosis, design provides the intervention; it's the discipline that translates understanding into tangible proposals. Its approach isn't merely analytical but fundamentally generative: it focuses on generating ideas and exploring a potentially limitless set of solutions for complex problems.

From a design thinking perspective (the mindset, not the methodology), design introduces an iterative process that makes ideas tangible. This allows abstract systemic visions to materialize into artifacts or services that can be experienced and evaluated in the real world, facilitating rapid learning and risk mitigation before large-scale implementation.

Moreover, design ensures that interventions are deeply rooted in the human experience, focusing not only on functionality but also on the profound emotional, psychological, and sociocultural reasons why people use products, that is; on their meaning.

While pure systems thinking might risk staying in the realm of ideas (and idealization), design thinking, with a systemic lens, manages this productive tension by integrating analytical rigor with practical experimentation.

Within the historical landscape of this discipline, it's important to highlight how



Nota. Adaptada de un diagrama del aprendizaje de bucle simple y doble, del artículo "Chris Argyris, norms of competence and justice" (H. Silverman, 2013), basado en el concepto de Chris Argyris.

the Politecnico di Torino (POLITO) School of Design has, over the past 20 years, consolidated a distinctive approach and a robust methodology for Systemic Design.

Luigi Bistagnino (2009) is central to this development. His work catalyzed a fundamental transition from "design for ecology" toward a more encompassing systemic paradigm, laying the conceptual foundations for what this institution defined as: "A new approach to design and production processes to promote sustainable and inclusive development models" (POLITO, n.d.).

This approach, extensively developed in Bistagnino's literature, is supported by five interdependent pillars or principles that form its theoretical and practical DNA

Relations:

- *It's posited that the relationships among a system's elements are what generate and define the system itself. This embraces the premise that "the whole is greater than the sum of its parts," a core concept of systemic design theory (Bistagnino, 2009).*

Outputs > inputs:

- *This principle aims for the "outputs" (waste or residues) of one process to become "inputs" (resources) for another, designing continuous flows of matter, energy, and information to maximize efficiency and eliminate waste (Bistagnino, 2009).*

Autopoiesis:

- *Inspired by the works of Maturana and Varela (1980), this principle aims to design systems capable of self-organizing, adapting, and reproducing themselves, maintaining their identity while co-evolving with their environment (Bistagnino, 2009; Maturana & Varela, 1980).*

Act locally:

- *This principle prioritizes the local context, identifying and enhancing its unique material, social, cultural, and economic resources to foster resilience and territorial identity (Bistagnino, 2009).*

Humanity-centred design:

- *Complex problems are approached from a perspective that centers society and human beings, understood not as isolated users, but as active parts of a broader ecosystem. This aligns with Donald Norman's (2013) advocacy for design that satisfies deep human and planetary needs.*

Building on this robust theoretical foundation and as a practical reflection of its maturity, at least two complementary operational arms have emerged from Bistagnino's work, demonstrating how academia can catalyze real transformation. Far from competing, these initiatives form a synergistic ecosystem where research and application constantly feed into each other, proving the viability of the systemic approach beyond the classroom.

On one hand, the SYS LAB (Systemic Design Lab) has established itself as a center for research and methodological development, anchored within the Department of Architecture and Design. Its primary function is to refine theory, develop analytical tools, and apply a rigorous four-phase process to address complexity.

This iterative process includes:

1. ***Comprehending Complexity through a Holistic Diagnosis that maps the flows and actors of a system;***

2. ***Addressing Challenges, identifying criticalities and potentialities through co-design with stakeholders;***

3. ***Designing the System, selecting and implementing the most suitable solutions via a Roadmap; and***

4. ***Evaluating the System, quantifying results and visualizing their impacts across multiple scales to inform an effective narrative of change.***

Torino, Nota. Adaptada de Turin, por T. Trikoz, 2023, Behance (https://www.behance.net/gallery/166218681/Turin).

On the other hand, and as a natural step towards knowledge transfer, SYDERE (Systemic Design Research Education Center) has emerged as a spin-off entity dedicated to the application and dissemination of this methodology. This multidisciplinary platform operates through two main areas of action:

1. ***An area of education and capacity building: Through courses, workshops, and master's programs, this area seeks to empower a new generation of professionals with a systemic mindset and tools.***

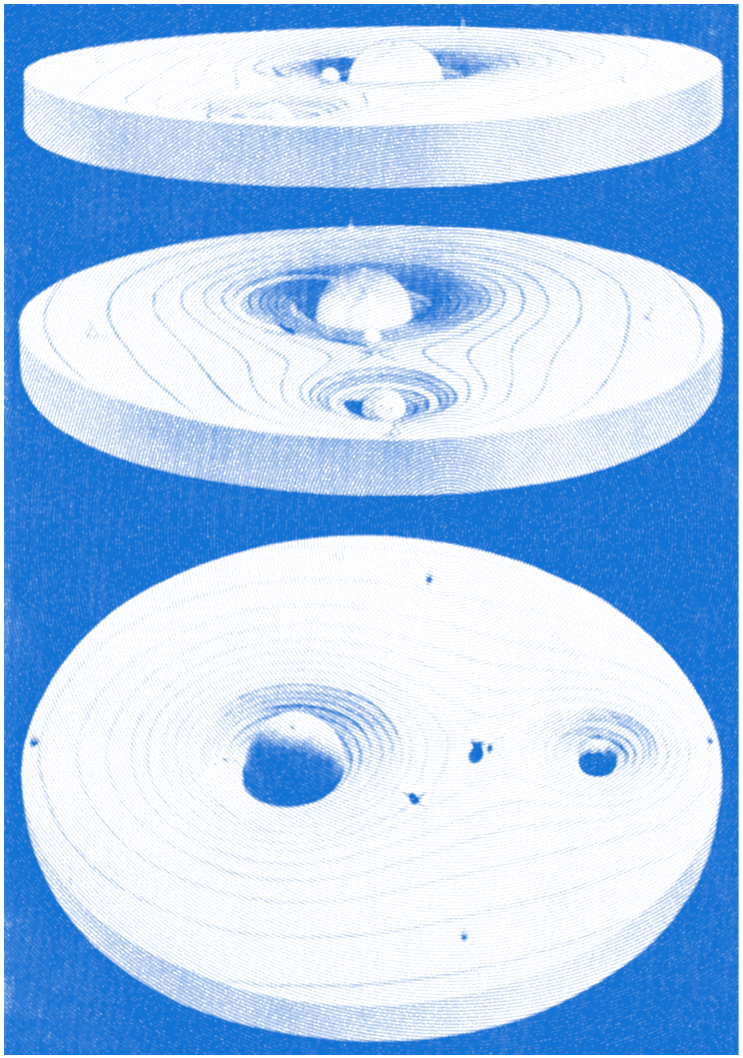
2. ***An area of applied research and development of concrete projects: This area collaborates directly with public and private entities. This practical work specializes and diversifies through two distinct branches:***

- ***"SYDERE Arts: This section of the center is dedicated to the interdisciplinary study of strategic and innovative aspects in art and design projects. Its function is to act as a cultural mediator among the project world, the art system (including artists, curators, gallerists, and journalists), and the general public. Through the systemic design methodology, it aims to create innovative products, services, and exhibition spaces to attract new audiences. Additionally, it collaborates with local stakeholders to unify and promote best practices that contribute to the valorization of the common good, thereby driving behavioral change" (SYDERE, n.d.a).***

- ***"SYDERE Heritage: This branch of the laboratory focuses on design for cultural heritage, applying an innovative and systemic approach. It starts from a specific cultural asset and its territory to implement strategies that enhance its value, actively involving local stakeholders. The laboratory also investigates the growing role of technologies such as blockchain and artificial intelligence (AI) in the management of corporate digital archives. The purpose of these technologies is not only to improve the security and reliability of information but also to expand the accessibility of archives, overcoming geographical, economic, and social barriers, in line with Sustainable Development Goal 4 of the 2030 Agenda" (SYDERE, n.d.b).***

This articulation of theory and practice demonstrates a functional and robust systemic model, where academia not only theorizes but also acts. The approach developed at Politecnico di Torino materializes into a dynamic ecosystem where fundamental research and on-the-ground application don't operate as separate spheres, but as parts of a virtuous and continuous cycle.

In this model, methodological rigor and conceptual development are constantly nourished and validated through concrete projects in real contexts. In turn, the learnings and challenges that arise from practice inform and enrich the evolution of theory, ensuring its relevance and effectiveness. This intrinsic synergy between "knowing" and "doing" constitutes the methodological foundation of the proposal developed in this research and serves as a compelling example of how systemic design can transition from being a concept to a driver of sustainable transformation.



Nucleos y evolucion, Nota. Adaptada de una ilustración de Heinz Hähnel, que aparece en el libro Astropol. Vacaciones en una estación espacial (A. Fritz, 1951). La imagen fue recuperada del sitio web de K. Bürgle (s.f.).

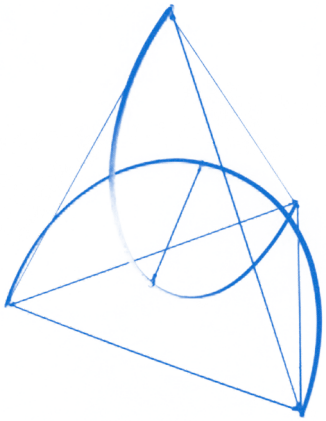
3.1 Building Resilience, Sustainability, and Collective Knowledge

Beyond specific approaches like those developed by the Politecnico di Torino, this research, based on an extensive review of multiple theoretical and practical foundations, asserts that the inherent synergy of Systemic Design aims to generate tangible and transformative impacts.

Among these, the following stand out as interconnected and mutually reinforcing: the building of resilience, the promotion of multidimensional sustainability, and the catalysis of collective knowledge. These qualities position Systemic Design as an ideal framework for addressing the problems and challenges currently facing humanity.

In summary, this thesis evaluates that Systemic Design, by operating on the three interconnected axes of resilience, sustainability, and collective knowledge, not only offers a framework that complements and enriches the analysis of complexity inherent in systemic thinking. More fundamentally, it actively seeks to configure systems capable of learning and evolving in the face of contemporary challenges.

These values, driven by Systemic Design, are crucial, and their coherence and applicability will be demonstrated in the development and presentation of the design proposal that forms the core of this research.



Trio, Nota. Adaptada de una imagen de un tetraedro con puntales de medio círculo, por M. Pars, s.f., de la página Icosahedron tensegrity (Tensegriteit, http://www.tensegriteit.nl/e-tetrahedron.html).

Fostering Multidimensional Sustainability

From the systemic perspective adopted in this thesis, sustainability is a system's capacity to maintain or enhance human well-being and ecological integrity across generations. This recognizes the deep interactions among its environmental, social, economic, and cultural dimensions (Blewitt, 2018; Costanza et al., 2014). Systemic Design, as evaluated here, drives sustainability by:

- *Integrating sustainability as a holistic and transversal objective throughout all phases of the process, learning from the organizational principles of natural ecosystems that have sustained life for millennia (Capra & Luisi, 2014; Benyus, 1997).*
- *Employing transdisciplinary approaches to address the inherent complexity of sustainability challenges, promoting "ecological" and systemic literacy (Wahl, 2016).*
- *Facilitating a deep understanding of the interconnections among the diverse dimensions of sustainability, considering that diversity is only a strategic advantage if an interconnected community exists (Jackson, 2003).*
- *Considering the complete life cycle and the extended consequences of interventions, moving beyond the prioritization of short-term financial interest that often hides negative externalities and creates instability (Fry, 2009; Meadows, 2008)..*
- *Promoting design for longevity, repairability, and reuse, and encouraging the adoption of sustainable behaviors and business models, recognizing that design is a key catalyst in this transition (McDonough & Braungart, 2002; Ellen MacArthur Foundation, n.d.).*

Building Systemic Resilience

Resilience, understood as a system's capacity to absorb disturbances, reorganize, and not only recover but also adapt and evolve by learning from experience, is a fundamental attribute that Systemic Design (SD) explicitly aims to cultivate. This thesis argues that SD contributes to resilience through:

- *A deep understanding of systemic dynamics, which enables the conception of interventions that strengthen a system's inherent adaptation and self-organization (Meadows, 2008).*
- *The promotion of diversity and functional redundancy of actors, roles, and resources—crucial elements for flexibly responding to unexpected perturbations and for the system's self-repair capability (Walker & Salt, 2012).*
- *The promotion of continuous learning and adaptive experimentation, facilitated by the iterative nature of the design process (Senge, 1990).*
- *An emphasis on "Design for Resilience" that advocates for restorative and transformative strategies in the face of systemic crises, recognizing that resilience is not merely an individual quality but a collective attribute emerging from high-quality relationships and mutual care within robust social systems (Manzini, 2015; Zolli & Healy, 2012).*

Generating Collective Knowledge

This research posits that the generation of collective knowledge—the emergence and sharing of information, understanding, and wisdom through the interaction of a diverse group, is intrinsic to Systemic Design. It catalyzes this process by:

- *Establishing co-creation and co-design as fundamental pillars, valuing practical knowledge, lived experience, and the multiple perspectives of all stakeholders, rather than solely privileging formal expert knowledge (Manzini, 2015; Sanders & Stappers, 2008).*
- *Fostering continuous adaptive learning and shared reflection, crucial elements for the evolution of both individual and collective system intelligence through feedback and experience (Senge, 1990).*
- *Aligning its practices with the principles of collective learning systems, such as promoting a culture of collaboration, providing supportive infrastructures for data and knowledge exchange (understanding knowledge as a common good), and integrating learning from the broader system (Nonaka & Takeuchi, 1995).*
- *Facilitating robust and consensus-driven group decision-making processes, where language and dialogue become tools for creating new realities and shared understandings (Isaacs, 1999).*

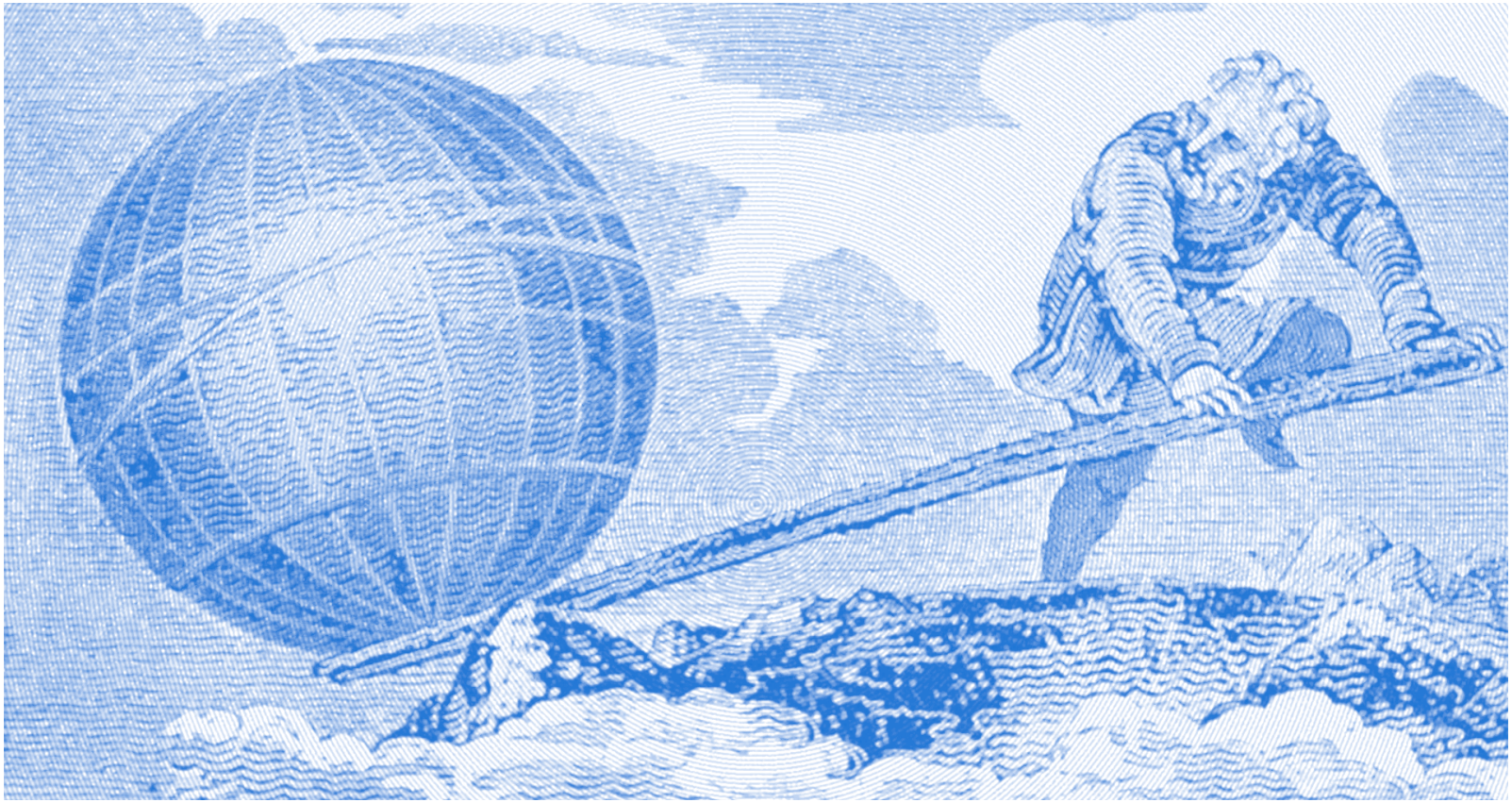
Figure 2: Transformation of Design Under the Synergy of Systemic Design, Note: This figure is an original creation.

3.2 The Systemic Designer as a Manager of Systemic Transformation

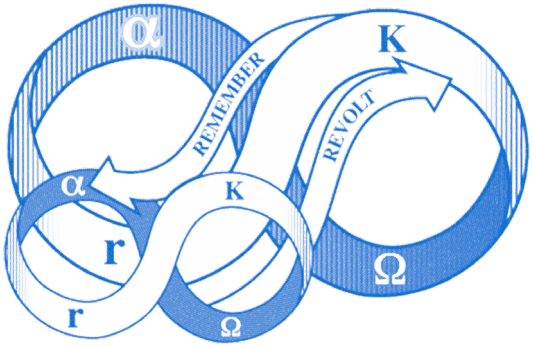
The emergence and consolidation of Systemic Design as a strategic approach to innovation and change fundamentally redefines and expands the traditional role of the designer.

This role evolves from simply creating artifacts to a multifaceted profile that includes facilitating collaborative processes, architecting complex interactions and systems, and, in its most mature and essential expression, managing systemic transformation.

From the perspective developed in this research, this metamorphosis, articulated through these fundamental pillars, specifically manifests as a redefinition of the designer's functions and tasks, as detailed on the following page, the designer's role shifts toward:



Give me a lever long enough and a fulcrum on which to place it, and I shall move the world Nota. Adaptada de Archimedes' lever, 17th century artwork [Ilustración], por Science Source, s.f., Science Photo Library (https://www.sciencephoto.com/media/1194141/view).

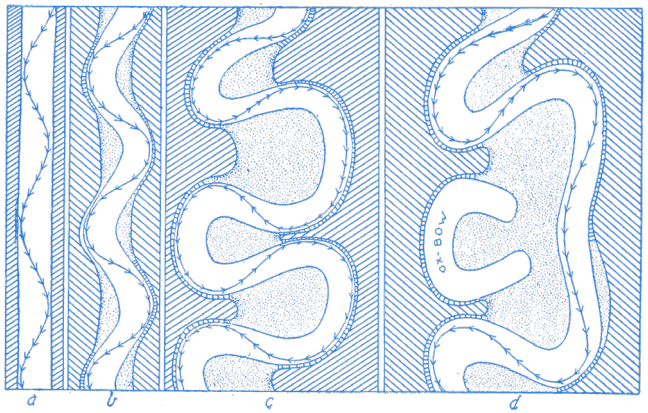


Nota. Adaptada de Panarchy of adaptive cycles [Diagrama], por H. Silverman, s.f., Solving for Pattern (https://www.solvingforpattern.org/gallery-of-models/). CC BY-NC-SA 3.0.

The Designer as a Process Facilitator (Beyond Artifact Creation)

In this expanded role, the systemic designer moves past producing objects to become a catalyst for collective intelligence and coordinated action. Their work focuses on guiding diverse groups of stakeholders through rigorous, participatory processes of shared understanding, collaborative ideation, and co-creation of solutions. This requires expertise in orchestrating constructive dialogue, the ability to visualize inherent system complexity through visual and narrative tools, and the capacity to navigate uncertainty by fostering a culture of experimentation, iterative learning, and knowledge co-creation.

In this context, the artifacts designed (whether systemic maps, conceptual models, low or high-fidelity prototypes, or narratives of possible futures) aren't ends in themselves. Instead, they serve as instruments to catalyze reflection, strategic dialogue, and transformative collective action.

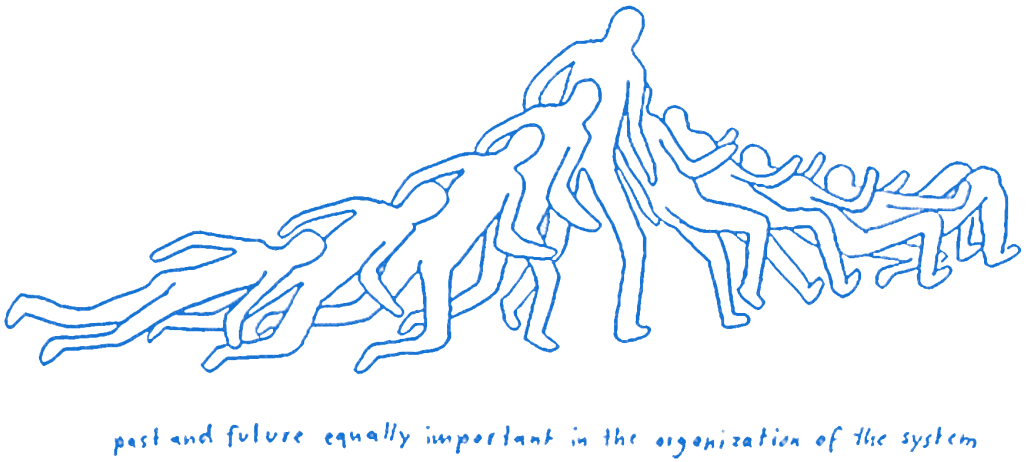


Nota. Adaptada de Top view of a winding river with meanders [Ilustración], por Morphart Creation, s.f., Adobe Stock.

The Designer as an Architect of Interactions, Flows, and Structures

From this research's synthetic perspective, the systemic designer deeply engages in shaping the "how" (processes and dynamics) and the "who" (actors and their roles) of a system's operation and evolution. This "architectural" work (inverting the traditional roles between architecture and design) includes:

- ***Designing Interactions and Relationships: Configuring and reconfiguring how diverse system actors relate, communicate, exchange value, and collaborate. The goal is to find more effective, equitable, and generative interaction patterns.***
- ***Designing Information and Learning Flows: Critically considering how information and knowledge flow, who accesses what data, how it's interpreted and converted into learning, and fundamentally, how feedback loops (both formal and informal) inform decision-making and the system's continuous adaptation.***
- ***Designing Organizational, Social, and Governance Structures: Questioning, proposing, and co-designing roles, responsibilities, governance forms, collaborative networks, business models, or even public policies. The objective is to create structures that are more adaptable, resilient, and aligned with the system's purposes and the well-being of its members.***



El presente del diseño depende del pasado y del futuro. Nota. Adaptada de Speculative time; past and present equally important, por A. Töpfer, s.f., Vektorbarock (https://salon.io/vektorbarock).

The Designer as a "Systemic Transformation Manager" (Anticipating the Future Role)

This thesis posits that the designer's most significant evolution in the systemic context is their emergence as a "Systemic Transformation Manager." This role goes beyond isolated interventions to encompass the orchestration, accompaniment, and long-term sustainment of deep, multifaceted, and often non-linear change processes. This management role requires a distinctive set of competencies and mindset, especially vital in dynamic innovation processes, such as:

- ***Adaptive and Facilitative Leadership: The ability to guide groups through complexity, ambiguity, and resistance to change, fostering self-organization, safe experimentation, and continuous adaptation to emerging challenges.***
- ***Strategic Vision and Futures Thinking: The skill to catalyze the co-creation of inspiring shared visions and the design of robust, flexible transition strategies that allow navigation toward desired, sustainable futures.***
- ***Fostering the System's Learning Capacity: An active commitment to building the system's own reflective and adaptive capacity, enabling it to learn from experience and transform continuously and autonomously.***
- ***Navigating the Politics of Change and Power Dynamics: A keen sensitivity and ability to understand, manage, and navigate power dynamics, divergent interests, and the inherent resistances in any significant change process, always acting within an ethical and transparent framework.***
- ***"Gardener" or "Custodian" Mindset for the System: An approach that involves cultivating the conditions for the system's healthy flourishing and evolution, guiding its development with humility, patience, a long-term perspective, and a deep respect for its inherent complexity.***

In the vision emerging from this thesis's research, the systemic designer is profiled as a catalyst for latent potentialities, a weaver of collaborative networks, and an ethical and strategic guide toward the co-creation of systems that are more resilient, sustainable, equitable, and ultimately, more human.

This conception of their role consequently opens new and significant spaces for design practice, transcending the boundaries of the traditional design economy.

Chapter 2:
The Wicked Dynamic: Unraveling the Interconnection of Systems, Problems, and Innovation.

"Why Everything is Connected, understanding the Roots and Ramifications of Systemic Complexity."

The previous chapter established systemic thinking as an indispensable conceptual framework for navigating 21st-century complexity and championed design's inherent potential as an agent of transformation. It was argued that the synergy between the two, Systemic Design, offers a promising path to build resilience and sustainability. However, for a design intervention to be truly transformative, it must first accurately diagnose the nature of the dysfunction it aims to address. Contemporary crises—from ecological collapse to economic fragility and social fragmentation—are not isolated events but interconnected symptoms of an underlying pathology: a recurring, self-perpetuating pattern of failure.

This chapter delves into the central problem that justifies the need for a new innovation model. To do so, it proposes and unpacks the concept of the "Wicked Dynamic" (WD), a theoretical-systemic framework developed in this thesis to understand how a fundamentally flawed worldview generates intractable problems and "solutions" that, paradoxically, exacerbate the original dysfunction. The chapter will unravel the architecture of this dynamic, showing how the systematic neglect of complexity and the persistent application of linear and reductionist thinking lead to cascading negative consequences (Ackoff, 1974; Meadows, 2008).

This chapter will build a strong argument about the nature of the problems that the Systemic Design Innovation (SDI) model seeks to address. To this end, it will explore how this dynamic manifests in practice. This exploration will examine the decontextualized perception of systems (Wicked Systems), the complex problems that emerge from them (Wicked Problems), and the dysfunctional innovation applied to "solve" them (Wicked Innovation). It will thus demonstrate that the root of many of our deepest crises does not lie in merely technical failures, but in a fundamental "crisis of perception" (Capra & Luisi, 2014).

The Wicked Dynamic (WD) framework, presented in this chapter, does not emerge from a purely theoretical analysis but from a process of inquiry motivated by fundamental curiosity: recognizing the patterns present that determine a system's actions. It is the result of over a decade of interdisciplinary academic and professional experience; a journey through the broad and evolving complexity of design, but also from introspection. At each stage, across different industries, geographies, and

problem scales, a disconcertingly consistent pattern persisted: a systematic gap between design's transformative potential and its practical impact and application, often instrumentalized and relegated to a superficial role.

This observation, which might seem a mere disciplinary frustration, gains a much deeper meaning and raison d'être from the perspective that proliferates in this thesis: that of the Global South. In this context, innovation is not a luxury aimed at competitive advantage but a fundamental necessity for survival and for the pursuit of more equitable and sustainable futures. Inefficiency and wasted potential are not simply bad business; they are a barrier to development and well-being.

Therefore, the question that drove this research was a blend of contexts, a search for root causes, and an attempt to frame a problem that felt both personal and universal:

Why, despite increased awareness of major global challenges and the proliferation of discourse on innovation (and design), do proposed solutions often seem insufficient, fragmented, or, worse still, generators of new crises?

And more intimately, what is design's true role within this system? What can we and cannot we do, and, more importantly, why? What truly limits us? What is the most important gift that design, as a discipline, can offer the world? These questions, born in diverse contexts, demand an answer beyond the boundaries of a single project or discipline.

Hence, the answer did not seem to lie in analyzing the most visible phenomena (economic crises, technological trends, social movements). For a designer, accustomed to observing interaction and use, this required a radical shift in focus. Instead of observing the pieces frantically moving on the surface, the inquiry shifted towards what makes them move: how much they move, the freedom with which they do so, and, crucially, what things do not move and why.

The focus shifted to what is taken for granted: the underlying logic, mental models, and power structures that govern the system. The Wicked Dynamic is, therefore, the conceptual framework developed to name that invisible logic, that flawed "operating system" running in the background of our collective efforts. It is the conceptual wall that limits imagination and the mental barrier that blocks transformative action.

This framework is not presented as a prescriptive theory but as an invitation to reflection, a diagnostic tool for the reader to analyze their own context. The Wicked Dynamic is not a phenomenon that occurs exclusively on a global scale; it is a fractal pattern that replicates in team management, organizational strategy, and public policy. It is that feeling of pushing a door marked "pull," of running on a treadmill that speeds up every time we quicken our pace.

Recognizing it is the first step to intervening; it implies a shift in consciousness, realizing not so much what has been done, but what is being done and why it is being done. It represents the transition from being a passive participant caught in the cycle to becoming a conscious agent who begins to design the way out.

Strictly speaking, this research did not discover the WD; it merely named it.

1. Definition of “Wicked Dynamic” (WD)

The recurrent crises afflicting our social, economic, and environmental systems aren’t a series of unfortunate, unconnected events. Instead, they’re the predictable outcome of a pattern of systemic dysfunction; an underlying logic that perpetuates failure.

This research argues that to understand the root of this dysfunction, we must first recognize a fundamental quality: humanity, and by extension the systems it creates, is inherently innovative. The historical evolution and survival of our species have relied on a constant capacity to adapt, learn, and self-regenerate in the face of challenges.

Building on this premise, this thesis proposes a conceptual framework to name, analyze, and ultimately intervene in the pattern that systematically disrupts this natural cycle and blocks this innate capacity: the Wicked Dynamic (WD).

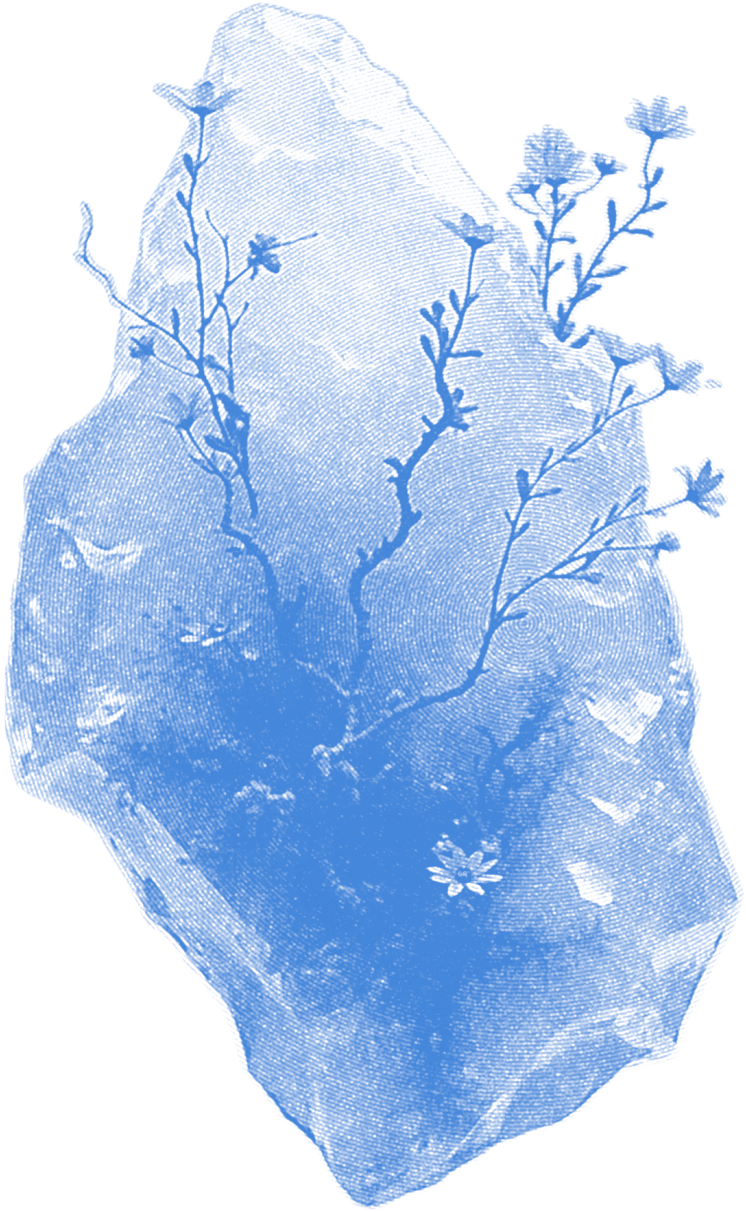
In the context of this proposal, the Wicked Dynamic is formally defined as::

> ***The systematic neglect of naturally emerging innovative properties that drive the self-renewal capacity of ecosystems, due to a flawed understanding of systems as static, immutable linear interconnections.***

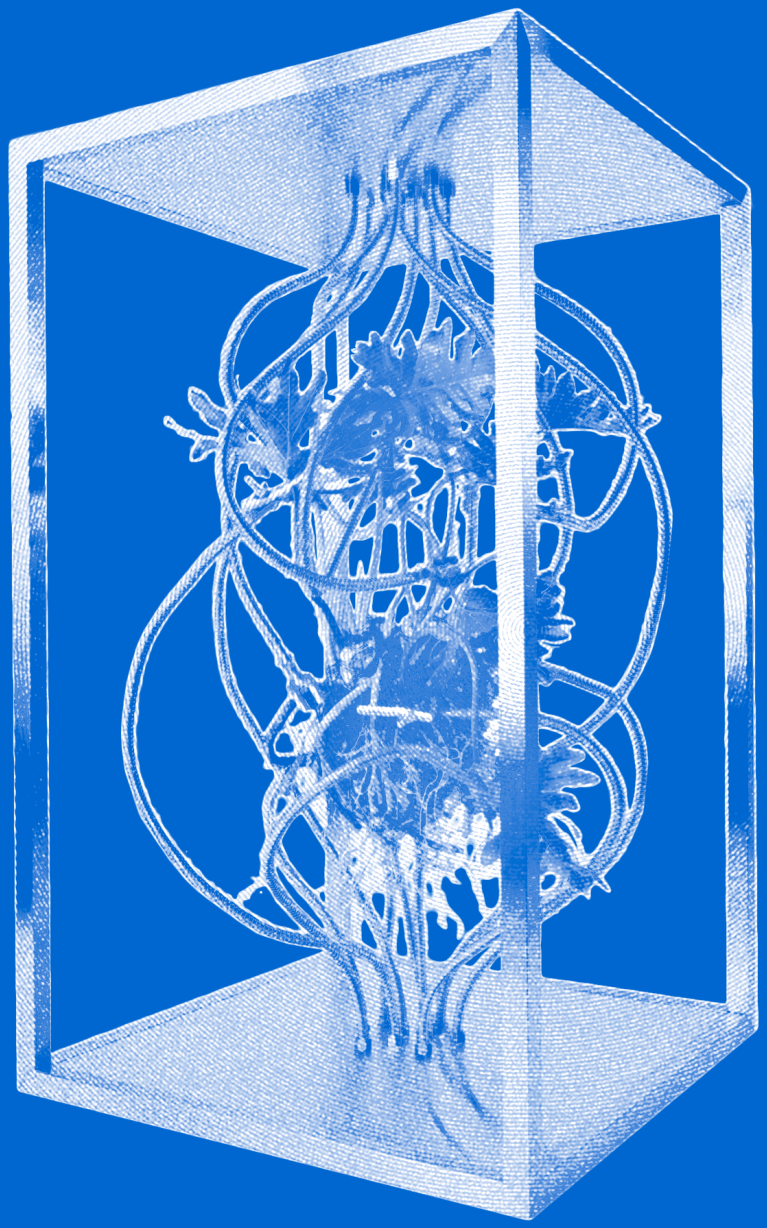
Essentially, the WD is a pathology of anthropocentric thinking that, when applied to the management of complex systems, not only degrades them but actively suppresses their innate ability to evolve (at least, at their natural pace).

This neglect isn’t necessarily an accidental oversight; it can be interpreted as a deliberate characteristic of a hierarchical system that, for the benefit of a minority, favors predictability and control over vitality and emergent adaptation.

It’s the root cause explaining why so many of our well-intentioned interventions fail or lead to worse situations than the initial ones, a phenomenon that Peter Senge (1990) captured in his first law of systems thinking: “Today’s problems come from yesterday’s ‘solutions.’”



Petrified nature. Nota. Elaboración propia.
La imagen fue generada con la herramienta de inteligencia artificial



Nota. Adaptada de Botanical Sculpture #5 GOD [Fotografía de escultura], por A. Makoto, 2012, sitio web del artista (https://azumamakoto.com/en/project/yqyf16199/).

If we look to nature for examples of this dynamic, we'll find countless replicas. Consider the attempt to cultivate a high-yield plant in a perfectly controlled environment, like a laboratory or a hydroponic greenhouse. Through linear, controlled intervention (precise supplementation of light, water, and nutrients), we can make it develop exactly as expected. It grows quickly, looks vigorous, and meets all defined success metrics within that isolated environment. This intervention, on its own terms, is a triumph of optimization.

However, the problem emerges when this plant, designed in a vacuum, faces the complexity of the world outside its original context. It's unprepared when we plant it outdoors and it starts to rain. Its roots, accustomed to passively receiving nutrients, might be weak and unable to seek sustenance in complex soil. Its structure, never exposed to wind, could be fragile. Rain, which for an adapted plant is a source of life, could be a saturating or breaking shock for this one. The intervention, though successful in the lab, has created a fragile and dependent organism, stripped of its innate resilience.

Moreover, even if the plant survives this transition, nothing ensures its fruit will be truly "fruitful" in a systemic sense. The fruit might be large and abundant but lack the nutrients only a rich interaction with soil microbiology can provide. Or worse, its intensive cultivation might have required so many external resources that, in the long term, it exhausts the surrounding soil's fertility, harming the entire ecosystem.

This is the core of the Wicked Dynamic: the linear, optimized "solution" for a narrow objective (the plant's rapid growth) not only turns out to be fragile but also generates unintended negative consequences in the broader system, demonstrating that the true cost of forced simplicity is the destruction of systemic resilience. The intervention didn't "solve" a problem; it solved a consequence and shifted focus away from the real problem, making its impact invisible until it was too late.

This dynamic is deeply embedded in our society and our growth model. While the example of planting and cultivation is real and clearly illustrates it, this dynamic repeatedly manifests in high-risk environments with significant economic, social, and environmental repercussions.

To analyze its operational structure, the Wicked Dynamic (WD) can be conceptualized as an interdependent causal cascade, formulated as follows:

$$WD = WS(WP(WI))$$

Where the components are defined as:

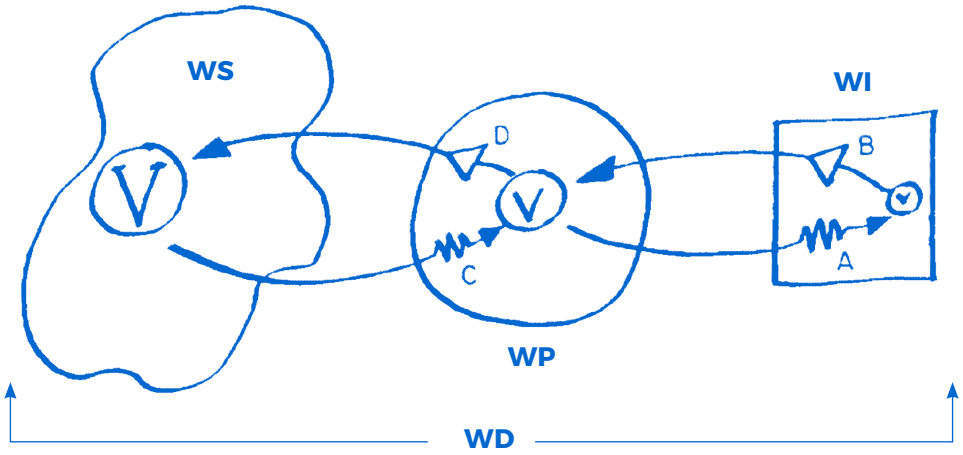
- Wicked Systems (WS): This constitutes the state of a system (be it ecological, social, or organizational) that has been corrupted and rendered dysfunctional by persistent management based on a linear and reductionist worldview. The starting point, therefore, is the decontextualized perception of systems and their dynamism, treating them as predictable machines rather than the living, adaptive organisms they are.

- Wicked Problems (WP): These are not isolated issues but the symptomatic and inevitable manifestations of an underlying Wicked System. They are characterized by their complexity, interdependence, lack of clear solutions, and their tendency to constantly evolve, aligning with Rittel and Webber's (1973) original definition of "wicked problems."

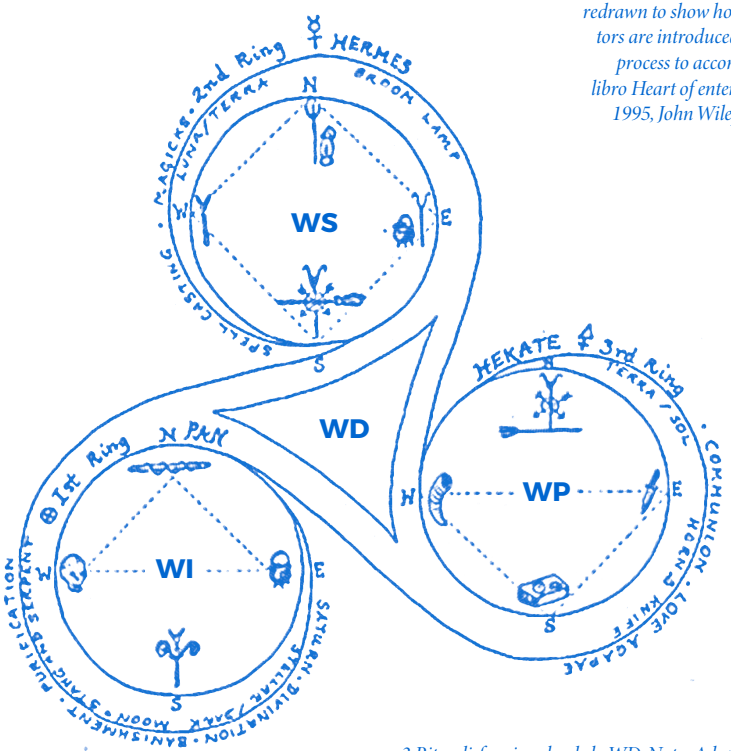
- Wicked Innovation (WI): This is the dysfunctional "solution" that results from attempting to address a Wicked Problem with linear or fragmented approaches, without questioning the logic of the Wicked System that originated it. These innovations (often technological, political, or incentive-based) attack symptoms in isolation and, in the process, reinforce systemic dysfunction, generating inefficient, discouraging, and erratic environments.

This formula doesn't describe a simple sum of components but rather a nested hierarchy and a destructive feedback loop. Wicked Innovation (WI) is applied to a Wicked Problem (WP), which, in turn, is a manifestation of a Wicked System (WS). The predictable failure of WI reinforces the flawed perception that underpins the WS, thus perpetuating the entire Wicked Dynamic (WD).

To fully understand the WD, it's necessary to analyze each of these components in detail, illustrating how they connect to form this self-reinforcing cycle of failure.



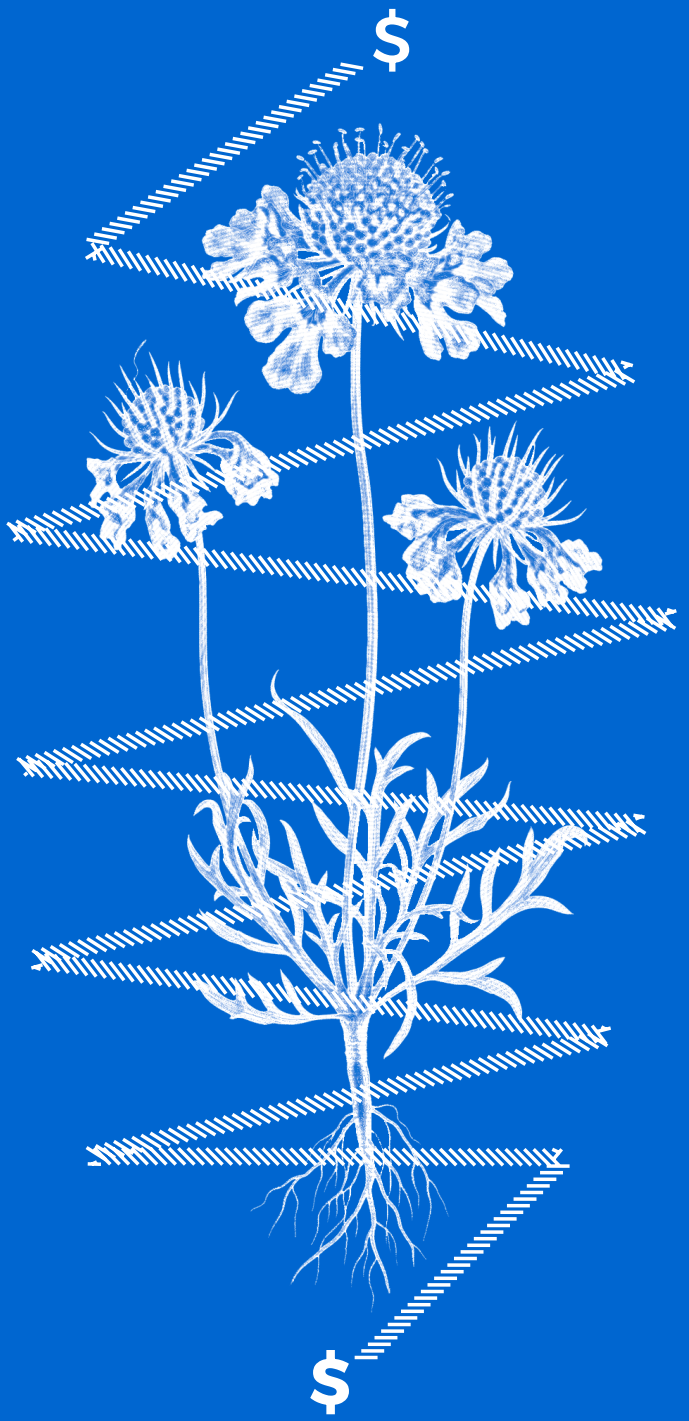
Nota. tomada de "Figure 21. Figure 20 redrawn to show how amplifiers and attenuators are introduced into the variety diffusion process to accommodate Ashby's Law", del libro Heart of enterprise (p. 110), por S. Beer, 1995, John Wiley & Sons. Copyright 1995 por John Wiley & Sons.



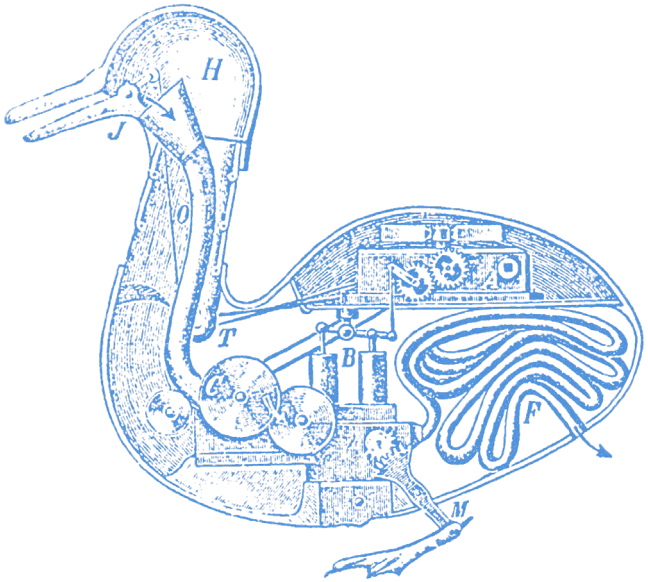
3 Ritos disfuncionales de·la WD, Nota. Adaptada de "Triune Compass Rosa" [Diagrama], de autor desconocido, recuperada de la publicación de blog de Chattering Magpie - Summoner of the Hearth (2017).

Despite the applied vitamins and substrates intended to stimulate its growth (WI), the plant didn't thrive. This intervention, by ignoring natural cycles, nutritionally weakened it (WP). The subsequent oversaturation of nutrients, aimed at accelerating its development, proved lethal to an already fragile plant.

Although death is inherent in nature, in this case, the human intervention wasted resources on a process that was flawed from the start (WS), and even worse, it mass-commercialized the process for profit (WD).



2. Wicked Systems (WS):
The Decontextualized Perception of Systems



Que parezca vivo no significa que lo este, Nota. Adaptada de un esquema del Canard digérateur, por J. de Vaucanson, 1738 (https://commons.wikimedia.org/wiki/File:DigestingDuck.jpg). La obra se encuentra en dominio público.

The origin of the Wicked Dynamic lies in a fundamental perceptual error: the tendency to view and manage complex, living, and adaptive systems as if they were simple, static, and predictable machines. A Wicked System is not an inherently bad system; rather, it is a potentially healthy system that has been degraded and made dysfunctional by the persistent application of management based on this linear and reductionist worldview.

This mechanistic worldview, whose intellectual legacy includes figures like Descartes and Newton, conceives the universe as a grand clockwork mechanism operating according to fixed and immutable laws. Its favored method, reductionism, assumes that a complex system can be understood by decomposing it into its constituent parts. This approach is fundamentally flawed when applied to living systems (Capra, 1996), as their essential properties (such as the resilience of an ecosystem or the culture of an organization) are emergent: they arise from the interactions and organization of the parts and cannot be found in any single component alone.

When this mechanistic logic is applied to an ecosystem, an organization, or an economy, the system's "corruption" occurs. Optimization of a single, narrow outcome (today, the economic return on investment) is prioritized while the health, interconnectedness, and long-term dynamics of the entire system are systematically ignored or suppressed (Dörner, 1997). This imposes a rigidity that destroys the system's capacity for self-organization and adaptation, two of the most crucial "innovative properties" that living systems possess to ensure their continuity and evolution (Meadows, 2008).

The mechanism through which this linear management progressively corrupts the system is best understood through the concepts of path dependency and lock-in. When an initial decision is made based on a simplistic cause-and-effect model (for example, adopting a specific technology to maximize short-term performance), infrastructures, processes, and expectations are created that establish an initial "pathway" (Arthur, 1994; David, 1985).

Once established, this pathway tends to reinforce itself through positive feedback loops. Initial successes derived from the linear decision (such as an increase in efficiency or profits) justify further investment and commitment to that same pathway, marginalizing or discarding alternatives that could offer greater long-term resilience. Over time, the system becomes so interconnected and invested in this single path that it becomes "locked-in" (North, 1990). This validates one of the most powerful principles of systems thinking, already discussed in the previous chapter: the system's structure shapes its behavior (Meadows, 2008). The "locked-in" structure not only limits possible actions but also dictates future behavior, making it predictably dysfunctional.

This structural lock-in then solidifies at the cognitive and cultural levels, creating a collective mindset that internalizes the dominant trajectory as the only viable or "correct" way to operate. This is where the justification of "we've always done it this way" emerges: an expression that masks inertia and resistance to change, elevating a historical decision to the status of an unquestionable norm. This phenomenon leads to what are known as "socio-ecological traps"; persistently undesirable states from which the system, having lost its original flexibility and being caught in its own rigid culture and structure, finds it enormously difficult to escape on its own (Scheffer et al., 2001; Olsson et al., 2004).

To foster the analytical and glocal spirit of this research, It will be demonstrated how the Chilean development model, particularly since the structural reforms implemented during the military dictatorship (1973-1990), provides clear examples of how linear and reductionist management, prioritizing economic optimization over socio-ecological complexity, generates and sustains Wicked Systems:

The Privatization of Water and the Petorca Crisis

At the core of this Wicked System (WS) lies Chile's 1981 Water Code. This legal framework, designed with a purely transactional market logic, transformed water from a public and common good into a fully tradable private property. It decoupled water rights from land ownership and granted free, perpetual usage rights (Bauer, 2004; Budds, 2009).

This initial decision, coupled with a deliberately weakened state institutional framework, created a path dependency that structurally favors the export agro-industry. The system became "locked-in" to a model where the economic success of a few is sustained by externalizing water costs onto communities and ecosystems. The resulting Wicked Problem (WP) is the socio-ecological crisis in valleys like Petorca, where market logic has permitted the drying of rivers and depletion of aquifers to maintain vast avocado plantations, thereby destroying local resilience and ways of life (Larrain & Latorre, 2021; Romero & Sasso, 2014).

"Sacrifice Zones" and Pollution in Quintero-Puchuncaví

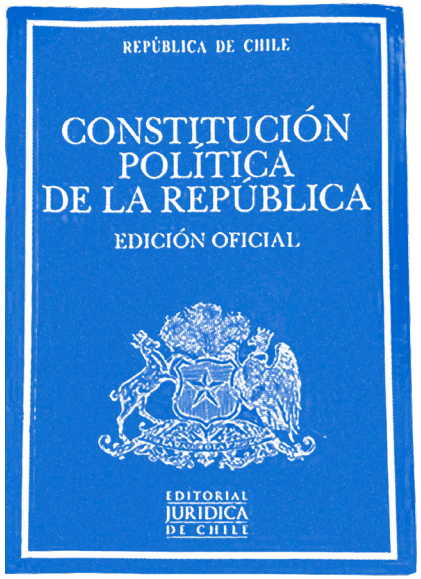
This Wicked System (WS) is rooted in a model of territorial planning that, since the 1960s and deepened subsequently, has concentrated highly polluting industries in specific geographical zones (Castillo et al., 2017; Román et al., 2018). The issue is not the industry itself, but the fragmented logic of its placement, ignoring the negative synergies and cumulative impacts on the ecosystem and human health.

A historically weak and sectorialized regulatory framework, incapable of managing the systemic impact of the industrial complex, has institutionalized what is known as environmental injustice (Vergara & Bojórquez, 2014; Busto, 2015). The Wicked Problem (WP) is the normalization of degradation, where communities with less political and economic power bear a disproportionate burden of national pollution. The coexistence of high-risk industries and residential areas has transformed the bay into a WS where disease and ecological degradation are not an accident, but a structural and predictable characteristic of the system.

The Monoculture Mindset: Forestry and Salmon Farming

The forestry industry, driven by Decree Law 701 of 1974, which heavily subsidized the planting of exotic species like pine and eucalyptus, is a paradigmatic example of imposing a factory-like logic onto a complex ecosystem (Carrasco & Salgado, 2017; Otero, 2006). Diverse and resilient native forests were replaced by vast, homogenous, and highly vulnerable monocultures, especially susceptible to fires (Nahuelhual et al., 2014).

Similarly, salmon farming introduced an exotic species and an intensive production model into the fragile marine ecosystems of Patagonia (Buschmann et al., 2017; Soto et al., 2019). Both models represent a radical simplification of ecological complexity to maximize a single indicator: short-term production. The resulting Wicked System (WS) consists of these artificial socio-ecosystems. The Wicked Problem (WP) is the fragility that permits mega-forest fires, the proliferation of pests, water pollution, and ecological collapses—direct consequences of ignoring the diversity, interconnectedness, and inherent resilience of the original living systems.



Nota. Adaptada de una fotografía de la portada de la Constitución de 1980 (autor de la fotografía desconocido), publicada en el artículo "Expertos/as analizan los caminos para un nuevo proceso constituyente", 2022, Portal de la Universidad de Chile.

It is crucial to understand that the creation of these Wicked Systems isn't merely a technical or management error. In Chile, at a deeper level, it's the result of the persistent colonial dynamic of power and knowledge. As decolonial theorists like Aníbal Quijano and Walter Mignolo argue, colonialism didn't end with administrative independence; it established a "colonial matrix of power" that endures to this day (Quijano, 2000; Mignolo, 2000). This matrix imposed Eurocentrism as the only valid perspective of knowledge, a process Mignolo (2000) calls the "coloniality of knowledge."

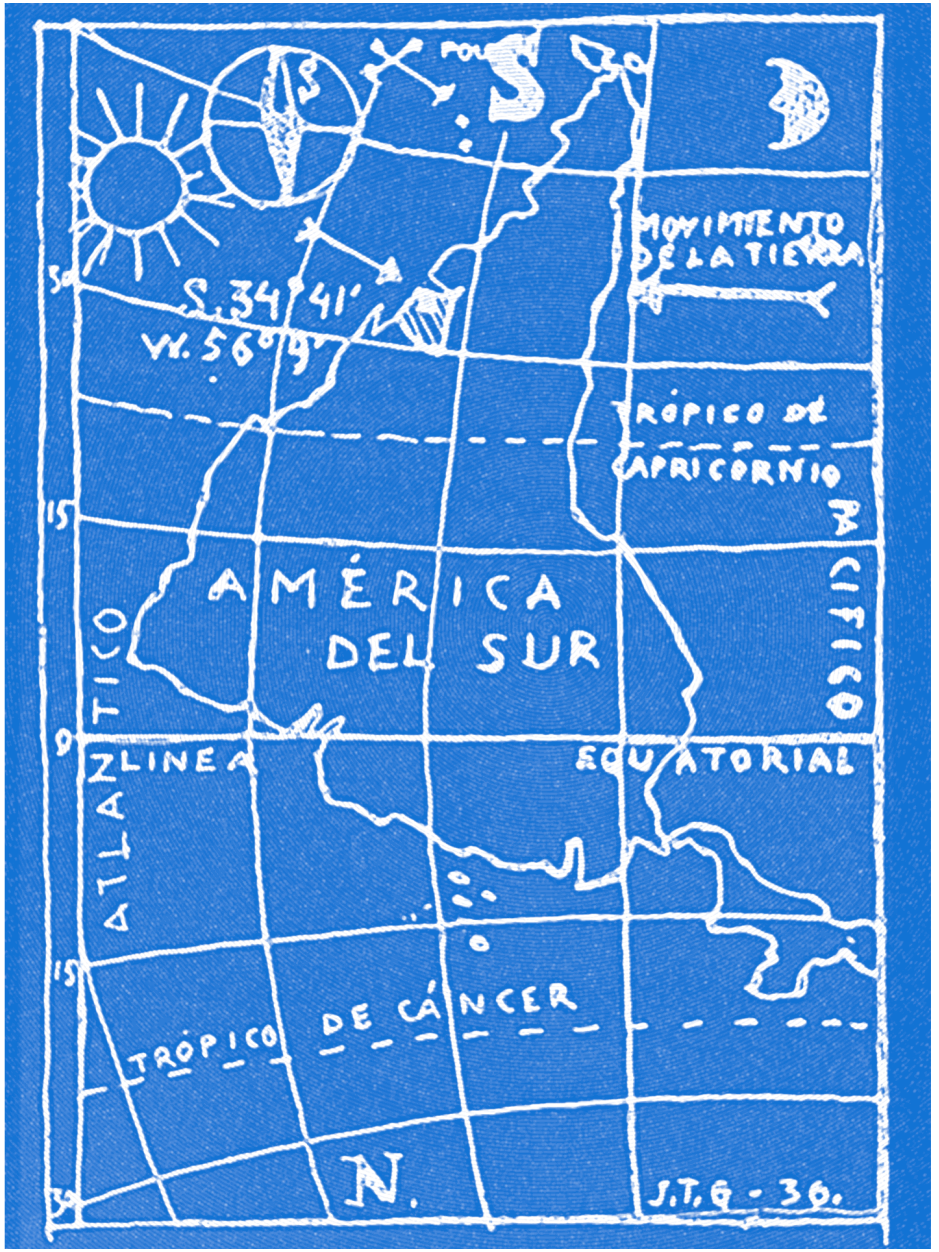
In parallel, the Western scientific and philosophical worldview, with its mechanistic vision and fundamental culture/nature dualism, proclaimed itself the sole rational way to understand the world. This actively invalidated, repressed, and subalternized the relational and systemic cosmologies of indigenous peoples and other cultures of the Global South (Lander, 2000). Ramón Grosfoguel (2016) describes the result of this process as an "epistemic and ontological extractivism," where not only material resources are violently extracted, but, more insidiously, an individualistic and mercantilist way of being and knowing is imposed, presented as universal.

From this perspective, the creation of Wicked Systems in Chile, through the privatization of common goods like water and the imposition of extractivist production models, is a direct manifestation of this imposed ontology that conceives nature as a mere resource to be exploited rather than an interconnected living system (Escobar, 2018).

Therefore, this thesis posits that a truly effective and transformative response must necessarily be decolonial.

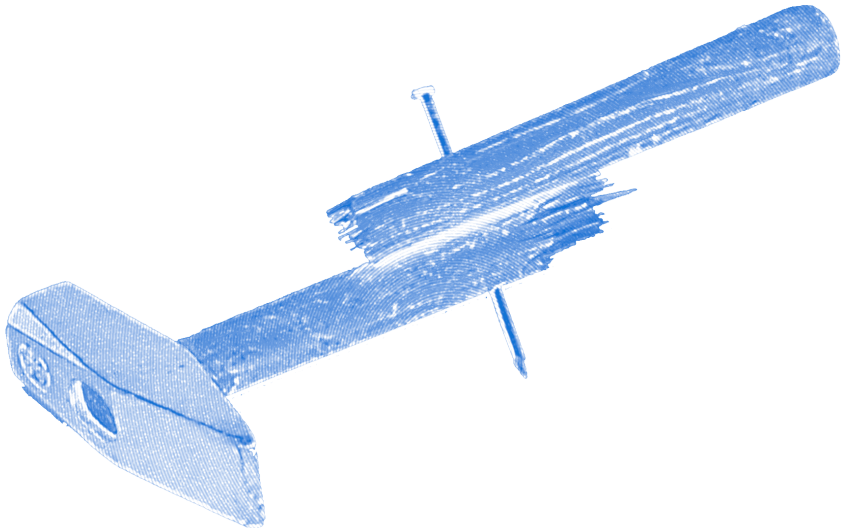
This perspective deeply resonates with the tenets of Gui Bonsiepe, convictions forged not in theoretical abstraction but through his direct participation as a designer and innovator in ambitious projects of social and technological autonomy in Latin America. From that lived experience, particularly in the Chilean context, Bonsiepe argues that design in the "periphery" cannot be a mere replica of models from the "center" but must constitute a practice of emancipation.

The solution, therefore, doesn't lie in imported technical fixes but in a "design disobedience" (Bonsiepe, 2021) that drives genuine cultural and technological liberation. This approach recognizes and activates designers' capacity to challenge dominant power structures, but only if, as Bonsiepe insists, their practice genuinely opens space for a diversity of knowledge and ways of being in the world, starting from the unrenounceable principle that problems of the periphery can only be solved from and by the periphery itself.



Perspectiva del sur global, Nota. Adaptada de América invertida [Dibujo a tinta], por J. Torres-García, 1943 (https://www.ceciliadetorres.com/artists/focus/joaquin-torres-garca).

3. Wicked Problems (WP): The Emergent Consequence of Dysfunction



Problemas viciados, Nota. Adaptada de Fotografía, por U. Schramm, 2013, Flickr (https://www.flickr.com/photos/uschramm/8383029587/).

Once a system has been transformed into a Wicked System (WS), it begins to generate dysfunctions that manifest as chronic, interconnected, and intractable problems. These are Wicked Problems (WPs). Their "wicked" nature, as originally defined by Rittel and Webber (1973), isn't an intrinsic characteristic of the problem itself but a direct consequence of its origin in a system that has lost its capacity for self-regulation and adaptive learning.

Bringing this concept to the realm of design, Richard Buchanan (1992) argues that "wickedness" intensifies due to design's fundamental indeterminacy. Since design lacks a fixed object of study, each formulation of a wicked problem is simultaneously the invention of a possible solution, making them inseparable and evolutionary.

The assertion that "every wicked problem can be considered a symptom of another problem" (Rittel & Webber, 1973, p. 160) becomes particularly lucid in this context, as each WP is inextricably embedded in the network of corrupted feedback loops of the underlying WS. The intractability of the problem is, therefore, a direct reflection of the rigidity and structural dysfunctionality of the system that generates it.

The Chilean Wicked Systems, previously analyzed, have generated a harvest of interconnected Wicked Problems, among which the following examples can be cited:

The Privatization of Water and the Petorca Crisis

Here, the Wicked Problem (WP) isn't merely water scarcity. Instead, it's a multidimensional crisis that encompasses the collapse of traditional family farming, the systematic violation of the human right to water, and the emergence of public health crises stemming from the poor quality of water distributed via tanker trucks.

"Sacrifice Zones" and Pollution in Quintero-Puchuncaví

Here, the Wicked Problem (WP) manifests as a chronic health and environmental emergency. Its symptoms include recurrent episodes of mass poisoning in the population, especially among children, significantly elevated cancer rates, and the irreversible destruction of traditional livelihoods, such as artisanal fishing, due to contamination.

The Monoculture Mindset: Forestry and Salmon Farming

Here, the Wicked Problem (WP) stemming from monocultures manifests as uncontrollable "mega-fires" that devastate vast territories, a water crisis exacerbated by the high water consumption of pine and eucalyptus plantations, and the collapse of marine ecosystems under the pressure of salmon farming, leading to the appearance of anoxic "dead zones" and massive escapes that threaten native fauna.

Similarly, on a global scale, the Wicked System (WS) of an economy rooted in fossil fuels has spawned the quintessential Wicked Problem (WP) of our era: climate change. This perfectly fits Rittel and Webber's criteria: it's complex, uncertain, value-laden, lacks a clear solution, and every large-scale intervention carries potentially irreversible risks. In each of these instances, the intractable problem dominating public discourse is merely the visible symptom of an underlying system managed with a broken logic.

What might appear as isolated and specific events within a national context are, in reality, local representations of the same pattern of systemic failure, resonating globally.

The logic underpinning the Wicked Dynamic is surprisingly replicable. If you examine a European context, such as Italy, for example, the crises reveal structurally similar patterns to those in Chile, even if their immediate causes differ:

The Water Crisis in the Po Valley

The water crisis in Italy's industrial and agricultural heartland, the Po Valley, doesn't stem from privatization as it does in Petorca. Instead, it arises from fragmented governance and uncoordinated extraction, leading to a large-scale "tragedy of the commons" (The "tragedy of the commons" is a well-established concept in ecological economics and resource management; see: Hardin, 1968; for the Po Valley case: Di Prima et al., 2020).

The "Terra dei Fuochi" in Campania

The "Terra dei Fuochi" in Campania, much like Quintero-Puchuncaví, is a sacrifice zone. However, its Wicked System (WS) stems from a perverse symbiosis between the failure of the state in waste management and the infiltration of criminal organizations that create a parallel system of illegal dumping (The "Terra dei Fuochi" is a widely documented case of environmental contamination due to illegal waste management; see: Mazzei et al., 2017).

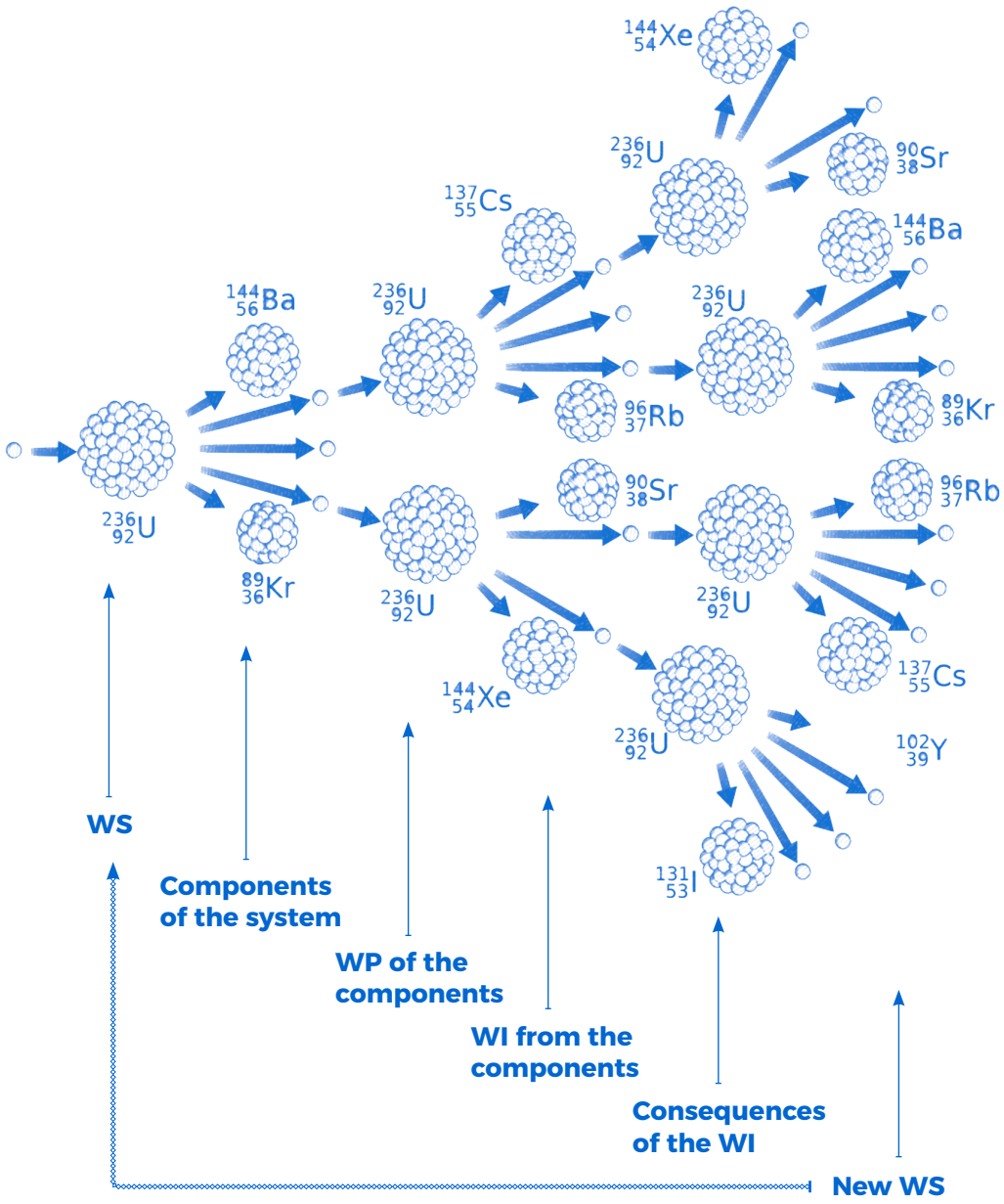
The Devastation of Olive Groves in Apulia

The devastation of olive groves in Apulia by the bacterium Xylella fastidiosa is a Wicked Problem (WP) that, like the fires in Chile, emerges from the systemic vulnerability of a historical monoculture (The Xylella fastidiosa outbreak is a clear example of how monocultures can generate systemic vulnerabilities; see: Saponari et al., 2019).

Although the triggers and political actors differ, the structure of the Wicked Dynamic (WD) remains the same: a governance system applying linear logic is incapable of managing complexity and thus generates intractable problems.

This pattern replicates on a planetary scale. The 2008 financial crisis was the result of a Wicked System (WS); a deregulated global financial system, that generated the Wicked Problem (WP) of systemic risk (Acharya et al., 2010; GFC, 2011). More recently, supply chain disruptions during the COVID-19 pandemic revealed the Wicked System (WS) of "just-in-time" logistics, which had sacrificed business resilience for short-term economic efficiency (Ivanov & Tsipoulanidis, 2020; Ponomarov & Manuj, 2020).

These are not isolated incidents; they are echoes of the same Wicked Dynamic (WD) operating at different scales.



Repercusiones, Nota. Adaptada de "Nuclear fission chain reaction" [Ilustración], por MikeRun, 2017, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Nuclearfissionchainreaction.svg). CC BY-SA 4.0.

4. Wicked Innovation (WI): The Trap of the Linear Solution

Nota. Adaptada de la caricatura editorial It shoots further than he dreams, por J. F. Knott, 1919, publicada originalmente en el Dallas Morning News. La obra se encuentra en dominio público.

The final, and perhaps most insidious, stage of the Wicked Dynamic is the application of Wicked Innovation (WI). This thesis defines WI as a "solution" that, though well-intentioned, is conceived in a narrow and linear fashion to be applied to a Wicked Problem (WP). This isn't innovation in the transformative sense envisioned by Schumpeter (1934), as a "creative destruction" that reconfigures systems. Instead, it's a low-complexity, often incremental innovation that ignores the structure of the underlying Wicked System (WS). Precisely because of this disconnection, it's destined to fail, produce counterproductive consequences, and ultimately reinforce the original dysfunction.

The main characteristic of WI is its deceptive nature: its difficulty in being identified at the moment without a systemic view of the whole.

Without this perspective, it's easy to believe that all innovation is inherently positive. Many WIs, in fact, arise from positive intentions and a genuine desire for change, but their inability to reconfigure the fundamental structure of the system limits them to interventions that only attack symptoms, not root problems. This not only fosters the perpetuation of the problem but also a growing territorial inequality. This is because these symptomatic "solutions" act as localized "painkillers" that, while they may alleviate short-term pain in a specific place, require resources for their implementation. Consequently, territories or communities with greater economic and political capacity are the ones that can afford to apply these "painkillers," while less resourced areas are neglected, widening the gap and consolidating inequity.

WI represents the closure of the Wicked Dynamic's feedback loop. It is the embodiment of Donella Meadows' (2008) "fixes that fail," where attempts to fix the system with the same logic that corrupted it only deepen the trap. It is not disruptive innovation, but maladaptive innovation that entrenches the system in its dysfunction.

The appeal of WI to decision-makers is powerful: it offers the lure of a docile solution for a wicked problem, reframing an intractable challenge as if it were a technical and measurable problem. This allows for the implementation of "solutions" that generate quantifiable metrics and visible short-term results, thereby creating the illusion of control and progress from which systemic thinking tries to detach itself.

These wicked innovations can manifest in various forms:

Incentives (Wicked):

These are policies that apply a simple, linear incentive to a complex social system, leading to counterproductive behaviors that undermine the original objective.

Solutions (Failed):

These are large-scale projects that address a visible symptom of a Wicked Problem (WP) while simultaneously creating new and often deeper systemic issues.

Resistance (to Progressive Policies):

These are policies that fail because the social system, in its complexity, resists or subverts the linear rules imposed upon it.

In the analyzed Chilean cases, Wicked Innovations are evident, and their failure to address the initial problem is undeniable:

The Privatization of Water and the Petorca Crisis

In Petorca, the "solution" of distributing water via tanker trucks addresses a symptom (lack of water access) but utterly fails to touch the structural cause (the Water Code and water hoarding).

"Sacrifice Zones" and Pollution in Quintero-Puchuncaví

In Quintero-Puchuncaví, the Prevention and Decontamination Plans act as WI. They focus on mitigation measures that contain the conflict but don't eliminate the source of contamination.

The Monoculture Mindset: Forestry and Salmon Farming

Finally, in southern Chile, wildfire-fighting policies are a WI that tackles the fire itself but ignores the flammable monoculture landscape that promotes it.

These examples illustrate how path dependency and systemic lock-in, discussed previously, generate highly complex feedback loops. Applying Wicked Innovation to these entrenched systems is not only ineffective but actually strengthens the trap, demonstrating the need for an equally dynamic and profound approach to intervention.

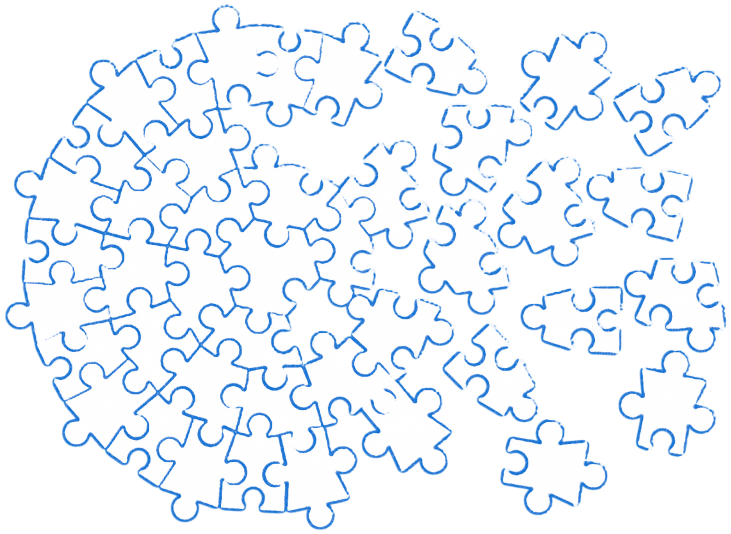
To escape the Wicked Dynamic, what this thesis identifies as the most fundamental change is required: a transformation at the level of perception, shifting from analyzing parts to understanding patterns. However, as the persistence of Wicked Innovation demonstrates, this change in mindset, though necessary, is not sufficient. While the vast and robust theoretical framework of systems thinking is excellent for diagnosing complexity, it requires a specific methodological bridge to avoid getting stuck in analysis paralysis. Consequently, an innovation strategy is needed that is as systemic and adaptive as the problems it aims to address.

This demand for an innovative strategy is significant. At the corporate and organizational level, it implies cultivating dynamic capabilities that allow for not just incremental improvements, but also radical reconfigurations.

This demands constant attention to the environment and highly effective resource utilization to sustain a balanced innovation portfolio.

In the social sphere, it requires sensitive monitoring of community needs and multi-sectoral collaboration to ensure solutions generate genuine and sustainable social value.

Finally, in the public and governance realm, it demands a transition from traditional regulation towards policies that act as catalysts, fostering ecosystems of open innovation and strategically directing resources to enable systemic transformation.



Putting the whole together, Nota. Adaptada de una fotografía de autor desconocido, publicada por u/Pleasant-Salt, 2021, en Reddit (https://www.reddit.com/r/pics/comments/l0mw6k/all-your-interests-in-one-place/).

5. The Ontological Turn: Towards a Pluriverse of Worlds and Systemic Value

As explained in the previous chapter, systems thinking offers a fundamental counter-narrative to the mechanistic worldview. It focuses on emergence, self-organization, and resilience as key, irreducible properties of living systems. Self-organization is a system's ability to create complexity and structure without centralized control (Capra & Luisi, 2014); resilience is its capacity to survive, adapt, and persist in a changing environment (Walker & Salt, 2012). Linear management, by imposing rigid control, suppresses self-organization and, by optimizing for short-term efficiency, destroys resilience, making systems fragile and dysfunctional (Meadows, 2008).

The paradigm shift needed to overcome the Wicked Dynamic therefore involves adopting a systemic view of life, as articulated by key thinkers who have redefined the understanding of reality within the framework of this thesis:

Donella Meadows

With exceptional clarity and pragmatism, she translated the complex principles of system dynamics into accessible wisdom. She taught us to "dance with systems," to listen to their feedback, and to identify "leverage points": those intervention spots where a small push can create deep and lasting changes, thereby offering a fundamental bridge between theoretical understanding and transformative action.

Fritjof Capra

He teaches us that life should not be understood as a collection of objects, but rather as a network of relationships (The Web of Life). From this perspective, the essential properties of a living system (such as its intelligence or adaptability) are emergent properties of the whole and cannot be understood through the isolated analysis of its parts. Therefore, a "systems view of life" (The Systems View of Life) is necessary to comprehend it.

Gregory Bateson

With his concept of the "ecology of mind," he urges us to look for the "patterns that connect" rather than isolated elements. He argues that linear thinking is not simply a neutral tool, but a flawed epistemology that, by its very nature, puts us in conflict with the interconnected and circular logic of living systems.

Lynn Margulis

Through her revolutionary theory of endosymbiosis, she demonstrated that cooperation and symbiosis, not solely competition, are fundamental creative forces in evolution. Her work reveals that life not only competes but also creates novelty and complexity through association and collaboration, a principle that linear thinking is incapable of valuing or fostering.

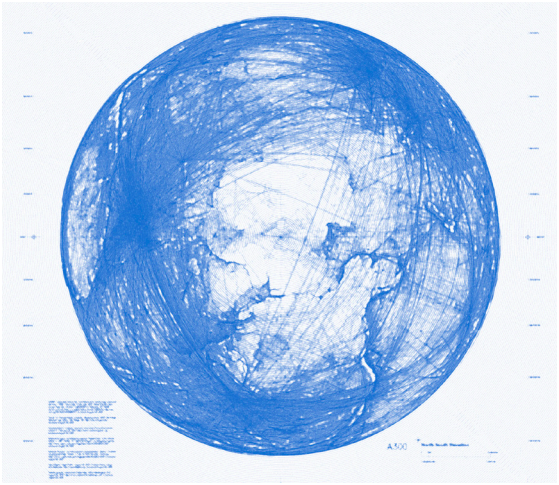
By adopting this systemic lens, we can begin to discern the global patterns underlying the Wicked Dynamic. We uncover the pattern of extractivism, evident in Chile's water crisis, Italy's waste management issues, and resource exploitation across the Global South. The pattern of cost externalization emerges, linking pollution in bays like Quintero to the planetary climate crisis. The pattern of linear solutions applied to complex problems becomes apparent, connecting the ineffective pace of the Green Revolution to the austerity policies imposed by international financial institutions.

Ultimately, these patterns reveal a profound psychological fracture, as described by philosopher Arne Næss (1973) in his concept of Deep Ecology: the ecological crisis is, at its root, an external manifestation of the perception of an isolated "self" separated from the web of life.

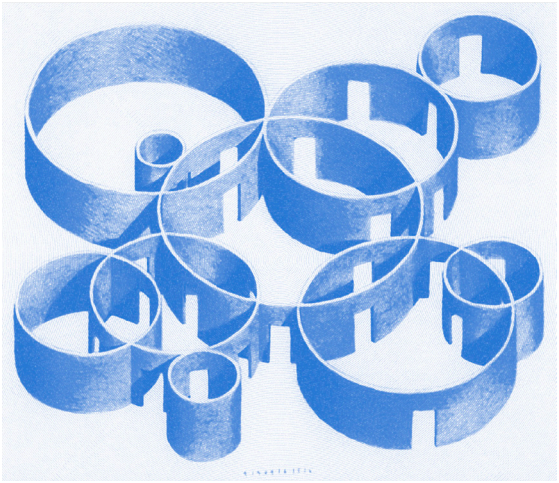
While systemic thinking teaches us to see relationships, the "ontological turn" in social sciences, largely driven by dialogue with indigenous cosmologies, challenges us to go a step further: to question the very nature of the "reality" we observe and take for granted (Blaser, 2013; Viveiros de Castro, 2014). Understanding life as a network of interdependent interrelationships makes evident the need for a conception of value that is also systemic, not merely economic (Escobar, 2018; Latour, 2005).

This is where movements like Decolonial Ecology and philosophies such as the Buen Vivir of Andean peoples gain crucial relevance. They do not propose an "alternative development" but an "alternative to development" (Gudynas, 2011).

Their focus is not abstract economic growth, but the achievement of a full life within community and in harmony with a nature considered a subject of rights, not an object of exploitation. The Amerindian perspectivism formulated by Eduardo Viveiros de Castro (1998) and the political ontology of Marisol de la Cadena (2015) show us that many socio-environmental conflicts are not simple disputes over resources, but clashes between different worlds; between distinct ways of being and knowing.



Globalizacion, Nota. Adaptada de The City of 7 Billion, por Plan B Architecture and Urbanism, 2015, Slow Built (https://slowbuilt.com/#/the-city-of-7-billion/).



Pluriverso, Nota. Adaptada del "Concept diagram", por M. Pezo y S. von Ellrichshausen, 2016, publicado en "Pezo von Ellrichshausen creates labyrinthine pavilion of overlapping cylinders" de A. Frearson, 2016, Dezeen.

Parallel to these perspectives, and emerging from within Western economic critique itself, are frameworks that seek to dismantle the paradigm of unlimited growth. A paradigmatic example is Kate Raworth's Doughnut Economics model (2017). This framework proposes replacing the goal of infinite GDP growth with an objective of prosperity in dynamic balance.

To do so, it visually and conceptually defines a "safe and just space for humanity," bounded by a "social foundation" that guarantees basic human rights and an "ecological ceiling" that respects planetary limits. By focusing on prospering within the "Doughnut," this approach, though originating in a different context, converges with decolonial philosophies by questioning the imperative of growth and advocating for an economic model that serves life.

Consequently, Arturo Escobar's (2018) call for a "pluriverse" (a world where many worlds fit) reveals itself not as a utopia, but as a political and practical necessity to overcome the Wicked Dynamic.

Recognizing that the biological diversity we need to survive fundamentally depends on the ontological, cultural, and economic diversity we are capable of respecting and cultivating is the essential step towards creating more just and resilient systems.

6. Synthesis and Call to Action: From Managing Failure to Stewarding Resilience

The analysis in this chapter reveals the pervasive and destructive nature of the Wicked Dynamic (WD). The framework WD = WS(WP(WI)) has proven to be a robust diagnostic tool for exposing the common architecture of systemic failure across diverse contexts. From Chile to Italy, from agriculture to finance, the pattern remains consistent: a reductionist worldview that prioritizes short-term, linear goals (like efficiency or immediate profit) leads to the implementation of Wicked Innovations that degrade system resilience, resulting in intractable crises.

The 2008 financial crisis and the supply chain disruptions during the COVID-19 pandemic were not unpredictable "black swans"; they were predictable systemic failures, the outcome of designing systems optimized for efficiency but stripped of resilience. The question we must ask ourselves is:

Do we want this to happen again, or do we want to start building systems designed to thrive in uncertainty?

Overcoming the Wicked Dynamic demands a paradigm shift: we must transition from merely managing problems to stewarding resilience, and from focusing on efficiency to pursuing sustainability. The goal can no longer be to find the definitive "solution" to wicked problems, but rather to foster the learning and adaptive capacity of the systems on which we depend. This is not an abstract task; it's a call to action with profound economic and strategic implications. Design, in this context, is not a secondary player but a central force in shaping contemporary economies, from the materialization of financial flows to the organization of markets and the creation of value (Julier, 2017).

This economic role of design makes its alignment (or misalignment) with systemic logic of paramount importance. On one hand, instrumentalized design, operating under the logic of the Wicked Dynamic, becomes an accelerator of unsustainability and fragility (Fry, 2020). On the other hand, and herein lies the fundamental opportunity, design informed by a systemic understanding becomes a powerful driver for sustainable innovation and the creation of resilient value.

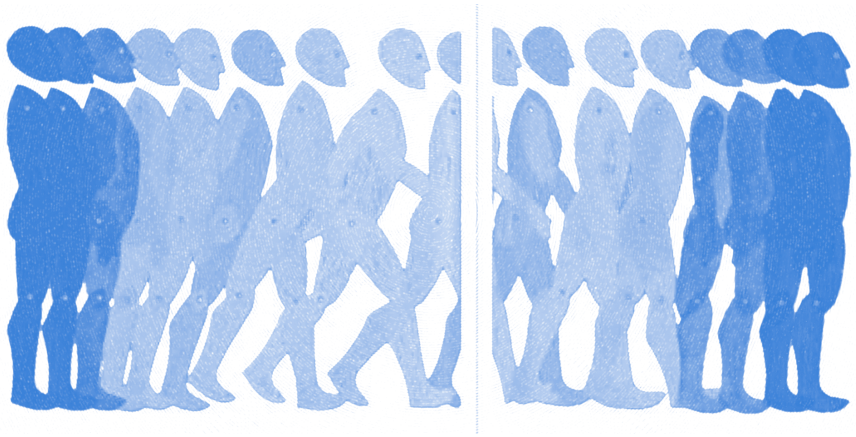
As we've already specified, this isn't an abstract task; it's a call to action that challenges various system actors:

- ***For leaders and managers, this demands abandoning the illusion of control and adopting a stance of epistemic humility. It means recognizing the limits of human knowledge and the irreducible complexity of the world to manage uncertainty more wisely and adaptively (Meadows, 2008; Senge, 1990).***

- ***For designers and innovators, it implies a conscious act of disobedience: rejecting the allure of Wicked Innovation. Instead, it means reorienting creative talent toward strengthening healthy feedback loops, fostering self-organization, and deliberately designing for systemic resilience.***

- ***For society as a whole, it entails the responsibility to exert vigilant and constant pressure. This pressure acts as a vital feedback loop, as demonstrated by social movements that, by rejecting narratives of merely individual responsibility, demand a fundamental transformation of the system.***

Therefore, studying the Wicked Dynamic imparts a lesson in humility, but also in agency. Our capacity to control complex systems is inherently limited, and the belief that we can engineer our way to security is the illusion that fuels the crisis.



Nota. Adaptada de una ilustración para el artículo "The rhythm of life" (p. 112), por R. Borja, 1968, en Science year: The World Book science annual, 1968.

6.1 Do You Recognize the Wicked Dynamic in Your Environment?

We invite you to use the following questions as a diagnostic tool to visualize how the Wicked Dynamic (WD) might be operating in your own professional, organizational, or community context.

Figure 3: Do You Recognize the Wicked Dynamic in Your Environment? Note: This figure is an original creation.

7. Why Innovation is the Answer

The persistence of the Wicked Dynamic stems, as Daron Acemoglu and James Robinson (2012) argue, from the incredible resilience of the extractive institutions that underpin it. The vision presented in their work shares and validates the systemic foundations addressed thus far in this thesis: their "vicious circles," in which extractive institutions self-perpetuate and resist change, are a direct manifestation of the powerful feedback loops that govern system behavior. From this perspective, shared and deepened throughout this text, failure is not an accident but the predictable outcome of a governance structure deliberately designed to block "creative destruction" and opportunities for the majority.

Given this diagnosis, inaction is not a neutral option; it is a form of complicity with the perpetuation of failure. The opportunity and the need to intervene emerge precisely from this understanding. If the root of the problem is institutional, then innovation cannot be merely technical or product-based. Innovation must be, fundamentally, institutional and systemic. We must innovate not only to solve Wicked Problems but to transform the Wicked Systems that originate them, consolidating more inclusive and participatory governance structures. This is the only path to generate positive and lasting change.

The next chapter of this thesis will present the System-driven Innovation (SDI) Model, not as a final solution but as a practical methodology and a framework for thought to begin this journey. It will be proposed as a "methodological bridge" that equips organizations, particularly those who do not feel obligated to act, with the tools to stop being passive (and/or active) victims of the Wicked Dynamic and become agents of systemic transformation. The task, ultimately, is to move from being architects of instability to being custodians of resilience.

Instituciones solidas, Nota. Adaptada de Atlas Supports the Heavens [Grabado], por B. Picart, 1731, recuperada de Public Domain Image Archive (https://pdimagearchive.org/images/5d9d3ffa-ecff-44d6-b689-61889004d33f/). La obra original se encuentra en el Rijksmuseum y está en dominio público.encuentra en el Rijksmuseum y está en dominio público.

Chapter 3:
System-Driven Innovation (SDI).

"A Systemic Design Framework for Collaborative Innovation"

The previous chapters of this thesis established a critical diagnosis of our era. Chapter 1 laid the groundwork for systems thinking and championed design's inherent potential as an agent of transformation.

Chapter 2, in turn, unpacked the "Wicked Dynamic" (WD): a recurring pattern of systemic failure where a linear and reductionist worldview (the Wicked System - WS) generates wicked problems (Wicked Problems - WP), which are then addressed with "solutions" that perpetuate the cycle (Wicked Innovations - WI).

This diagnosis reveals that traditional innovation models, often centered on product, short-term efficiency, or isolated technological solutions, are insufficient (Christensen, 1997; Scharmer & Kaufer, 2013) and, frequently, complicit in the perpetuation of the WD.

The trajectory of innovation thinking over the last half-century reveals a clear evolutionary progression;; a journey from linear simplicity to the complexity of interconnected ecosystems. Early conceptual frameworks, known as first and second-generation models, were characterized by a linear, unidirectional logic (Rothwell, 1994), where innovation swung between "Technology Push" and "Market Pull," providing a basic framework that, due to its simplicity, failed to capture the interactive nature of the real process.

Recognizing these limitations, third and fourth-generation models emerged, introducing the concepts of interaction and integration. These models, acknowledging the need for constant collaboration and feedback, structured innovation as a managed process with decision points (Cooper, 1990).

The most recent evolution has led us to network and open innovation models, where valuable knowledge is recognized as distributed, and collaboration must extend beyond organizational boundaries to include suppliers, customers, and even competitors (Chesbrough, 2003).

Furthermore, innovation is now conceptualized as a phenomenon occurring across entire ecosystems, driven by platforms and large-scale co-creation (Gawer & Cusumano, 2014; Nambisan et al., 2017), where organizations' capacity to transform is driven by platforms and large-scale co-creation processes, and where the ability to transform the dynamic itself is key to

survival and success (Demil & Lecocq, 2010).

However, despite this sophisticated evolution (from linear to network, from organization to ecosystem), a systemic analysis reveals the persistence of a limiting pattern: although models have become more complex and collaborative, their fundamental focus has often remained anchored in optimizing the existing system rather than transforming it. Most of these frameworks, even the most advanced and complex, operate under the logic of the WD.

Incredibly powerful tools have been developed to connect actors, accelerate processes, and manage value flows, but the underlying premises that define that value almost exclusively in economic terms are rarely questioned. We have learned to innovate in a more interconnected and efficient way, but we largely continue to act within the same dynamic and under the same rules.

This is the pattern that explains why, despite decades of advances in innovation management, our societies continue to face wicked systems, problems, and innovations (Wicked Dynamic).

The question that then emerges is inescapable:

if existing models fail, what is the alternative? How can we move from innovation that aggravates dysfunction to one that cultivates resilience and sustainability?

This chapter presents the central proposal of this thesis: System-Driven Innovation (SDI) model. SDI is defined as a systemic design-based innovation model that helps organizations navigate complexity, manage the Wicked Dynamic, and build systemic resilience.

SDI isn't simply another linear process; it's a framework for thinking and action that redefines innovation as a continuous, collaborative, and fundamentally systemic process, with the primary goal of addressing and counteracting the WD.

Its differentiation from traditional models is profound, though difficult to identify. While conventional innovation has historically been evaluated by its ability to generate competitive advantage and economic return for an individual entity, SDI prioritizes generating economic, social, and environmental benefits for the system as a whole, by strengthening the community of actors that compose it. It's based on the premise that the long-term health and prosperity of any organization are inseparable from the health and resilience of the broader ecosystem in which it operates.

This chapter will now detail SDI's architecture: its fundamental principles based on self-organization and supporting a systemic conception of value; its methodological phases, designed to directly intervene in the three components of the WD; its multi-level impact; and the redefinition of the designer's role that this new paradigm demands.

1. Fundamental Principles of SDI: From a “Wicked Dynamic” to a “System-Driven Dynamic”

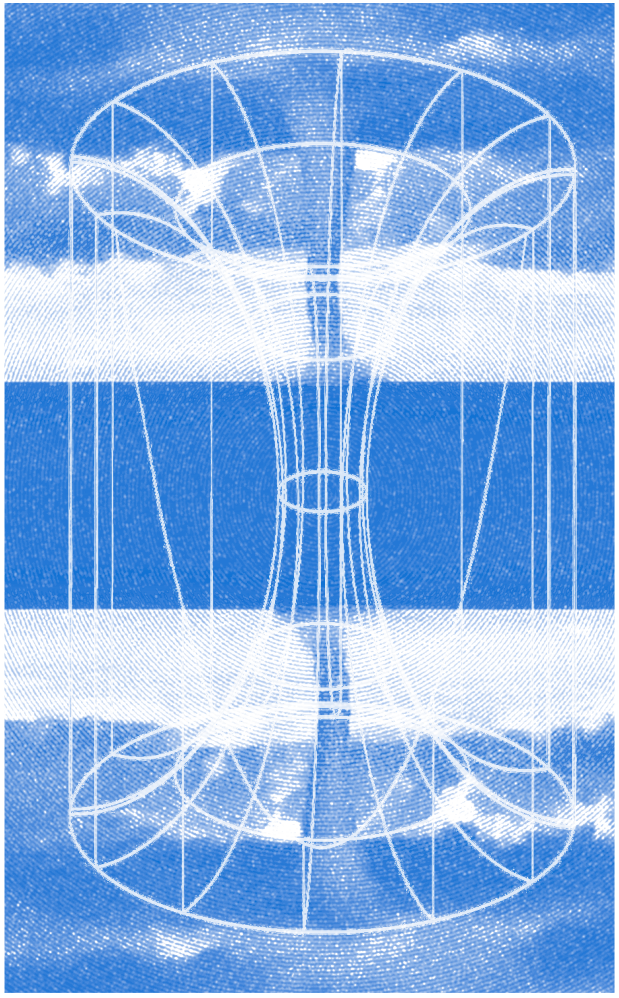
The preceding chapters of this thesis have moved from the philosophical foundations of systems thinking to a critical diagnosis of a recurring dysfunction in our socioeconomic ecosystems: the Wicked Dynamic (WD). It has been argued that this cycle of failure; where a linear and reductionist worldview (the Wicked System - WS) generates wicked problems (Wicked Problems - WP), which are then addressed with “solutions” that perpetuate the cycle (Wicked Innovations - WI), is not an accident but the predictable result of this flawed perception. As a counterpoint, the System-Driven Innovation (SDI) model has been presented as a regenerative, collaborative, and autopoietic alternative to intervene in this dynamic.

The SDI model rests on two interconnected principles that form its philosophical and operational core. These principles aren’t mere guidelines; they’re the pillars enabling organizations to shift their mindset from an extractive and reactive logic to a regenerative and proactive one. The conscious application of these principles seeks to catalyze a fundamental transition: the move from the Wicked Dynamic, a self-reinforcing cycle of systemic failure, to a System-Driven Dynamic, a virtuous cycle of learning, adaptation, and holistic value creation.

This new dynamic isn’t imposed externally; rather, it’s cultivated to emerge from the community of actors itself, reconfiguring the very nature of innovation governance within the organization.

The starting point for a model like SDI doesn’t come from conventional analysis but from a shift in observational focus; In a world obsessed with speed, change, and movement, systemic innovation often originates from contemplating the static: what remains unchanged, what’s taken for granted, what persists as unquestioned orthodoxy in our industry, our organization, our professional practice, our culture, and consequently, in our actions? It is in the deconstruction of these inertias, in these unattended areas characterized by their indefiniteness, that the deepest opportunity lies (Senge, 1990; Meadows, 2008).

The trigger is the recognition of a fundamental lack, not in products, but in relationships; not in functions, but in meanings (Krippendorff, 2006). This recognition fundamentally requires a refoundational mindset: an actor, be it a leader, a designer, or a team (regardless of their distinction or hierarchical role) who develops a sensibility to perceive the dysfunction of the Wicked Dynamic. This actor takes on an active role as a catalyst for change, motivated not by an external mandate, but by a deep personal and professional dissatisfaction with the status quo, and by a vision, even if initially abstract, of the systemic benefits that could be unlocked.



This awakening doesn’t happen in a vacuum; it’s a “storm”: an environment of increasing volatility, uncertainty, complexity, and ambiguity (VUCA) that makes traditional structures and linear business models increasingly fragile (Snowden & Boone, 2007).

This storm, however, shouldn’t be seen solely as a threat; it’s the chaotic context that illuminates the latent potential of “grey areas” and creates an unavoidable urgency to explore them. In a storm, visceral behavior often prevails; actions prioritize survival, guided by instinct, and self-imposed barriers or conventions vanish. It’s in this disruption that the system becomes permeable to new logics.

The SDI model is precisely designed to navigate this storm, not by avoiding it, but by leveraging the opportunities its chaos reveals.

These potentialities, which linear approaches often ignore, are found in unexplored areas: ambiguity becomes an invitation to creative exploration (Buchanan, 1992); fragmented information transforms into a puzzle to solve for a unique systemic vision (Fan, 2025); underutilized resources are revealed as a hidden source of value (Bistagnino, 2009); hidden inefficiencies become optimization opportunities (Sutton, 2023); latent user needs become the seed of entirely new markets (Kim & Mauborgne, 2015); emergent patterns act as weak signals of possible futures (Watkins, 2018); and, crucially, weak or non-existent interconnections present themselves as an opportunity to build bridges and generate synergistic value that no single actor could create alone (Manzini, 2021).

In this scenario, SDI posits that, while a refoundational and critical mindset is needed, its mere understanding isn’t enough for action; collaboration in a conducive environment is required.

The situation (the storm) paradoxically becomes an ideal space for latent opportunity: a "perfect storm" (Tapscott et al., 2001 and later applied to mass collaboration by Tapscott & Williams, 2006), because it pushes actors to share a perception of risk and an imperative need, catalyzing collaboration around a common goal of survival and adaptation.

This research does not seek to romanticize vulnerability, precariousness, or merit. On the contrary, it pragmatically recognizes that the dynamic of crisis is a present reality in multiple global scenarios; a force that, on one hand, affects and limits the behaviors and properties of living systems, but which, at the same time, acts as a powerful accelerator of change.

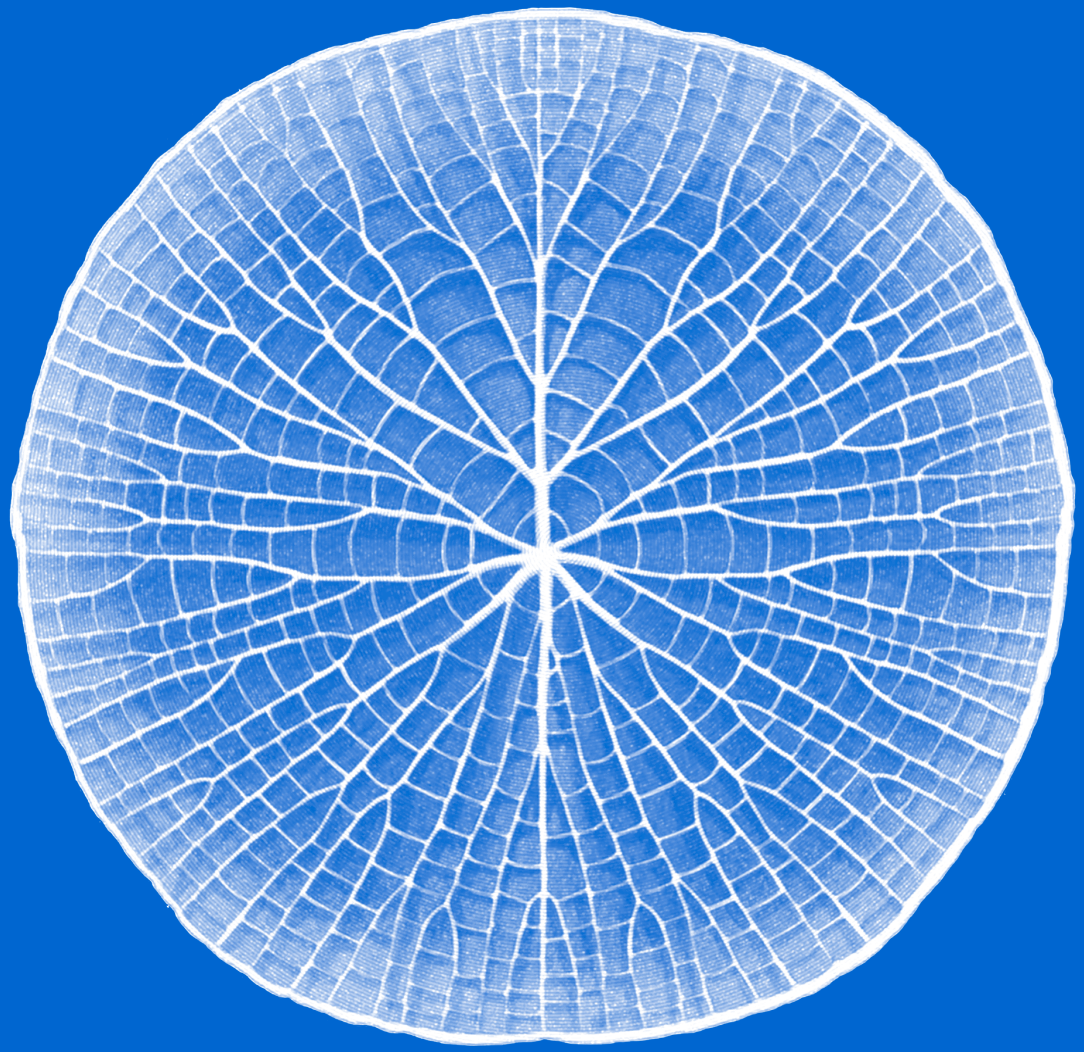
However, this transformative potential is not automatic. It requires the presence of an actor conscious of the dynamic, with access to the resources and influence necessary to trigger deliberate action. Consequently, the SDI model's proposal is based on the evidence that the mechanics of the WD cannot be addressed solely with awareness; it must be accompanied by robust theory and intentional practice.

In this sense, the SDI model considers academic spaces (like this thesis) to be fertile ground for fostering these inherently disruptive actors to have the opportunity to access resources that support change. This change is conceived not as a large corporate project, but through association as a social movement: an alliance of wills, often initiated by a minority, that activates to transform a workspace (network) into a movement with purpose, thus honoring the premise that Design is, in its essence, a deliberate and political act.

This new form of interaction originates in a community that shares a deep dissatisfaction with the present and a belief in the possibility of a different future. The decision by a group of actors to cooperate under a new paradigm (Systemic Value-Benefit) is, in itself, an act of radical innovation. This shared conviction, formalized in an association with a common objective, constitutes the "spark" that, step by step, ignites and sustains the dynamic of change.

This initial community, even if small, then becomes the nucleus of a new autopoietic system: a network that, if properly nurtured, has the potential to generate systemic impact that transcends its initial scale. By demonstrating a more resilient, equitable, and regenerative value creation model, this association not only solves its own problems but creates an "attractor" that inspires and can ultimately transform the entire ecosystem, demonstrating that an alternative to the Wicked Dynamic is not only possible but also viable and desirable.

Nota. Adaptada de Charting a new course [Ilustración], por S. McReath, 2016, Behance (https://www.behance.net/gallery/40327961/Charting-a-new-course).



Nota. Adaptada de la ilustración "Giant Waterlily" del proyecto Botanicum, por K. Scott, 2016, sitio web de la artista (https://katie-scott.com/).

1.1. The Organization as an Autopoietic Structure

The first principle of SDI radically redefines the notion of collaboration. It doesn't view the community of actors (employees, clients, suppliers, partners, the local community) as a mere group of stakeholders to manage, but as a living system with the potential to become an autopoietic structure.

The previously introduced concept of autopoiesis (self-production), coined by Chilean biologists Humberto Maturana and Francisco Varela (1980), describes systems that continuously produce the components and relationships that constitute them, thus maintaining their organization and boundaries in the face of disturbances. They are systems that create and recreate themselves, preserving their identity. Therefore, they constantly innovate to adapt and ensure survival. As seen in previous chapters, sociologist Niklas Luhmann (1995) extended this concept to social systems, arguing that they self-produce through communication. Each communication links to previous communications and enables future ones, creating a closed, self-reproductive network that gives the social system (whether a family, a company, or society as a whole) its identity and autonomy.

From the SDI perspective, an organization becomes autopoietic when it's capable of regenerating, by itself, the essential intangible resources for its survival and prosperity: trust, shared purpose, knowledge flows, and collaborative relationships.

The goal of SDI, therefore, isn't to control the community from the outside, but to facilitate the conditions for it to self-organize and become self-sustaining: to innovate.

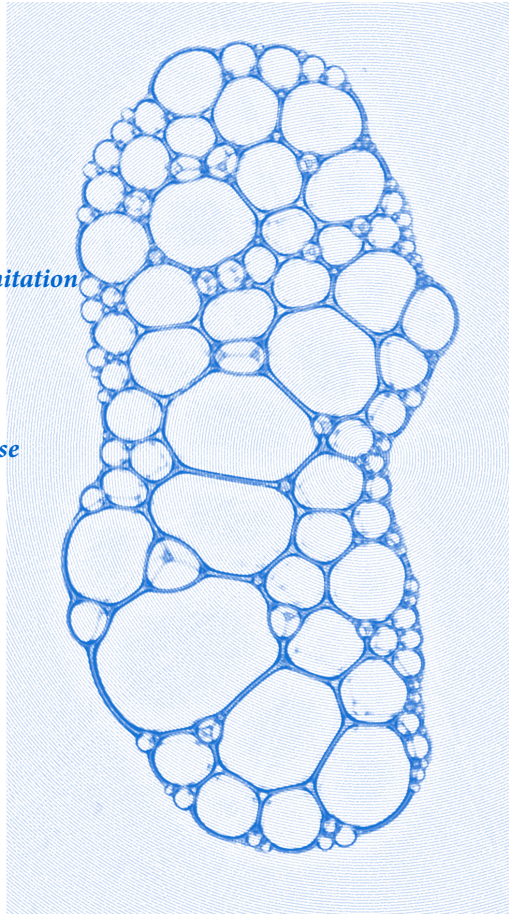
To do this, it's crucial to understand the difference between cooperation and collaboration. Cooperation can be a loose interaction, often short-term and with individual goals, where parties assist each other. Collaboration, in contrast, is a deeper, planned, and long-term process, oriented towards common goals and sustained by high levels of trust. It is this form of structured and purposeful interaction that is proposed as the specific type of "communication" that drives autopoiesis in a system.

However, fostering autopoiesis isn't a passive act; it requires deliberate contextual design. Based on the analysis of agile and resilient organizations (Goldman et al., 2012; Laloux, 2014), as well as social systems theory (Luhmann, 1995; Morgan, 1997), several indispensable properties that an organization must cultivate to foster autopoiesis as an emergent characteristic can be identified:

Operational and Structural Delimitation

Autonomy with a Common Purpose

Component Production Network



Nota. Adaptada de Bubbles [Fotografía], por B. Leonard, 2010, Flickr (https://www.flickr.com/photos/29537006@N04/5068513733).

Operational and Structural Delimitation

An autopoietic organization is operationally closed. This doesn't mean it's isolated; on the contrary, it remains open to the flow of energy and resources (Maturana & Varela, 1980; Luhmann, 1995). This delimitation implies that its internal operations (its decisions and processes) are determined by its own logic and structure, not directly by the external environment.

Therefore, the environment doesn't "operate" on the system; instead, it "perturbs" it (either positively or negatively). The organization interacts with these perturbations through structural couplings: specific departments or roles (like R&D, legal, marketing) that act as "sensors." These sensors are tuned to perceive certain external changes and translate them into internal decisions (Luhmann, 1995).

This selective closure is what grants the organization its autonomy and resilience, allowing it to co-evolve with its environment without losing its identity.

Autonomy with a Common Purpose (Alignment)

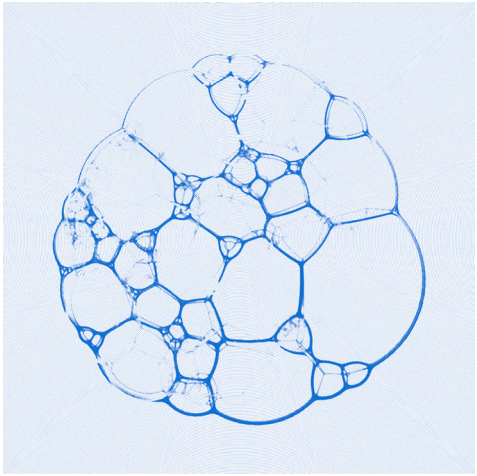
Autonomy without a shared purpose can devolve into chaos. Organizational autopoiesis demands a dynamic balance between the autonomy of its parts and their alignment with a global purpose (Morgan, 1997).

Leadership doesn't micromanage the "how" (the tasks of teams or squads). Instead, it establishes the premises for decision-making: the "why," the mission, and the strategic vision. With this clear alignment, teams can be granted significant autonomy to self-organize and discover the best solutions to achieve these shared objectives, thereby fostering emergent innovation.

Component Production Network

In an organization, "components" aren't physical; they're structural elements like decisions, norms, roles, and culture. An autopoietic system needs a recursive network where these components are continuously reinforced, evaluated, and reproduced (Luhmann, 1995). A decision is made based on previous decisions (the "decision premises") and, in turn, becomes a premise for future decisions.

This network of decisions, guided by the organization's culture and programs, ensures the coherence and persistence of the system's identity over time, regardless of the specific individuals comprising it at any given moment. Therefore, preserving its content is crucial for maintaining organizational identity and is a highly valuable component of the autopoietic process.



Nota. Adaptada de Black bubble art element graphic [Ilustración], por Rawpixel, s.f. (https://www.rawpixel.com/image/3280755/free-illustration-image-art-black-bubble).

Within this framework, the systemic designer's role in SDI is crucial as they act as a catalyst.

Their goal isn't to "build" the community, but to facilitate the conditions for autopoiesis to emerge. They become an "architect of the decisional context," as Luhmann (1995) describes. Their work isn't to impose solutions, but to design the system that can find its own solutions.

To achieve this, as we've already defined, they use methodologies to:

Making Mental Models Explicit

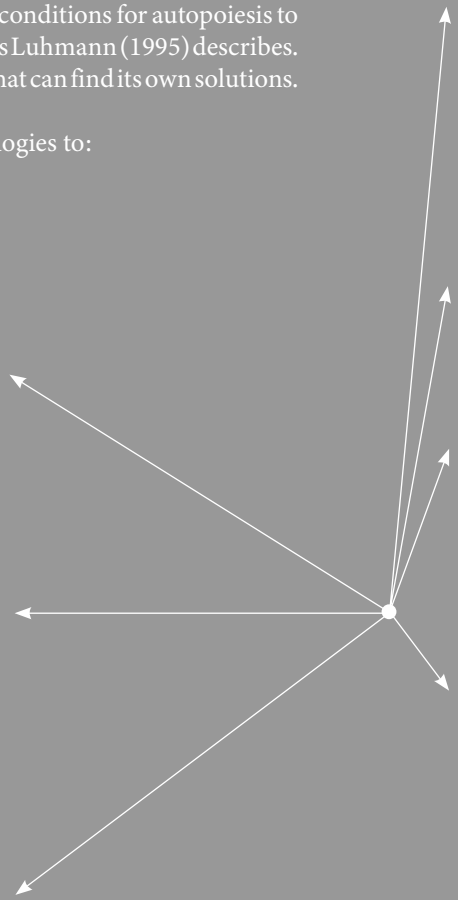
Through conversation, observation, and the use of mapping tools, the designer helps participants articulate, share, and challenge their underlying assumptions, thereby co-creating a shared purpose that serves as a basis for alignment (Senge, 1990).

Designing "Communication Pathways"

The designer helps structure resource flows and collaborative platforms that allow knowledge and decision-making to circulate efficiently and transparently, nourishing the system's communication network (Luhmann, 1995).

Fostering Psychological Safety

An indispensable requirement for trust and genuine collaboration is the creation of a safe environment where participants can express ideas, disagree, and admit mistakes without fear (Edmondson, 1999). The designer, as facilitator, is responsible for modeling and protecting this safety, which is the foundation of social capital and diversity.



Living Labs (LLs)

Co-creation ecosystems in real-world contexts. They are ideal for mobilizing users' tacit and contextualized knowledge, and for building social capital and civic resilience. (This approach has become established as an environment for open innovation and co-creation; see: Schaffers et al., 2011; Leminen et al., 2012).

Open innovation (OI)

A paradigm for managing flows of explicit knowledge and intellectual property across organizational boundaries, optimized to accelerate the innovation of products and services. (The concept of open innovation was popularized by Chesbrough, 2003).

Public-Private Partnerships (PPPs)

Contractual frameworks designed to mobilize financial capital and share risks in large-scale infrastructure projects. (PPPs are a widely studied model for project financing and implementation in public management; see: Hodge & Greve, 2020; Grimsey & Lewis, 2004).

Innovation Clusters

Geographical (and non) concentrations that enhance the diffusion of tacit knowledge and access to specialized human capital to foster regional competitiveness. (The concept of clusters and their importance for regional innovation has been fundamental in economic theory; see: Porter, 1990).

Consequently, for an organization to be autopoietic, it requires a constant flow of resources (knowledge, capital, infrastructure, relationships), in which collaboration is the process that mobilizes these resources. The SDI relies on and can orchestrate four key structural mechanisms to facilitate this flow, selecting the most appropriate one based on the most critical resource in each context.

In summary, conceiving the organization and its innovation ecosystem as an autopoietic system constitutes the first fundamental pillar of the SDI model. This principle compels us to shift the focus of management: instead of attempting to control individuals or impose solutions from the outside, the objective becomes to cultivate an environment in which the system can learn, adapt, and regenerate itself.

Structured and purpose-driven collaboration is the communicative mechanism that fuels this process, allowing trust, knowledge, and resources to flow in ways that enable the system not only to withstand disruptions but to emerge from

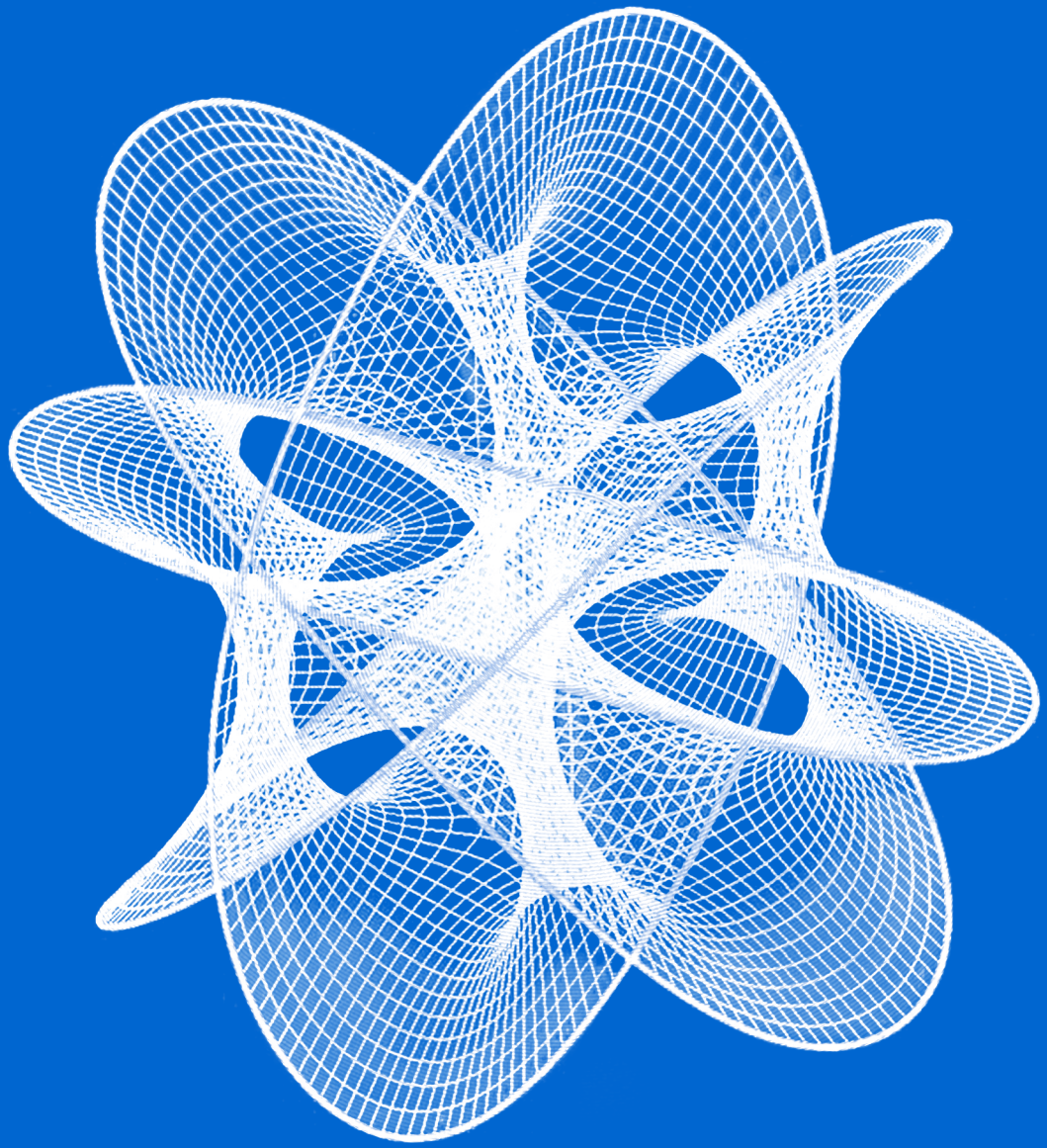
them stronger and more resilient. Autopoiesis, therefore, is not a final state, but a dynamic capability that must be continually designed and nurtured.

However, for a system to voluntarily orient itself toward autopoiesis and collaboration, its components must perceive the outcomes of this process as desirable and beneficial. If the sole purpose guiding interactions is the maximization of individual economic gain, the logic of the Wicked Dynamic will prevail, and any attempt at collaboration will be instrumental and fragile.

Therefore, for autopoiesis to become a virtuous and regenerative dynamic, a shift is essential in the second key component of organizational logic: the purpose that guides its decisions. This leads us directly to the second principle of the SDI, which addresses the necessary transition from economic value to systemic value.

Parte de cada uno. Nota. Adaptada de una imagen de autor y título desconocidos [Diagrama]. Recuperada de Pinterest (https://kr.pinterest.com/pin/147915169002691447/).

Parte del todo. Nota. Adaptada de una imagen de autor y título desconocidos [Diagrama]. Recuperada de Pinterest (https://kr.pinterest.com/pin/4222193395177729/).rsta.2006.1839).



Complejidad de la transformación del valor. Nota. Adaptada de Calabi-Yau manifold [Imagen generada por computadora], por A. J. Hanson, 2005, Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Calabi-Yau.png). CC BY-SA 3.0.

1.2. From Economic Value-Benefit to Systemic Benefit-Value

The second principle of the SDI directly addresses the logic that drives the WD: the primacy of a narrowly defined economic value and the consequent "concealment" of the negative externalities it generates. The SDI proposes and facilitates an evolution in the innovative mindset of organizations by redefining the concepts of "value" and "benefit," in order to overcome a paradigm that has proven to be systemically and profoundly harmful.

This transition is not a matter of mere ideological preference, but rather a conclusion that emerges from analyzing the systemic dysfunctions generated by the dominant "Shareholder Value" paradigm. This approach, popularized by economists such as Milton Friedman (1970), posits that the sole purpose of a company is to maximize profit for its owners within the "rules of the game." However, this thesis argues that decades of applying this logic have revealed its fundamental inefficiency at social, environmental, and, paradoxically, even economic levels.

As Joseph E. Stiglitz (2012) argues, the resulting system has been "working overtime to move money from the bottom and middle to the top," but in such an inefficient manner that the gains for the elite are far outweighed by the losses suffered by the rest of society. This is not wealth creation, but a transfer that destroys net value and generates growing inequality, which in turn weakens democracy, erodes trust, and fosters economic instability.

Much of this dysfunction stems from "rent-seeking," a concept that Stiglitz (2012) uses to describe the pursuit of income without creating new wealth. Rather than generating value, elites often use their power to establish monopolies, manipulate markets, or influence legislation in their favor. This behavior severely distorts the economy: it diverts talent toward financially speculative sectors rather than socially productive professions and rewards manipulation of information over transparency and fair competition.

Even in high-tech sectors, the Venture Capital model can foster a "fake it till you make it" culture that prioritizes exponential growth over viability or real benefit, perpetuating a "hot potato game" that ultimately harms the ecosystem.

We have normalized an economy that, in many cases, extracts value rather than creating it, and we have slowly come to accept this as an immutable and permanent norm, when in reality, this condition is not inevitable. This economistic logic erodes the social and democratic fabric. When elites accumulate sufficient economic power, they use it to shape laws and public perception in their favor, a phenomenon known as "regulatory capture" (Stigler, 1971; Stiglitz, 2012).

Justice can become an instrument for transferring wealth from the weak to the strong. Standard economic theory, by overemphasizing selfishness as the primary human motivator, has contributed to designing systems that undermine trust and loyalty values essential to any functional economy. As Ha-Joon Chang (2014) points out, people are not motivated solely by monetary gain; fairness, justice, and identity are intrinsically important. The perception of injustice negatively affects productivity and engagement, demonstrating that efficiency cannot be divorced from ethics.

In light of this diagnosis, this thesis posits a necessary conceptual progression toward a systemic understanding of value. Following the logic of Acemoglu and Robinson (2012), long-term prosperity depends on "good institutions" that promote the creation and distribution of value rather than its extraction and accumulation.

This evolution can be understood as a three-step process, beginning:

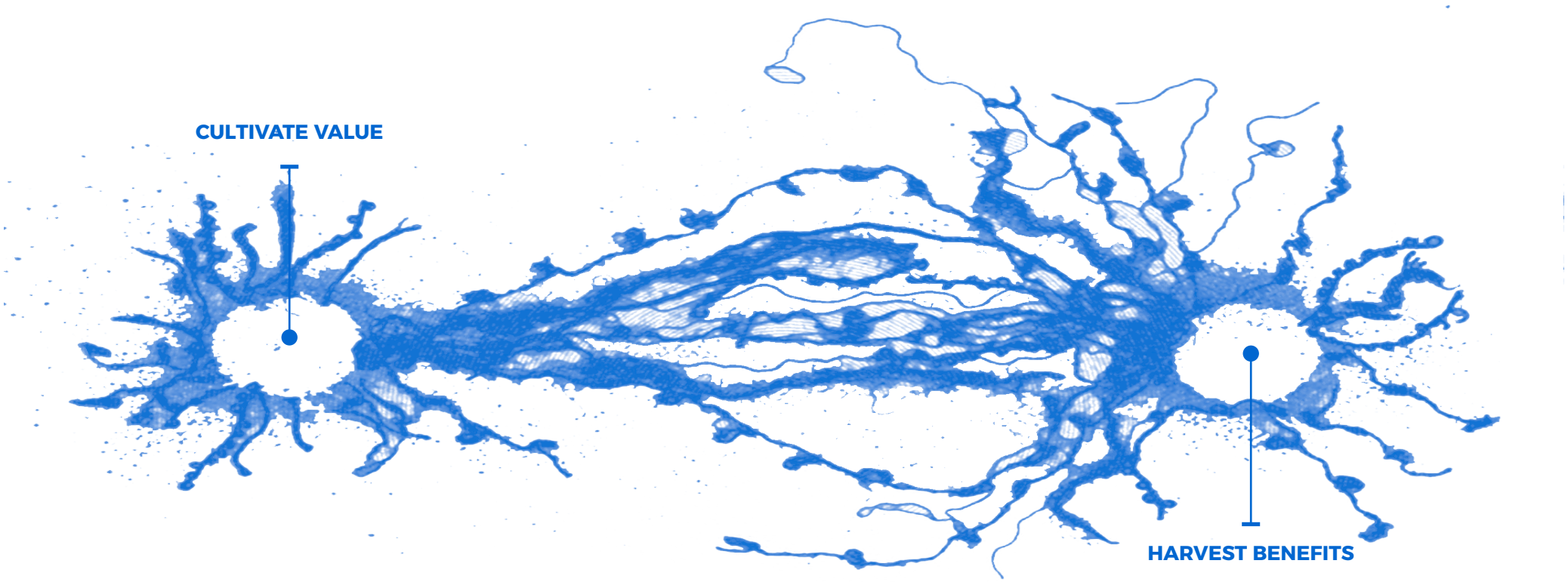
From:

1. ***Shareholder Value: The classical paradigm of extractive institutions, focused on maximizing financial returns, whose detrimental consequences have become increasingly evident (Friedman, 1970; Jensen & Meckling, 1976).***

2. ***And, Stakeholder Value: A broader approach that seeks to balance the interests of all directly affected groups (employees, customers, community) (Freeman, 1984; Donaldson & Preston, 1995).***

to:

3. ***Systemic Value: The SDI's proposal represents the next evolutionary step. It is not merely about balancing interests in a zero-sum game, but about positively enhancing the health, resilience, and generative capacity of the entire system. The premise is that by strengthening the system as a whole, more value is created sustainably and equitably for all its participants.***



Systemic Value

The multidimensional quality of a system that reflects its overall health, its resilience (capacity for adaptation and persistence), and its generative capacity (potential to create new possibilities and future well-being).

Value is not extracted; it is cultivated and manifested through the strengthening of the system's social, human, natural, and economic capitals as the foundation for a "well-understood self-interest" (Stiglitz, 2012).

Systemic Benefit

The positive and tangible outcome; both quantitative and qualitative, experienced by the system's participants (individuals, organizations, community, environment) as a result of the increase in systemic value.

Benefit is measured not only in financial terms but also through improvements in well-being, equity, learning, and sustainability.

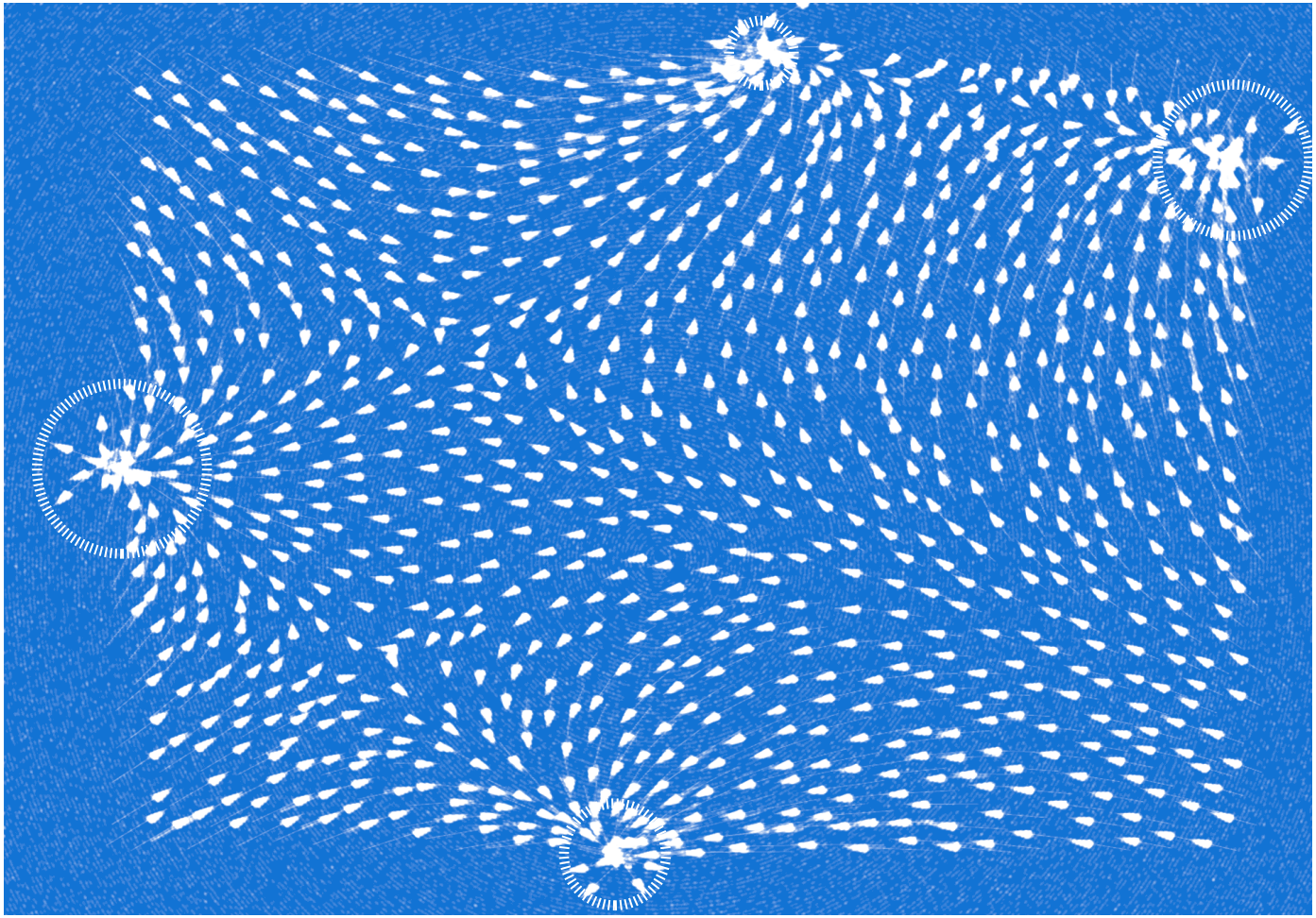
Cultivar-cosechar, Nota. Adaptada de Out of Body [Instalación de monoprints], por S. Aldworth, 2009, sitio web de la artista (https://susanaldworth.com/works/out-of-body/).

The System-Driven Innovation (SDI) model operationalizes this conceptual shift. It doesn't treat it as an abstract goal but as the outcome of a deliberate design process that moves from the "redistribution (exploitation) of value" to the "reconfiguration of value creation." To achieve this, it leverages existing frameworks that allow for the measurement of non-strictly economic value. Examples include the UN's System of Environmental-Economic Accounting (SEEA) for Natural Capital (United Nations, 2014) and the WASC framework for measuring Social Capital (trust, networks, norms) (Stone & Hughes, 2013). By activating these metrics within organizations, SDI makes holistic value visible and guides interventions toward optimizing systemic well-being.

However, to assess the true impact of the SDI model, measuring internally generated value isn't enough. It's equally crucial to gauge the market's dynamic comprehension and adaptation to this new concept of value.

Given this, this thesis posits a new indicator of transformation: the Systemic Value Transition Index. This indicator would visualize, like a dynamic heatmap, the evolution of organizations within an ecosystem along a spectrum ranging from a purely Private/Profit-driven approach towards a Public/Benefit-driven one.

Observing a shift in this "heatmap" towards the systemic benefit quadrant wouldn't be a mere metric but evidence of a cultural and market transformation, leveraging the mechanics of positive feedback loops. Thus, as more organizations adopt the new systemic value approach and demonstrate its viability, strong and consolidated "system attractors" are created (Meadows, 2008). These attractors redefine what the market considers successful, generating adaptive pressure on other actors (FOMO - Fear Of Missing Out) and accelerating a transition that, over time, can become practically "obligatory" for those who wish to operate legitimately and sustainably within the new paradigm.



Transición via atracción, Nota. Adaptada del diagrama "Step 3 – Sum point vectors", por J. Claghorn, 2014, del post de blog "Vector Fields – Part 1" (Generative Landscapes, org/10.1098/rsta.2006.1839).

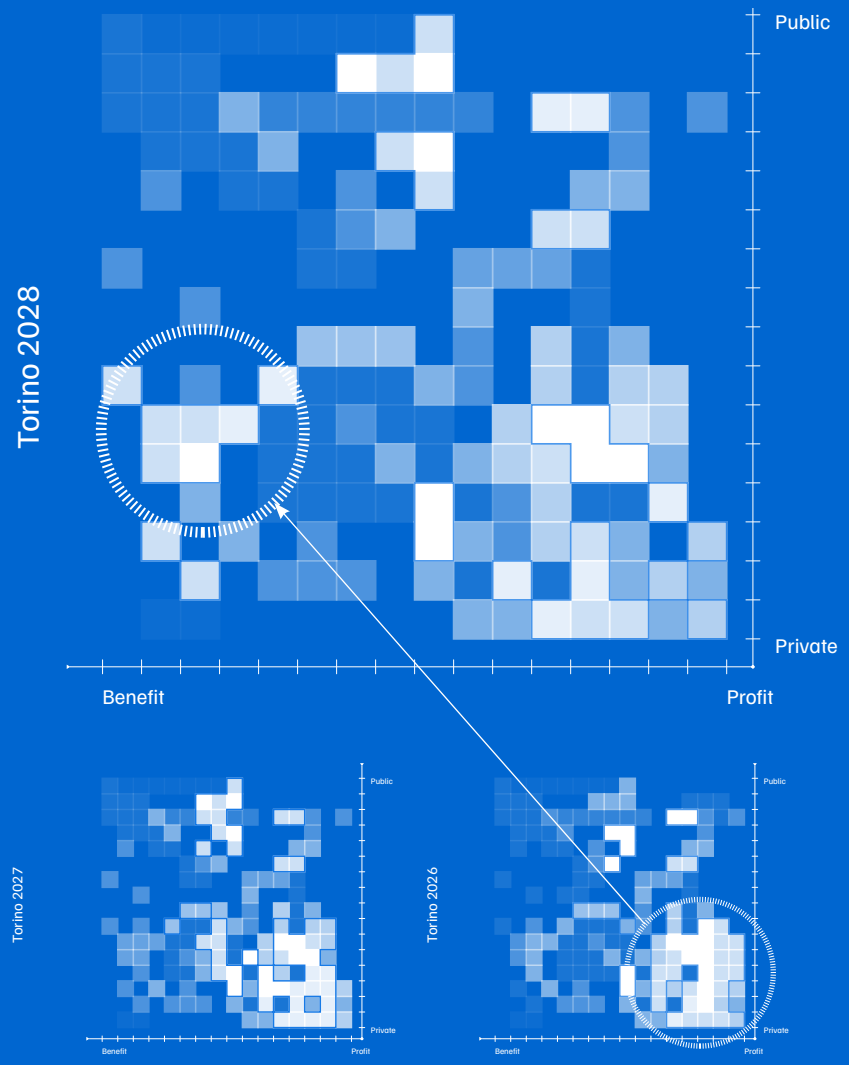
Measuring a new concept of value, A speculative storytelling

To concretize this proposal, a speculative exercise is presented, particularly regarding its accelerated timelines, to illustrate a possible transformation dynamic: applying the Systemic Value Transition Index to Turin's business ecosystem, visualized as a dynamic map between 2026 and 2028. This map, which contrasts the Private/Profit axis with the Public/Benefit axis, would allow for observation of the evolution of value creation logic in the market.

While the timelines are hypothetical, the process is eminently feasible, especially in a context like Turin's. The city isn't a blank canvas; it's a vibrant ecosystem in full transformation, recognized as the European Capital of Innovation 2024-2025 (iCapital), an award that precisely celebrates its capacity to create opportunities and improve residents' quality of life through an inclusive and sustainable innovation approach.

In an initial scenario, towards 2026, the index visualization would reveal an ecosystem in an early phase of transition. Most organizations are projected to concentrate in the lower-right quadrant, operating within what could be called an "Extractive Ecosystem." However, the most significant phenomenon would be the emergence of a pioneering cluster of organizations beginning to migrate towards the upper-right quadrant, signaling the birth of a new "system attractor" oriented towards Systemic Value-Benefit. This initial movement wouldn't arise from nothing; it would be based on an existing fabric of social innovation initiatives present in the territory and the strength of academic and governmental actors in Europe.

By 2027, the dynamic would begin to change visibly. As these pioneering organizations demonstrate the viability and resilience of their models, and as other companies, through adopting approaches like SDI, join the transition, the map's center of gravity would shift. The cluster in the "Extractive Ecosystem" would lose density, while a consolidated group of companies would already form an "island" of systemic value in the upper-right quadrant. This transition would be catalyzed by the city's existing innovation infrastructure, such as technology hubs and accelerators, which actively foster public-private collaboration. At this point, the narrative in economic and innovation forums would begin to evolve, highlighting not only profitability but also impact and resilience as new indicators of business success.



By the end of 2028, this speculative exercise allows us to visualize a tipping point. The map would show that the "attractor" of Systemic Value-Benefit has become the new dominant center of the ecosystem. The "Extractive Ecosystem" cluster would have significantly reduced, and the companies remaining there would begin to be perceived as less innovative or strategically riskier.

The adaptive pressure would have reversed; the imperative not to be left out of the new paradigm would accelerate the transition. This process would demonstrate how the visualization and measurement of a new type of value can, in itself, become the engine of profound cultural and economic transformation, highlighting the city's adaptation to new realities where balancing financial success with systemic impact is crucial for long-term viability.

The results of this example, while entirely speculative, help us remember and reconsider the possibility of being able to measure the transition of the conception of value in the market beyond the economic, as this actively represents the business (and social) culture behind these organizations;

From Private and Public → To collaboration
Focus on Economic Profit → Focus on Systemic Benefit

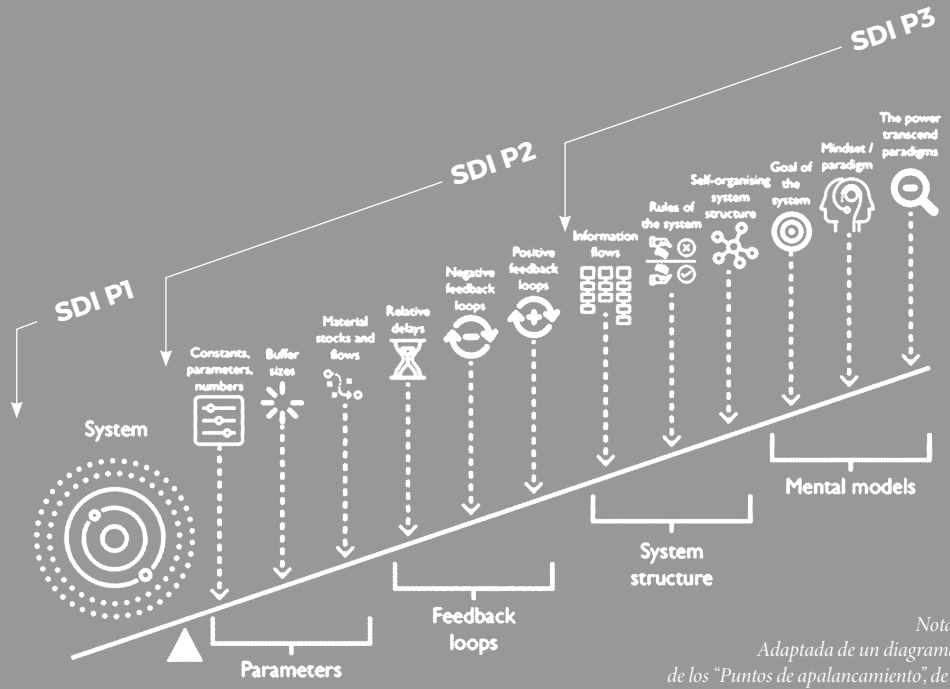
2. Methodological Phases of SDI for Intervening the WD

The SDI model is an iterative and adaptable framework, not a linear process. However, to guide action, it's structured into three key phases, each designed to address and transform one of the components of the Wicked Dynamic

$$(WD = WS(WP(WI))).$$

t's crucial to emphasize that while specific tools and examples are presented for each phase, the intent isn't to suggest these mechanics are universal or prescriptive. On the contrary, SDI posits that the final strategy, concrete tools, and specific solutions to adopt in each ecosystem or community must be co-developed in conjunction with its own components.

Therefore, the methodological phases must be developed and adapted to the particularities of each intervention environment. The model offers a structure for dialogue and action, not a rigid instruction manual.



Nota.
Adaptada de un diagrama de los "Puntos de apalancamiento", de " A systems approach to urban water services", por A. Ablo y P. A. B. D. Yacamán, 2021, Utilities Policy, 69. El modelo se basa en el trabajo de Donella Meadows (1999).

The intervention phases are:

Phase 1: Awareness - Addressing Wicked Systems (WS)

What and why? The goal of this phase is to dismantle the misperceptions that give rise to Wicked Systems. It seeks to generate a deep, shared, and systemic understanding of reality by making visible the interconnections, feedback loops, and mental models that govern the current system (Meadows, 2008). This is the foundation of any systemic intervention: one cannot change what one does not understand (Senge, 1990).

Phase 2: Collaboration - Addressing Wicked Problems (WP)

What and why? Once a shared systemic awareness has been established, this phase focuses on building the collective capacity to act. Wicked Problems are too complex to be solved by a single actor; they require collective interventions with shared responsibility (Rittel & Webber, 1973). This thesis considers collaboration to be the only effective means of addressing the multifaceted and interdependent nature of Wicked Problems.

Phase 3: Transformation - Addressing Wicked Innovation (WI)

What and why? The final phase seeks to consolidate change, ensuring that the new capacity for systemic innovation becomes embedded in the culture, behaviors, and policies of the ecosystem. The objective is to shift from isolated interventions to continuous systemic evolution, thereby avoiding a relapse into Wicked Innovations.

Phase 1: Awareness - Addressing Wicked Systems (WS)

Specific Objectives: To clarify flows (of matter, energy, information, and value), visualize the multiple perspectives of stakeholders, and analyze the underlying systemic patterns in order to reveal the true dynamics of the Wicked System (WS).

Tools and Methods:

System Mapping: This is the central tool of this phase. Systemic design methods presented earlier are utilized, such as stakeholder maps, causal loop diagrams (CLDs), and the Iceberg Model, among others, to build a visual and shared representation of the system. This collaborative process helps participants see the "whole" and make their mental models explicit (Kim, 1999; Senge, 1990).

Value Network Analysis (VNA): Both tangible (money) and intangible (knowledge, trust) value flows are mapped to identify where value is created, destroyed, or blocked within the network. This enables the identification of key nodes and leverage points (Allee, 2008; Verna, 2001).

Definition of Systemic Value: Based on this understanding, the organization's purpose and value proposition begin to be redefined—not in isolation, but in relation to the health and potential of the entire network.

Phase 2: Collaboration - Addressing Wicked Problems (WP)

Specific Objectives: To nurture the emergence of collective interventions, distribute costs and risks among participants, strengthen a common purpose, and redefine the value of success beyond purely economic terms.

Structures and Mechanisms:

Communities of Practice (CoPs): The creation of CoPs is encouraged as a social vehicle for innovation. These are groups of actors who meet regularly to learn together and improve their practice (Wenger, 1998). The SDI designs these communities to be evolutionary, dialogical, and to include multiple levels of participation.

Shared Management Platforms: Tools (digital or physical) are implemented to facilitate the flow of information, coordinate actions, and ensure transparent management of collective knowledge.

Value Distribution Models: An explicit dialogue is facilitated to agree on how costs, risks, and benefits of collaboration will be distributed (for example, through equitable or proportional cost-sharing models), which is crucial to align incentives and ensure the sustainability of collaboration (Elkin, 2017; Freeman, 1984).

Phase 3: Transformation - Addressing Wicked Innovation (WI)

Specific Objectives: To drive the evolution of the innovation culture, integrate new approaches into everyday policies and practices, and support sustainable and harmonious progress.

Approaches and Levers:

Measurement of the Investment-Outcome Dynamics: Purely financial ROI is abandoned. Success is measured through a set of holistic metrics that evaluate improvements in the system's capacity: efficiency, growth, and, crucially, resilience and agility (Kaplan & Norton, 1996; Eccles et al., 2012).

Cultural Change Levers: Change management tools are employed to foster a "growth mindset" that values experimentation and learning from failure.

Disclosure and Transparency Policies: The transparent use of performance reporting (following frameworks such as GRI or Integrated Reporting) is promoted not only as an external communication tool but also as an internal lever to drive flexible and natural behavioral change (GRI, 2021; IIRC, 2013).

Building Organizational Infrastructure: As suggested by the Stanford Social Innovation Review, lasting systemic change requires building a "robust infrastructure of organizations and leaders" capable of implementing, defending, and scaling innovations (Kania et al., 2018). Through interventions, ongoing dialogue, and continual validation, the SDI focuses on developing this long-term capacity among key organizational actors, especially those whose approval is required for innovation and investment processes.

These intervention phases aim to uncover and dismantle the barriers within the organization's original structure that limited the pursuit of a:

3. Systemic Impact of SDI

The SDI model is designed to generate impact across multiple scales, coherently addressing the hierarchical structure of the Wicked Dynamic.

Micro Level (Individual/Organization)

Impact at:

1- Micro Level (Individual/Organization)

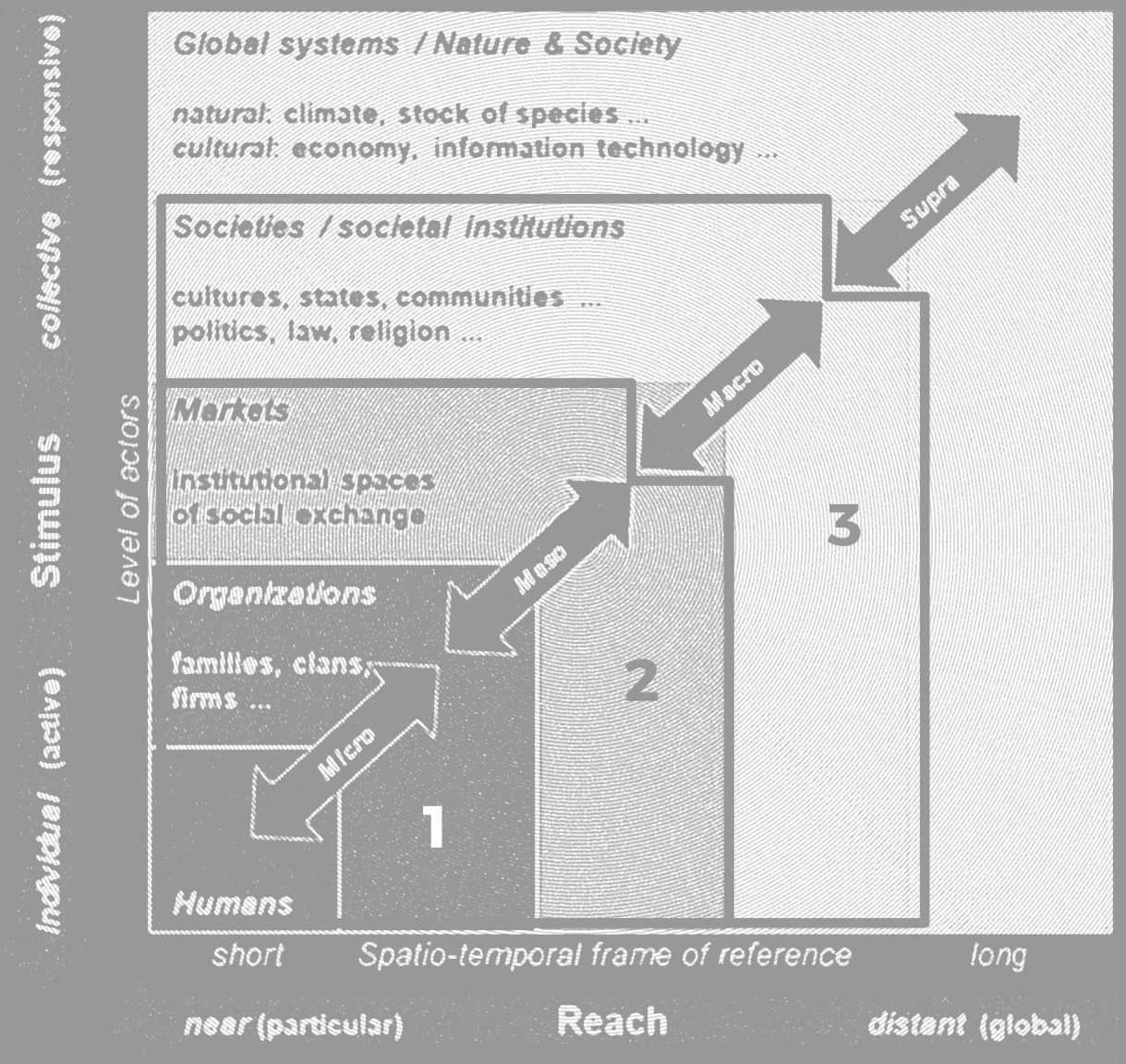
At this level, the SDI directly counters Wicked Innovation (WI). By improving innovation processes and culture within an organization, it optimizes performance, reduces resource waste on failed solutions, and empowers designers and other professionals with new tools and greater agency. This shifts innovation from being erratic to deliberate and systemic.

2- Meso Level (Ecosystem/Community)

Here, the SDI counters Wicked Problems (WP). By fostering collective effort and collaboration among multiple actors (businesses, NGOs, government, academia), it creates ecosystems with a shared purpose. The distribution of value, costs, and risks across the network increases the ecosystem's resilience and allows for complex problems to be addressed that no single actor could solve alone.

3- Macro Level (Society/Planet)

On the broadest scale, the SDI seeks to counter Wicked Systems (WS). By promoting business and collaboration models that regenerate rather than extract, the model contributes to sustainable economic, social, and environmental development. It fosters a deeper understanding of living systems and promotes a transition towards an economic and social paradigm that operates in harmony with planetary boundaries.



Nota. Adaptada de "Fig. 1.3. Micro-Meso-Macro-Supra", por F. Glauner, 2018, de Managing future enterprise: Staying ahead of the curve with symbiotic value networks.

This multi-level impact isn't a fortuitous consequence; it's the core of the SDI's strategy, designed to orchestrate a systemic transition that evokes the dynamics of the Two Loops Model (Berkana Institute, 2021).

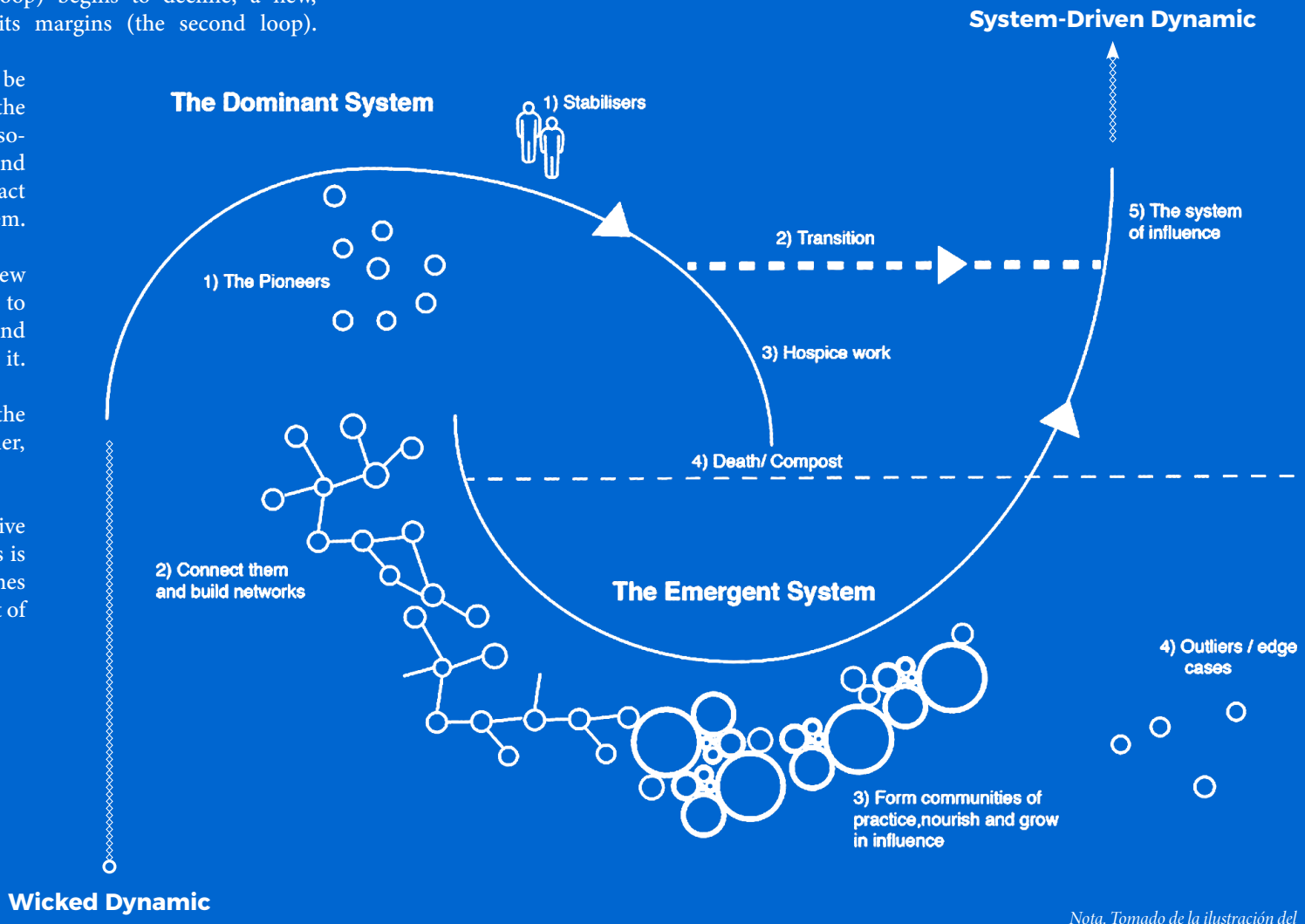
This model, used to describe how living systems transform, posits that while a dominant and dysfunctional system (the first loop) begins to decline, a new, more adaptive and resilient system emerges at its margins (the second loop).

SDI's interventions at the micro level can be understood as a way to "care for" and improve the existing system as it loses relevance, while meso-level interventions (the creation of alliances and communities of practice) are the deliberate act of weaving and nurturing that emergent system.

The macro-level impact is achieved when this new system becomes robust and coherent enough to become a viable alternative, attracting energy and resources from the old paradigm until it replaces it.

This delicate transition process, accompanying the decline of one logic while catalyzing the birth of another, doesn't happen by chance.

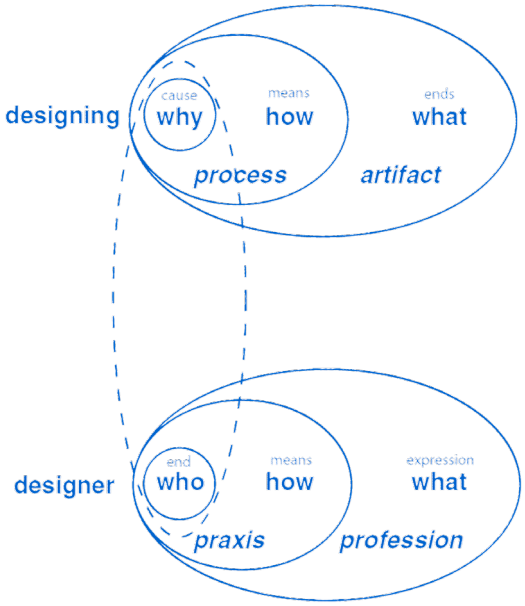
It requires guidance, conscious facilitation, and an active role capable of navigating between both worlds. This is precisely where the figure of the systemic designer comes in, whose role is redefined as the manager and catalyst of this transformation.



Nota. Tomado de la ilustración del "Modelo de los dos bucles", por C. Robinson (s.f.), basada en el trabajo del Berkana Institute.

4. The Transversal Participation of the Designer in the SDI Model

The SDI model redefines not only the what and how of innovation, but fundamentally, the who. It demands, and simultaneously cultivates, a new conception of the designer's role. They transcend their traditional position as mere executors of creative tasks to become managers of systemic transformation and catalysts of autopoietic innovation. This repositioning isn't a simple title change; it's a fundamental restructuring of their involvement, shifting from sporadic and late-stage participation to continuous and transversal engagement throughout the entire process. It's precisely this transversality that offers a practical solution to the problem of design's instrumentalization, which was analyzed in previous chapters.



Nota. Tomado de "Figure Figure 15.1 Designers and designing, de The design way: Intentional change in an unpredictable world (2.. ed., p. 240), por H. G. Nelson y E. Stolterman, 2012, The MIT Press. Copyright 2012 por The MIT Press.

The critical trajectory of design, which goes beyond mere function or aesthetics, reveals an intrinsic characteristic of the discipline: its natural tendency to disobey the barriers that seek to confine it. Gui Bonsiepe explores this "design disobedience" (Bonsiepe, 2021), arguing that designers are "agents for social change" capable of "imagining the possibility of another future." This capacity to project towards the possible (what isn't yet) is what drives design to transcend its self-imposed or externally defined limits.

As we understood in previous chapters, design has historically been constantly delimited and reduced. Attempts have been made to pigeonhole it into the production of material objects or into mere industrial "cosmetics." However, design, in its essence, has always sought to go beyond these restrictions. Bonsiepe's vision posits that design is an activity that refuses to remain an "insignificant quantity" or a mere appendage of other disciplines. This disobedience manifests in several aspects that the SDI seeks to enhance:

Beyond the Physical

Design isn't limited to physical materiality; it extends to the intangible, to information and interaction, exploring domains where design structures the action between users and artifacts.

Rejection of Instrumentalization

There is an inherent resistance to being reduced to a tool solely for economic optimization or marketing, instead seeking a deeper social and political purpose.

Scope of Practice and Knowledge

Design challenges traditional academic classifications, refusing to fit solely within science, technology, or art. It is an "alien element" in the traditional university setting, requiring an "autonomous discipline" and generating its own knowledge, transcending rigid methodologies and "linear thinking."

Shaping the Future

More than reacting to the present, design is a discipline that invents and shapes the future. This foresight is inherently disobedient to narratives of "no future" or technological determinism.

In the market, design is commonly confined to the final phases of innovation processes, often reduced to a function of "beautification" or superficial problem-solving. In this traditional model, which reflects WD mechanics, designers are handed an already framed problem (a commonly misidentified symptom) and asked to generate an aesthetic or functional solution within predefined limits in a dynamic ecosystem. This practice not only underutilizes the discipline's strategic potential but also makes it complicit in generating Wicked Innovations.

By being excluded from the initial diagnostic and strategic phases, designers don't get the chance to question problem assumptions, analyze the system as a whole, or identify true leverage points without encountering hierarchical barriers typical of classic management structures and strategies. The result is solutions that, while they may be elegant or efficient in a limited sense, often fail to address root causes, thus perpetuating the Wicked Dynamic.

This is why design disobedience isn't a senseless act of rebellion but a creative force that allows the discipline to reinvent itself and expand its impact, naturally seeking to break through the barriers that constantly limit it and reaffirming its potential as a transformative agent in a world in crisis.

The SDI model breaks this silo by integrating the systemic designer as a strategic actor from the outset and across all future iterations within the innovation cycle.

This approach is inspired by, and simultaneously evolves from, Roberto Verganti's concept of Design-Driven Innovation (2009). Verganti argues that the most radical innovations don't come from analyzing current user needs (market-pull) but from a "proposal"; a vision for how people's meanings attributed to things might change. This "design push" is a strategy that redefines the rules of competition by radically changing why people desire a product. However, in Verganti's model, this vision often emanates from the company itself or a select circle of "interpreters" (designers, artists, technologists).

SDI takes this concept of "push" and deepens it, proposing a fundamental change: instead of being "design-driven innovation," the goal is to facilitate the "system-driven innovation."

Here, design isn't the source of the vision; instead, it's the process and mechanics through which the system itself (the community of actors) articulates, develops, and pursues its own vision collaboratively.

The designer's role isn't to "push" a proposal but to cultivate the conditions for the proposal to emerge collaboratively from within the system.

This SDI proposal starts in the Awareness Phase, where its role isn't creative in the traditional sense, but eminently analytical and synthetic. Here, the designer isn't ideating solutions; they're helping the system see itself.

Through their mastery of complexity visualization tools, the designer facilitates the construction of a shared understanding of the Wicked System. The ability to synthesize qualitative and quantitative information and to translate diverse perspectives into comprehensible visual artifacts is crucial. This allows all participants—from top management to community members—to dialogue on a common basis, making their mental models explicit and revealing the hidden dynamics that govern the system.

In this stage, the designer is a strategic diagnostician, a cartographer of complexity.

Self-awareness, Nota. Adaptada de Échecs [Fotografía], por R. Maltête, 1955, sitio web del artista (http://rene.maltete.com/).

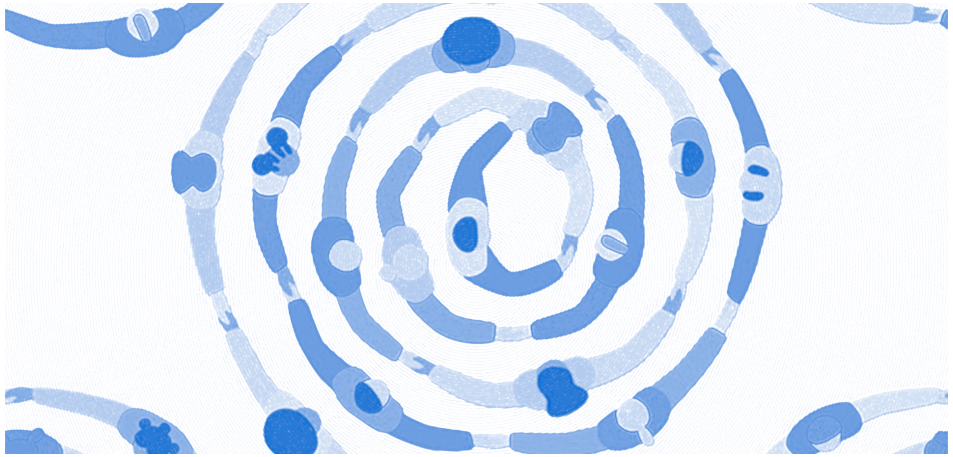
In the Collaboration Phase, the role of the designer evolves into that of a participatory process architect.

Their task is not to simply "collect" ideas from stakeholders, but to design and facilitate the spaces and interactions where co-creation can flourish.

This requires a deep understanding of the human side of innovation. As Mauro Porcini (2023) points out, successful innovation arises from "people who are in love with people," a profound empathy for their needs and aspirations.

The systemic designer within the SDI framework focuses on building trust and psychological safety; elements proven to be the essential lubricant for effective collaboration. Using methodologies such as co-design and tools like Empathy Mapping with the stakeholders themselves, the designer ensures that the voices of users and other marginalized actors are not only heard but meaningfully integrated into problem definition and solution generation.

Here, the designer does not impose a vision but catalyzes the emergence of collective intelligence, ensuring that solutions arising from collaboration address the complexities of the Wicked Problem in a relevant and equitable manner.



Together, Nota. Adaptada de Diverse people friend group round holding hands [Ilustración], por Cienpies, 2022, iStock (https://www.istockphoto.com/vector/gm1399719335-453472005).

Transicion, Nota. Adaptada de un diagrama de interfaces [Diagrama], publicado en el artículo "Interfaces buissonnières" de C. Bosqué y M. Kusnierz, 2011, Strabic (https://strabic.fr/Interfaces-buissonnieres).

Finally, in the Transformation Phase, the designer acts as an agent of implementation and cultural embedding.

Their ability to rapidly prototype extends beyond products to include new services, internal policies, or business models that alter governance frameworks.

The designer helps translate abstract strategies into tangible, low-risk experiments (which does not mean avoiding failure, but rather embracing continuous learning), enabling the system to adapt iteratively. Beyond prototyping, their role is crucial in ensuring that the new systemic mindset becomes integrated into the organizational culture.

As Quint, Gemsen, and Calabretta (2022) argue in Design Leadership Ignited, design leadership involves transforming daily routines and organizational symbols to scale the impact of design.

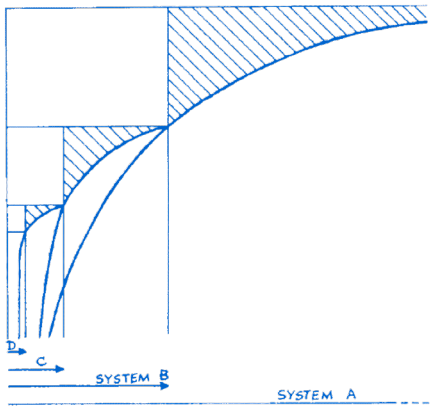
With a sensitivity for communication and experience, the designer helps craft new rituals, success metrics (the "Systemic Value-Benefit"), and narratives that will proudly establish systemic innovation as the organizational story of: "this is how we do things here."

This transversal involvement of the designer isn't just a theoretical proposal; it's supported by growing and solid evidence of its tangible value at a systemic level.

Far from being an ornamental expense, the strategic integration of design has proven to be a powerful driver of economic competitiveness, social resilience, and environmental sustainability.

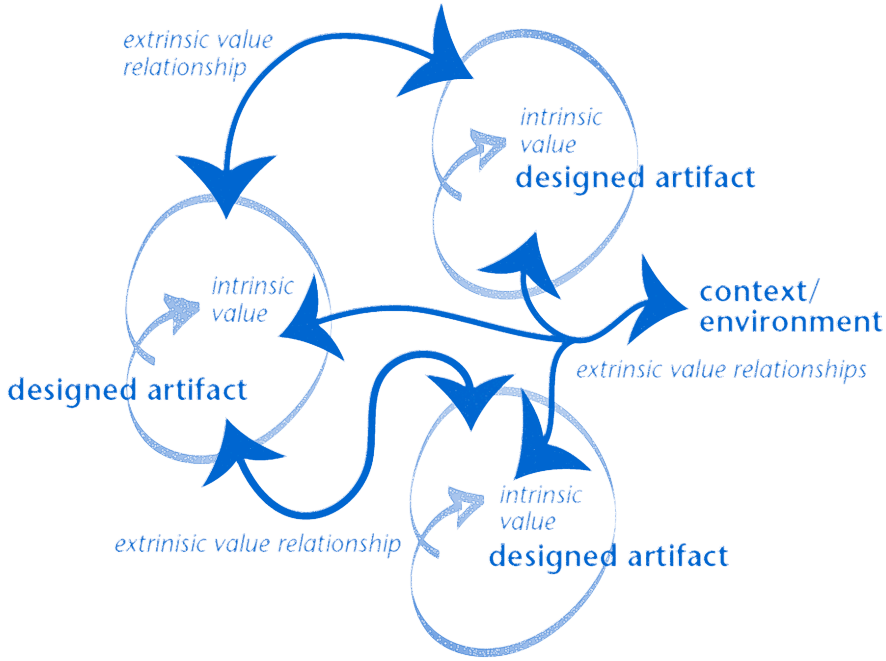
Economically, design is a fundamental pillar of modern economies. The "Design Economy 2024" report by the UK Design Council reveals that the design sector contributed £97.4 billion in Gross Value Added (GVA) to the UK economy, growing at double the pace of the economy as a whole (Design Council, 2025, p. 4). Similarly, in Italy, the design economy involves 281,000 companies (the largest in Europe) and has shown consistent growth in its added value in recent years (especially post-COVID), demonstrating its resilience and dynamism (Fondazione Symbola et al., 2025, p. 7). This macroeconomic impact translates directly to the company level. The German Design Council's 2025 report on the state of design in Germany conclusively states that design has been shown to increase organizational revenue and profitability by enhancing brand value, market share, and return on investment (ROI).

The SDI model builds on this evidence by positing that involving the designer in all phases of intervention drastically reduces the risk of investing in costly and failed Wicked Innovations. This is because, as the German Design Council points out, the organizations in which design is integrated typically possesses a deeper understanding of its customers, operationalizing social trends and market insights to ensure innovations succeed. By ensuring the problem is well-defined from the Awareness Phase and that the solution aligns with a real system need, integrated design minimizes the risk of undesirable developments, directly translating into superior systemic performance.



Nota. Adaptada de "Figure 2. Continuous adaptation of the non-l near system to economy cuts", del libro Heart of enterprise (p. 17), por S. Beer, 1995, John Wiley & Sons. Copyright 1995 por John Wiley & Sons.

From a social and environmental perspective, the benefits are equally significant. The same Design Council report establishes a direct correlation between investment in design and progress in achieving social and environmental objectives, such as the UK's Net Zero targets;



Nota. Tomado de "Figure 12.1 Value and meaning making in design", de The design way: Intentional change in an unpredictable world (2. ed., p. 195), por H. G. Nelson y E. Stolterman, 2012, The MIT Press. Copyright 2012 por The MIT Press.

"The Green Design Skills Gap" report reinforces this idea, indicating that 66% of designers have already worked on projects with environmental impact in the last year, and 71% expect demand for these skills to grow, although only 43% feel fully equipped to meet it (Design Council, 2025).

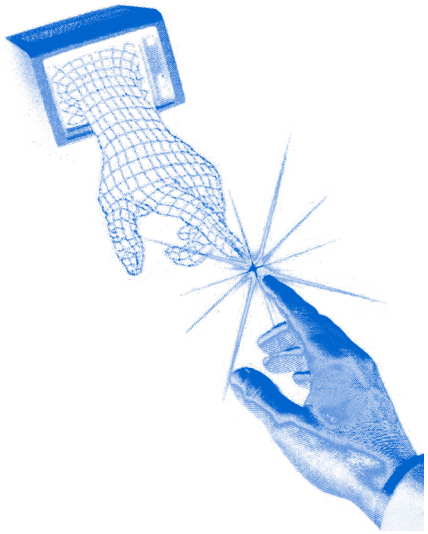
When the designer participates throughout the entire process, considerations of equity, accessibility, and environmental sustainability are not an afterthought but design criteria from the very beginning. This leads to solutions that are not only profitable but also socially responsible and ecologically regenerative.

For example, by applying circular economy principles from a product's conception, as promoted by the Ellen MacArthur Foundation, the designer can drastically reduce waste and pollution, generating environmental benefits and often discovering new business opportunities in service models or material recovery (Ellen MacArthur Foundation, n.d.; McDonough & Braungart, 2002).

The relevance of this redefinition of the designer's role is underscored by future labor market trends. Although the World Economic Forum's "Future of Jobs Report 2025"

predicts a significant transformation in required skills, "design and user experience" remains a key skill and is expected to increase in importance, validating the growing demand for professionals capable of addressing the complexity of human and systemic interactions (World Economic Forum, 2025, p. 37). However, it's crucial to note that, according to this same report, the "graphic designers" category is among those expected to experience a significant decline in the next five years, reinforcing the need for designers to transcend merely aesthetic or visual production roles (World Economic Forum, 2025, p. 19).

The widespread adoption of artificial intelligence and information processing technologies are the main drivers of this transformation, demanding that designers evolve into more strategic and systemic roles to remain relevant and provide irreplaceable value (World Economic Forum, 2025, p. 11).



Nota. Adaptada de la portada del libro Creative Black Book: Photography, 1985 (diseñada por A. Zenreich, 1985), publicada en el artículo "Friday Fun: Retro-Tech" de Christa (2018).

In conclusion, the SDI model posits that to solve the problems of design's instrumentalization and superficiality, the answer isn't simply to demand that designers be "more ethical, more efficient, and more creative." That's a linear solution to a systemic problem.

The true transformation requires a structural change: moving design from the periphery of business processes, where it functions as a reactive consulting service, to the strategic core, where it operates as a transversal and proactive capability. This means shifting from investing in design for the market's client/user to investing in design for the organization, which will then be reflected in the client/user through the organization's actions and offerings.

This repositioning is fundamental. The designer, within the SDI framework, is not a technician waiting for a brief, but a leader who possesses the unique ability to navigate complexity, facilitate dialogue, and synthesize diverse perspectives into coherent and actionable visions.

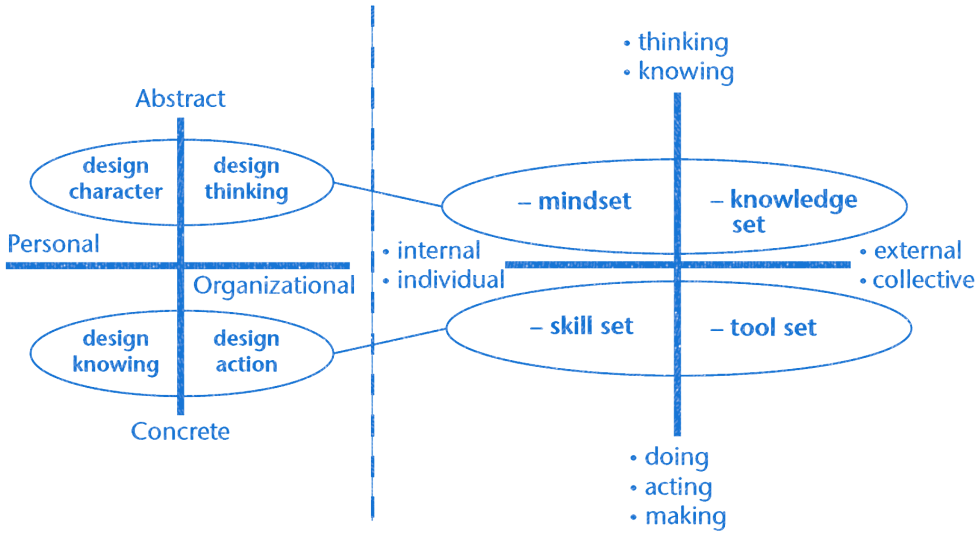
It's not just about "being/getting a seat at the table," but about questioning the very existence of the table itself. As highlighted in the "Leading Design Works" report, in complex and regulated industries, design has the opportunity to be at the forefront, shaping a future of ethical and human-centered services (Rebolledo et al., 2024).

When design is a strategy, its impact becomes systemic: instead of simply creating a "greener" product (a possible Wicked Innovation), its intervention can lead to redesigning an entire "system" (Business model) to be sustainable, thus addressing the root of the Wicked System.

By empowering the designer to act as a manager of autopoietic innovation, a gardener who cultivates the conditions for the system to flourish, the full potential of design to generate holistic and lasting value is unleashed.

The true competitive advantage and resilience in the 21st century will not come from efficiency in executing predefined solutions. In a world saturated with data but hungry for meaning, the ability to connect, contextualize, and co-create is not a soft skill, but the critical infrastructure for any organization that aspires not only to be profitable but to remain relevant over time.

The wisdom to co-create systems that can innovate, learn, adapt, and thrive in a constantly changing world is, in essence, the discipline of design put into strategic action.



Nota. Tomado de "Figure 14.12 Design learning domains", de The design way: Intentional change in an unpredictable world (2.. ed., p. 230), por H. G. Nelson y E. Stolterman, 2012, The MIT Press. Copyright 2012 por The MIT Press.

Chapter 4:
Businesses Adapted to SDI.

“Designing the roadmap to Navigate system complexity”

The preceding chapters of this thesis have journeyed from the philosophical foundations of systems thinking to a critical diagnosis of a recurrent dysfunction in our socioeconomic ecosystems: the Wicked Dynamic (WD).

It has been argued that this cycle of failure, where Wicked Systems (WS) generate Wicked Problems (WP) that are addressed with Wicked Innovations (WI), is not an accident but the predictable result of a linear and reductionist worldview.

As a counterpoint, the System-Driven Innovation (SDI) model has been presented; a theoretical framework proposing a regenerative, collaborative, and autopoietic alternative for intervening in this dynamic.

Now, this research must depart from the safe harbor of theory and venture into the turbulent waters of practice.

However, before deploying the SDI roadmap in a real context, it’s imperative to confront an uncomfortable truth that the popular narrative about innovation often omits, or worse, tries to suppress: innovation, by its very nature, is an inherently inefficient and failure-prone process.

The dominant corporate culture, obsessed with efficiency, predictability, and short-term return on investment, has desperately tried to frame innovation as a linear process: a kind of assembly line for ideas that can be optimized, controlled, and stripped of its fundamental uncertainty.

This view is not just a simplification; it’s fundamentally flawed and constitutes, in itself, one of the clearest symptoms of the Wicked Dynamic. The attempt to force the emergent complexity of creation into the straitjacket of linear efficiency is a recipe for stagnation and the generation of Wicked Innovations.

Data on innovation failure is consistently eloquent and devastating, revealing a persistent problem over time:

Clayton Christensen, a Harvard Business School professor, estimated that up to 95% of new consumer products launched each year fail, a figure that, though empirically debated, is still widely cited in contemporary literature to illustrate the challenge of innovation (Christensen, 2003; Zero100, 2024;

MIT Professional Education, n.d.).

Similarly, recent McKinsey research reveals that executive dissatisfaction with innovation performance persists: 84% of business leaders consider it a strategic priority, but only 6% are satisfied with their own organizations' results (McKinsey & Company, n.d.; Morris, 2023).

The outlook for startups is equally bleak, with recent statistics indicating that approximately 90% of them fail, and among those backed by venture capital, 75% fail to return capital to their investors, with a total loss of initial investment in 30% to 40% of cases (Failory, 2024; DesignRush, 2025).

This overwhelming failure rate cannot simply be attributed to bad luck or poor execution. It is the direct consequence of applying linear logic to a non-linear phenomenon. Genuine innovation does not arise from a predictable process; it emerges from experimentation, from exploring the unknown, from accepting uncertainty, and, crucially, from the learning derived from failure.

By attempting to confine this chaotic and emergent process within the narrow limits of short-term economic efficiency, organizations not only limit their potential but actively create the conditions for it to fail in achieving its objective.

Therefore, the need for a new paradigm is not an academic preference but a practical imperative. We need a model that doesn't view failure as an error to be avoided, but as a process to be prioritized, as a source of valuable data.

A model that is not based on static assumptions, but on real and updated data from the economic, social, and environmental system.

A model that doesn't react to changes but anticipates them, planning for a diversity of possible contexts. A model that understands innovation not as a production line, but as a collaborative network, a social movement that emerges from collective intelligence.

This final chapter marks that fundamental transition. We leave the realm of diagnosis and theory to fully enter that of application and projection.

The goal is no longer to describe the problem but to design a possible way out.

To this end, this chapter becomes an exercise in Systemic Design itself. Using the Politecnico di Torino's four-phase methodology as a base and expanding upon the pillars covered in this research, the SDI model will be applied to its most critical intervention context: the innovation ecosystem.

The purpose of this chapter is, therefore, twofold and profoundly practical:

First, the Wicked Dynamic framework will be applied as a diagnostic lens to reveal, in detail and with evidence, the invisible architecture governing the innovation ecosystem; The interconnections between actors, their mental models, structural incentives, and feedback loops that perpetuate superficial innovation and systemic stagnation will be unravelled.

Secondly, and as the core of this proposal, a detailed and actionable Prototype Roadmap will be designed. This will not be presented as a generic plan, but as an adaptable framework that articulates the strategies, tools, and mindset shifts necessary for an organization to navigate the phases of the SDI model.

Finally, to materialize this roadmap, an Intervention Project will be conceptualized: the design of a platform conceived as the enabling infrastructure to scale systemic innovation within the ecosystem.

This last chapter, therefore, delves into the realm of application, but it does so with a full awareness of this reality. The objective is not to present an idealized success case, but to use a real scenario as a laboratory to demonstrate how the SDI model can be a tool for managing complexity, not for eliminating it.

It seeks to illustrate how it's possible to navigate uncertainty and learn from failure constructively, transforming an ecosystem affected by the Wicked Dynamic into one that begins to cultivate a capacity for resilience and self-organization: The system driven dynamic.

It is not a conclusion in the traditional sense.

It is, deliberately, the invitation to move from managing failure to stewarding resilience. Its aim is to provide not a definitive map, but a compass and a toolbox: a field manual for navigating complexity.

It is a call for leaders, managers, and designers to stop being passive participants in the systems they inhabit and become conscious architects of more resilient, adaptive, and ultimately, regenerative ecosystems.

Next, a concrete case will be examined, breaking down its challenges and opportunities through the lens of SDI, to finally make tangible how theory can, and must, become transformative practice.

1. The Global Innovation Ecosystem: A Force Field Under Stress

To design an effective systemic intervention, you first need to understand the global playing field it operates within. Innovation isn't an isolated event; it's the result of a vast, dynamic ecosystem of interdependent actors that collectively generate, disseminate, and apply novelty.

Through the SDI perspective, this ecosystem is conceptualized as three major domains or sectors, each with its own logic, incentives, and contribution to the overall landscape: the academic sector, the governmental sector, and the commercial sector.

The Academic Sector: The Engine of Fundamental Knowledge

Universities and research centers constitute the primary source of scientific and technological knowledge that fuels long-term innovation. Their main role is to explore the frontiers of knowledge through basic research and to train the advanced human capital that the system needs to evolve. This sector operates under a "Technology Push" logic, where discoveries are often generated without immediate market application but lay the groundwork for tomorrow's technological disruptions (Rothwell, 1994, p. 8).

Despite the structural challenges that often limit its agility and direct connection to the market (a gap that will be analyzed later), the academic sector is an irreplaceable pillar. Its capacity to produce knowledge free from short-term commercial pressures makes it the matrix of radical innovation (This role of academia in generating fundamental knowledge has been widely recognized in innovation management literature; see: Teece, 1986).

Although directly intervening to reinvent academia exceeds the scope of this project, and based on this research's evaluations, it is not where the most critical need resides, recognizing its role as a key actor and designing better interfaces of collaboration with it is a central objective of the SDI model.

The Governmental Sector: The Architect of Context

Government, at its multiple levels (local, regional, national, continental), establishes the contextual frameworks within which other actors operate. Through regulation, public policies, investment in strategic infrastructure, and direct funding of research, the governmental sector shapes the environment, creating conditions that can inhibit or catalyze innovation.

In recent years, there has been a boom in "public innovation," with the creation of Policy Labs and the adoption of more experimental approaches to public service delivery. While often criticized for its bureaucracy and reactivity, the state possesses unparalleled scaling power and the unique ability to set the "rules of the game." The SDI model does not seek to intervene directly in the complex machinery of governance, but to understand it to align commercial sector innovations with public priorities and leverage existing policy instruments as powerful catalysts for change.

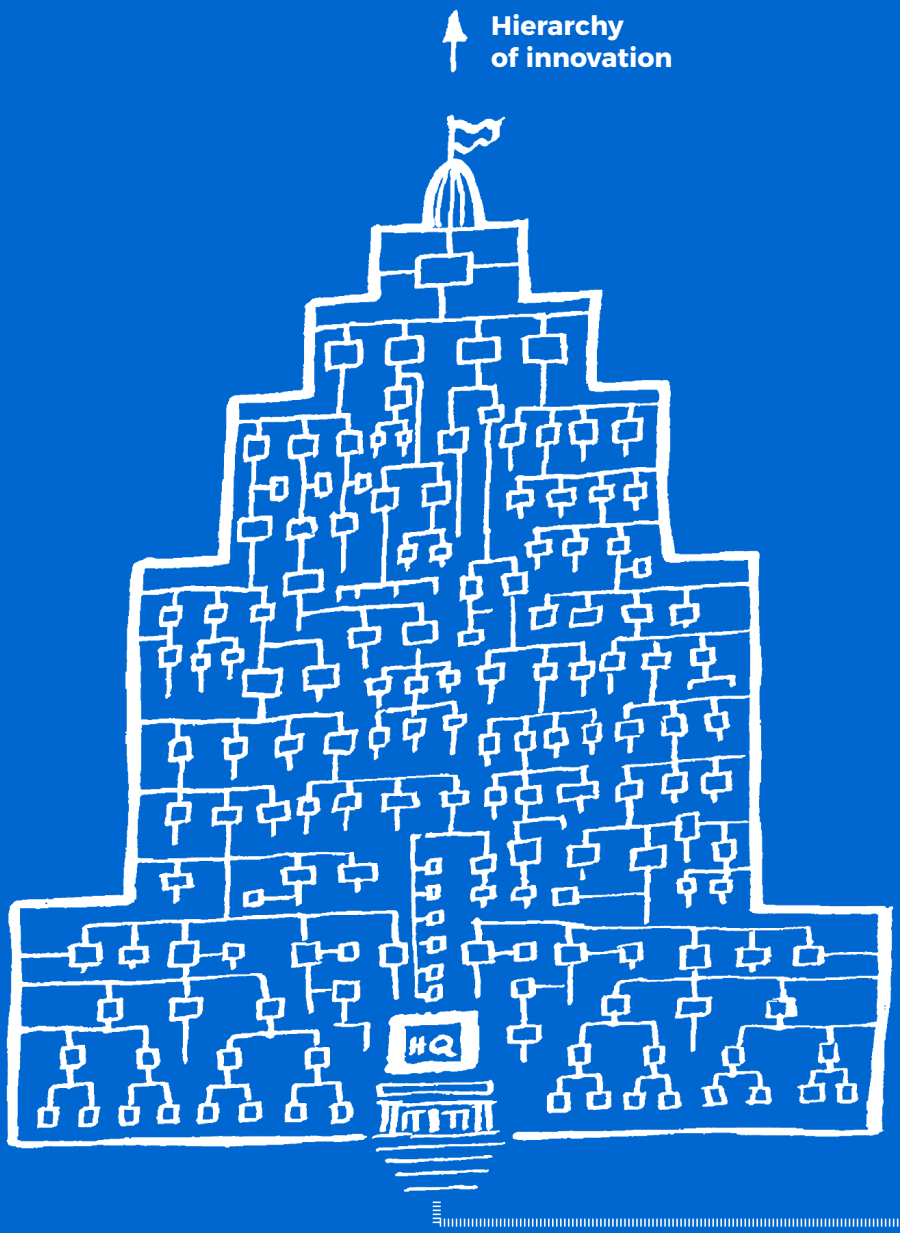
Trio de Fuerzas, Nota. Adaptada de la carátula del álbum Dvorák: Trio no. 4 in E minor, op. 90 ("Dumky"), diseñada por E. Socolov (c. 1960) para Monitor Records.

The Commercial Sector: The Battlefield of Application and Focus of Intervention

The commercial sector is where innovation meets the market; where ideas, whether driven by technology or market needs, become products, services, and business models. It is the domain of action, competition, and tangible value creation. However, this sector is not monolithic. As this research identifies, its dynamic is strongly dominated by two major "attractors": on one hand, large corporations, which often focus on incremental and sustaining innovation to defend their market positions (Christensen, 1997); and on the other, startups, which, with a focus on exponential growth, seek disruption (Ries, 2011; Blank, 2013).

It is precisely in the intermediate space between these two poles; a vast territory occupied by Small and Medium-sized Enterprises (SMEs), NGOs, and other organizations that do not fit the logic of the two major attractors (where this research places its focus of intervention).

This is the space where the Wicked Dynamic often manifests most starkly: the pressure to innovate is high, but resources are limited, and dominant innovation models are inadequate. It is here that a systemic intervention like that proposed by SDI can have the greatest impact, by offering an alternative path for value creation and resilience.

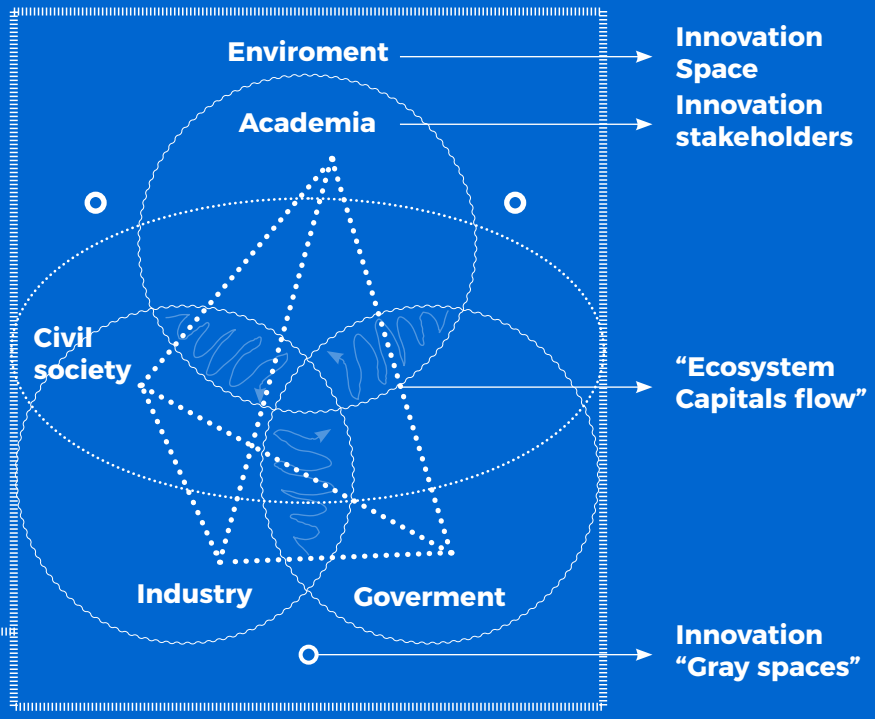


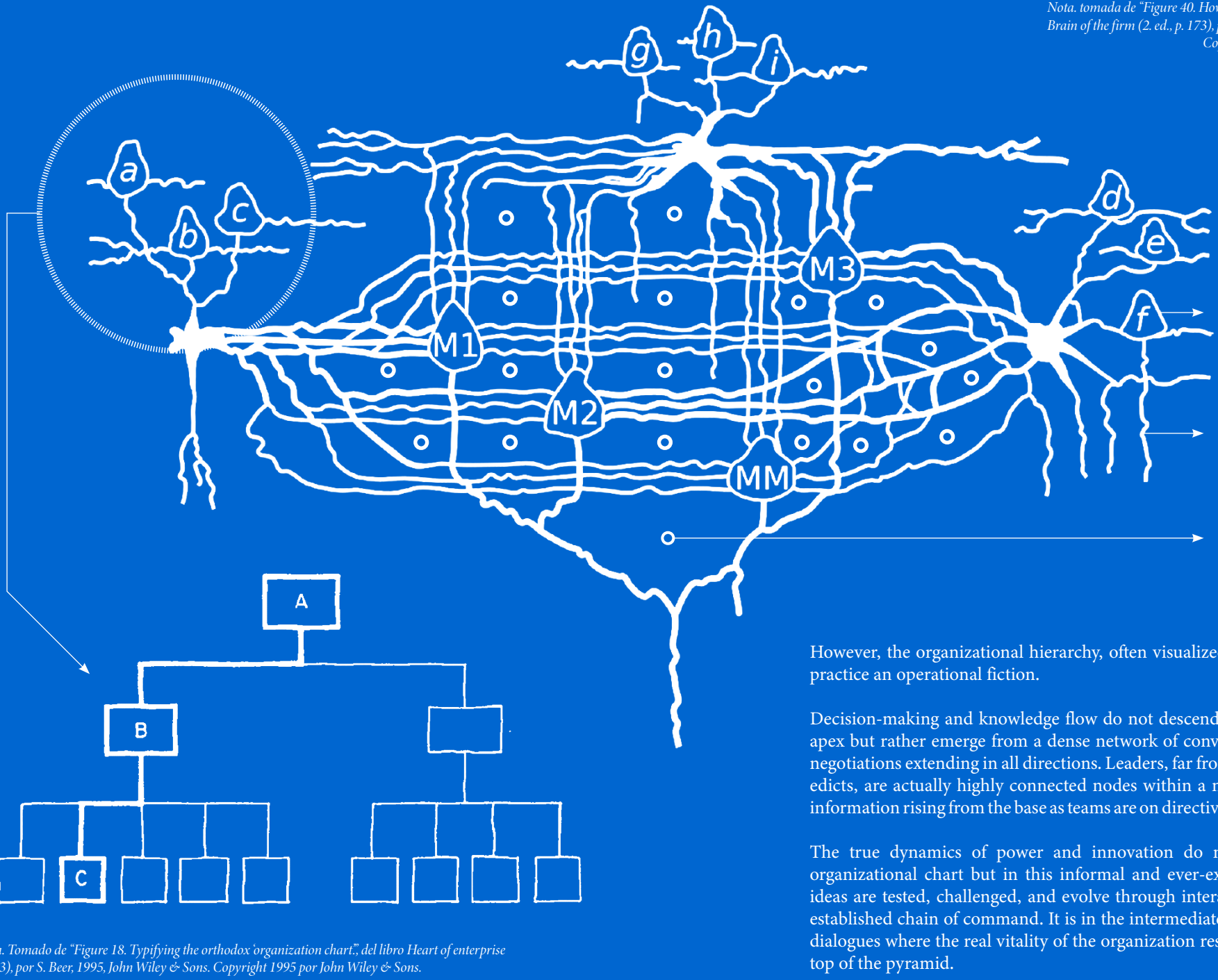
Nota. Tomada de "Figure 22. An exhibit: piece of paper discovered by barman after closing time, beside recumbent manager.", del libro Heart of enterprise (p. 111), por S. Beer, 1995, John Wiley & Sons. Copyright 1995 por John Wiley & Sons.

To effectively intervene in the innovation ecosystem, we must first decipher its undeclared power structure. Far from being a level playing field where the best ideas triumph by their own merit, innovation operates under an implicit hierarchy; a chain of command that dictates what is considered "innovative" and, more importantly, what gets funded and scaled.

The leadership of this process, wielded by those who control capital and market access, not only directs operations but defines the very purpose of the system. It acts as a gravitational attractor that molds the trajectories of all other actors. Understanding who holds this power and how their operational logic permeates the entire ecosystem is, therefore, the first step to identifying not only where attention is concentrated but, crucially, where untapped potential resides.

It is in the vast and often invisible region operating outside this center of gravity that the true opportunities for systemic transformation are found.





Nota. tomada de "Figure 40. How organizations really work", del libro Brain of the firm (2. ed., p. 173), por S. Beer, 1981, John Wiley & Sons. Copyright 1981 por John Wiley & Sons.

Nota. Tomado de "Figure 18. Typifying the orthodox 'organization chart'.", del libro Heart of enterprise (p. 73), por S. Beer, 1995, John Wiley & Sons. Copyright 1995 por John Wiley & Sons.

However, the organizational hierarchy, often visualized as a neat pyramid, is in practice an operational fiction.

Decision-making and knowledge flow do not descend linearly from an isolated apex but rather emerge from a dense network of conversations, influences, and negotiations extending in all directions. Leaders, far from being monarchs issuing edicts, are actually highly connected nodes within a network, as dependent on information rising from the base as teams are on directives descending from above.

The true dynamics of power and innovation do not reside in the formal organizational chart but in this informal and ever-expanding network, where ideas are tested, challenged, and evolve through interactions that defy any pre-established chain of command. It is in the intermediate spaces and cross-cutting dialogues where the real vitality of the organization resides, far more than at the top of the pyramid.

1.1. The Focus of Intervention: The "Grey Zone" of Innovation

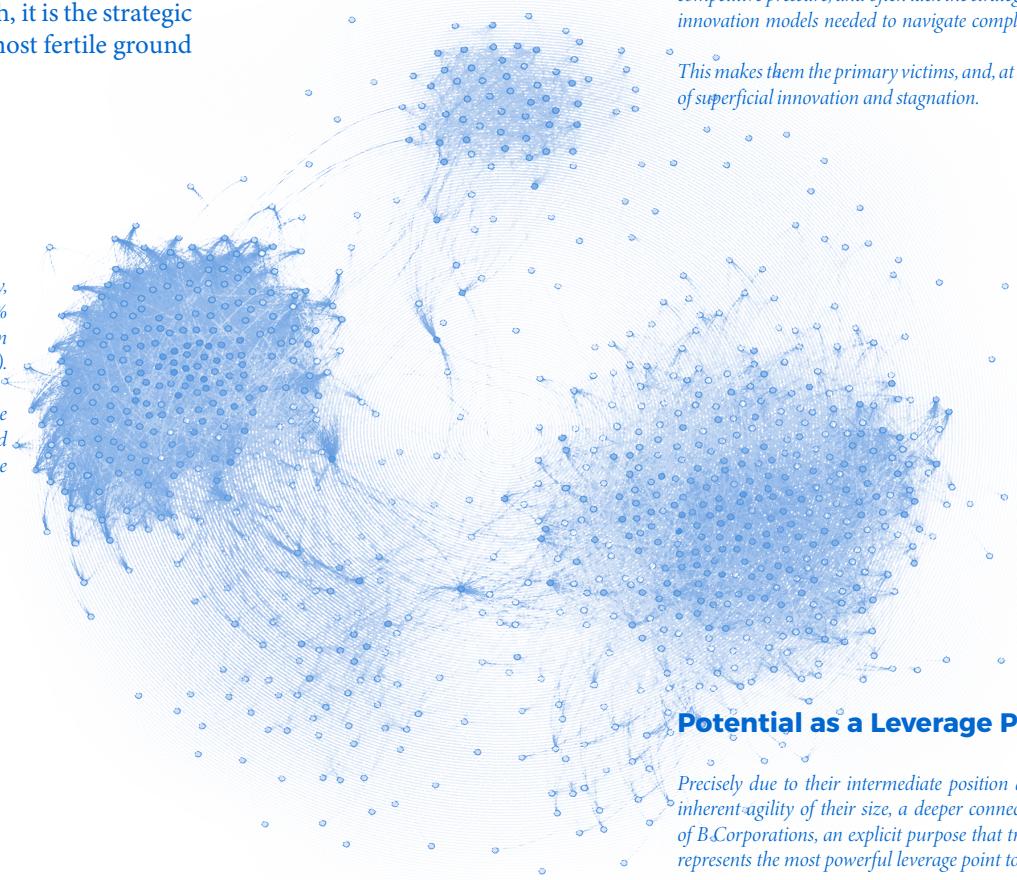
Between the two gravitational attractors of the innovation ecosystem; large corporations and high-growth startups, lies a vast and vital "grey zone": the fabric of Micro, Small, and Medium-sized Enterprises (MSMEs) and, within them, the emerging and significant movement of B Corporations.

This segment, which constitutes the backbone of most economies worldwide, is not simply another player on the field. From the perspective of this research, it is the strategic focus of intervention for three fundamental reasons that make it the most fertile ground for systemic change:

Systemic relevance

MSMEs are the primary engine of employment and local development. Globally, they represent about 90% of all businesses and generate between 50% and 60% of value added, as well as more than two-thirds of total employment, being even more significant in emerging economies (United Nations, n.d.a; OECD, n.d.).

Their health and resilience aren't isolated matters; they're directly coupled with the health and resilience of the communities they inhabit. Ignoring their needs and potential isn't just a strategic oversight; it's weakening the very foundation of the socioeconomic system.



Zonas, Nota. Adaptada de una visualización de redes personales, por msalganik, 2014, del post de blog "A gallery of personal networks from Facebook" (Statistical Modeling, Causal Inference, and Social Science, https://msalganik.wordpress.com/2013/02/24/a-gallery-of-personal-networks-from-facebook/).

Vulnerability to the Wicked Dynamic

As will be demonstrated in the diagnosis, this "grey zone" is particularly susceptible to the effects of the Wicked Dynamic. MSMEs operate with limited resources, face intense competitive pressure, and often lack the strategic capabilities and access to appropriate innovation models needed to navigate complexity (World Bank, n.f.; Hiscox, 2024).

This makes them the primary victims, and, at times, unwitting perpetrators of the cycle of superficial innovation and stagnation.

Potential as a Leverage Point

Precisely due to their intermediate position and unique characteristics; such as the inherent agility of their size, a deeper connection to their territory, (and in the case of B Corporations, an explicit purpose that transcends economic profit) this segment represents the most powerful leverage point to transform the ecosystem (OECD, n.d.).

Unlike large corporations, they are not so entrenched in hierarchical structures and cultural inertia. Unlike venture capital-backed startups, they are not subject to the tyranny of exponential growth at all costs. From the SDI perspective, they constitute the most fertile ground to cultivate a new paradigm of innovation.

1.2. B Corporations as a Focus of Intervention and Catalysts for Change

Within this vast and fertile "grey zone," a specific segment emerges as the ideal candidate to act as a pioneer and catalyst for a systemic intervention like the SDI model proposes: B Corporations. Their very strategic formation, which legally mandates a social, environmental, and economic triple-bottom-line purpose, not only aligns them with SDI principles but positions them as a natural "attractor" for a new innovation paradigm.

Unlike a traditional company, a B Corp doesn't need to be "convinced" that social or environmental impact matters; their fundamental challenge is no longer why, but how to do it effectively, resiliently, and sustainably.

B Corps, by their intrinsic design, have already overcome the most significant cultural barrier that perpetuates the Wicked Dynamic. Their governance structure obliges them to internalize externalities and to consider a much broader spectrum of value than mere financial return. This fundamental shift in operational logic transforms the chronic problems of traditional innovation into inherent opportunities.

The following illustrates this transition, contrasting the manifestations of the Wicked Dynamic in a conventional model with the mechanisms of resilience that B Corps already possess by design:

Exclusive Focus on Financial ROI
Innovation is restricted to what's immediately profitable, ignoring or externalizing social and environmental costs. This clearly indicates a Wicked System operating under a reductionist logic

Short-Term Tunnel Vision
Pressure for quarterly results prevents investment in long-term solutions and encourages the creation of Wicked Innovations that act as temporary "patches" but don't resolve the root cause

Transactional Stakeholder Relationships
Suppliers are seen as costs to minimize and customers as revenue sources to maximize. This erodes trust and limits genuine collaboration, preventing the system's autopoiesis.

Organizational Culture Centered on Competition and Silos
Interdepartmental collaboration is often a challenge, and innovation is hindered by the lack of a common language and objective that transcends departmental metrics.

Triple Bottom Line Governance

The legal mandate to generate social and environmental value expands the field of innovation towards solving Wicked Problems. This approach attracts a new type of talent, customers, and impact investors who seek coherence between their values and their economic actions

Long-Term Vision by Design

The statutory commitment to sustainability and stakeholder well-being fosters a culture of patient investment. This allows for the pursuit of resilient and regenerative solutions, whose profitability may not be immediate but is more durable.

Collaborative Value Network

Stakeholders are conceived as partners in a shared mission. This perspective is the foundation for co-creation, strengthening trust, and developing strategic alliances that address common challenges, laying the groundwork for an autopoietic system.

Purpose-Driven Culture

A shared and transcendent purpose, extending beyond economic profit, acts as a powerful unifying force. This shared purpose intrinsically aligns teams, fostering more fluid and authentic collaboration to achieve systemic goals.

Therefore, this chapter is not intended to be a universal analysis but a strategically focused intervention. By directing the SDI model towards this "grey zone," and especially towards B Corporations as catalysts for change, the aim is not merely to offer an escape route for the organizations within it.

The main objective is to demonstrate, through a case study with a natural predisposition to change, that by transforming this critical segment, a domino effect can be generated that reconfigures the logic of the entire innovation ecosystem, proving that a new paradigm is, in fact, possible.

Even so, despite this favorable predisposition, the Wicked Dynamic (WD) remains present and active, corrupting innovative potential and manifesting in a series of limitations that will be presented next.

2. Barriers to Innovation in the Grey Zone (Insights from Specific Diagnosis)

Before detailing the mechanics of the Wicked Dynamic, it's crucial to enumerate the barriers and problems faced by this economic sector. These barriers, identified throughout this research via quantitative and qualitative analysis with system stakeholders, aren't isolated failures but interconnected symptoms of a dysfunctional system.

For better understanding, these limitations have been grouped into three interdependent categories:

A. Structural and Ecosystemic Barriers

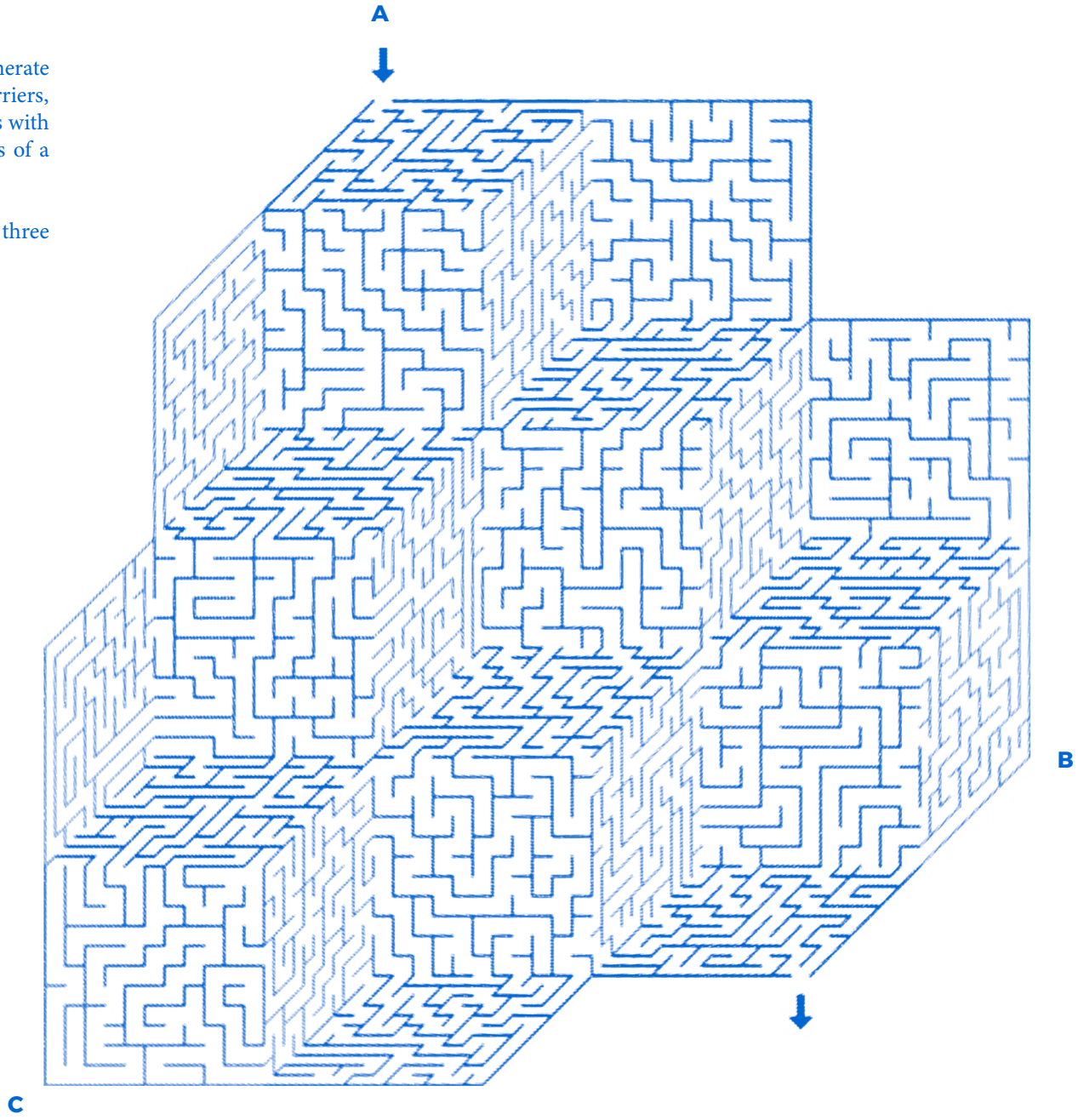
These are problems stemming from the very structure and logic of the innovation ecosystem itself, creating a "Wicked System" that limits genuine innovation.

B. Organizational Barriers

These are problems inherent in the internal structure and functioning of companies themselves, especially pronounced in the "grey zone."

C. Cultural and Mindset Barriers

These are the deepest barriers, related to the mental models and perceptions that dominate the ecosystem.



Nota. Adaptada de "Figure 2.4: Planair maze", de la tesis de grado Procedural maze generation (p. 18). por P. L. Ioannidis, 2016.

Academia-Industry Disconnection ("Relevance Gap")

There's a structural chasm between the advanced knowledge generated in universities and the practical needs of businesses. Academia, with its own incentives for publication and research cycles, produces knowledge that is often not directly applicable or accessible to MSMEs. These businesses, in turn, lack the channels and resources to effectively demand and absorb that knowledge. Even when a connection is made, there's a risk of falling into the Wicked Dynamic (WD) trap, leading to collaborations that address superficial symptoms rather than root problems.

Transactional Consulting Market

There is a significant segment of the consulting industry that promotes innovation as a packaged and standardized service. While this approach may offer quick solutions, it often fosters dependency and delivers superficial "solutions" that neither build internal capabilities nor address the root causes of problems. This model can end up extracting value rather than creating it, by disincentivizing long-term investment in the development of internal competencies (Mazzucato, 2021).

A. Structural and Ecosystemic Barriers

These are problems stemming from the very structure and logic of the innovation ecosystem itself, creating a "Wicked System" that limits genuine innovation.

Short-Term and Extractive Investment Logic

The financial ecosystem, dominated by Venture Capital (VC) logic, prioritizes exponential growth and rapid returns. Traditional funding models are often inadequate for social innovation, which requires "patient capital" and success metrics beyond just financial ROI (Seelos, Mair, 2017).

This pressure for short-term results compels companies to focus on superficial metrics and to sacrifice long-term sustainability and purpose, creating a fundamental tension for organizations.

Fragmented and Reactive Public Policies

Government support for innovation, while crucial, tends to be reactive, focusing on funding specific projects (through vouchers or competitive funds) rather than strengthening systemic capabilities and long-term collaboration within the business fabric (CEPR, 2024).

As evidenced in analyses of European innovation policies, these measures are often inefficient in addressing shortcomings in high-need territories, as they foster competition for scarce resources rather than collaboration to solve common problems (EURO-CASE, 2023, p. 8).

Furthermore, many of these funds present bureaucratic and co-financing requirements that are practically impossible for a micro or small enterprise to meet (UK Parliament, 2013; European Cluster Collaboration Platform, 2021, p. 11).

Chronic Resource Scarcity

The most frequently cited barrier in interviews and identified in literature research is the lack of financial capital and time. This scarcity forces managers to prioritize daily operations over long-term strategic planning, making innovation seem like an unaffordable luxury, even when there's a willingness to pursue it. Specifically, 41% of innovators in this sector report limited project budgets, and 37% cite insufficient time as significant barriers. Within this dynamic, small businesses and freelancers are disproportionately affected by the cost of tools and solutions, which limits their capacity for investment in innovation (Design Council, 2025).

Furthermore, "scarce asset accumulation" and a "lacking entrepreneurial culture" are presented as historical criticisms that hinder the sector's momentum (Fondazione Symbola et al., 2025). Finally, many of these organizations, trapped in urgency, do not allocate a stable percentage of their business model to R&D, limiting its use to specific and reactive instances.

Centralized and Reactive Decision-Making

Management is often highly concentrated in the founder or a small executive team. While this centralism can offer agility in the short term, it frequently leads to a focus on solving immediate problems ("firefighting") rather than anticipating and planning for future scenarios.

This pattern is common across all companies, but its impact is greater in micro and small businesses, which lack a wide margin for error. This is reflected in the high incidence of burnout and work-related stress among their leaders; up to 72% of startup founders report experiencing burnout, with 42% of small business owners experiencing it regularly (Lifehack Method, 2024; M Accelerator, 2025; Betaboom, 2023).

The World Health Organization (WHO) and the International Labour Organization (ILO) have highlighted that work-related stress can cause mental and physical illnesses, resulting in significant global economic losses (WHO & ILO, 2022). This strongly impacts the precise intervention area of this research, because SMEs, which employ the majority of the global workforce, often lack the financial and human resources to manage this stress (PubMed Central, 2020).

B. Organizational Barriers

These are problems inherent in the internal structure and functioning of companies themselves, especially pronounced in the "grey zone."

Difficulty in Attracting and Retaining Human Capital

Micro, Small, and Medium Enterprises (MSMEs) struggle to compete with the salaries and benefits offered by large corporations in order to attract and retain specialized talent, particularly in strategic design, technology, and innovation management.

The shortage of specialized skills, coupled with intense competition from larger companies that can offer more attractive compensation packages, makes talent acquisition a complex challenge for MSMEs (Bové Montero, 2024). In fact, one-third of MSMEs report difficulties in filling vacancies, and half experience long-term vacancies, threatening their ability to grow (ThinkBusiness, 2025).

Moreover, many of these enterprises (especially those under family management); face generational transition challenges that endanger their long-term survival (Intesa Sanpaolo, 2024).

This is not merely a generational handover, but a critical moment which, without proper planning, can lead to family tensions, drops in productivity, and strategic uncertainty (Winnerge, 2024).

Perception of Innovation as an Expense

Due to past experiences with "wicked innovations" that failed, many managers perceive investment in innovation as a risky expense with low returns. It is not seen as a strategic investment in resilience, learning, and future capabilities.

This perception is particularly acute in companies lacking the necessary cash flow to invest without incurring debt (European Commission, 2015; OECD, 2017), highlighting the need to rethink the business and profit model. The prioritization of short-term efficiency over long-term innovation investment is often worsened by economic uncertainty and pressure to maintain liquidity, making it difficult to adopt more strategic, long-term approaches (Global Innovation Index, 2023).

Fear of Failure

In a context of limited resources, the failure of an innovation project can have serious consequences. This generates a strong aversion to risk that inhibits experimentation, an essential component of genuine innovation. As Mauro Porcini (2023) describes, many corporate cultures punish failure, creating an environment where no one dares to propose truly new ideas. This aversion is exacerbated by a scarcity mindset, developed from the experience of operating under a constant Wicked Dynamic (WD), which discourages any movement outside the safe operational zone.

The presence of "fear of reputational risk" is a significant barrier for innovators, with 43% of participants in one study expressing concern about being accused of "greenwashing" if their attempts aren't perfect (Design Council, 2025, p. 21). Organizational culture and resistance to change are also identified as important obstacles to business transformation (World Economic Forum, 2025, p. 49).

Finally, the cost-of-living crisis has amplified companies' desire to prioritize short-term financial objectives over long-term investment, which inherently increases aversion to risky experimentation (Design Council, 2025, p. 39).

C. Cultural and Mindset Barriers

These are the deepest barriers, related to the mental models and perceptions that dominate the ecosystem.

Instrumentalization of Design (The Mechanics of Innovation)

As argued in previous chapters, in these segments design is systematically relegated to a tactical and aesthetic function at the end of the process. It is not used as a strategic tool to understand complexity, define problems, and guide transformation from the outset, which drastically limits its potential impact and perpetuates the creation of superficial solutions.

Focus on Efficiency over Resilience

The dominant logic in business management seeks to optimize existing processes for short-term gains. However, as systems theory demonstrates, excessive optimization often makes a system more fragile and reduces its ability to adapt to unexpected changes or crises (Taleb, 2012; Sheffi, 2015).

By prioritizing efficiency, redundancy and flexibility (both essential for resilience) are sacrificed (Christopher, 2016; Lengnick-Hall et al., 2011).

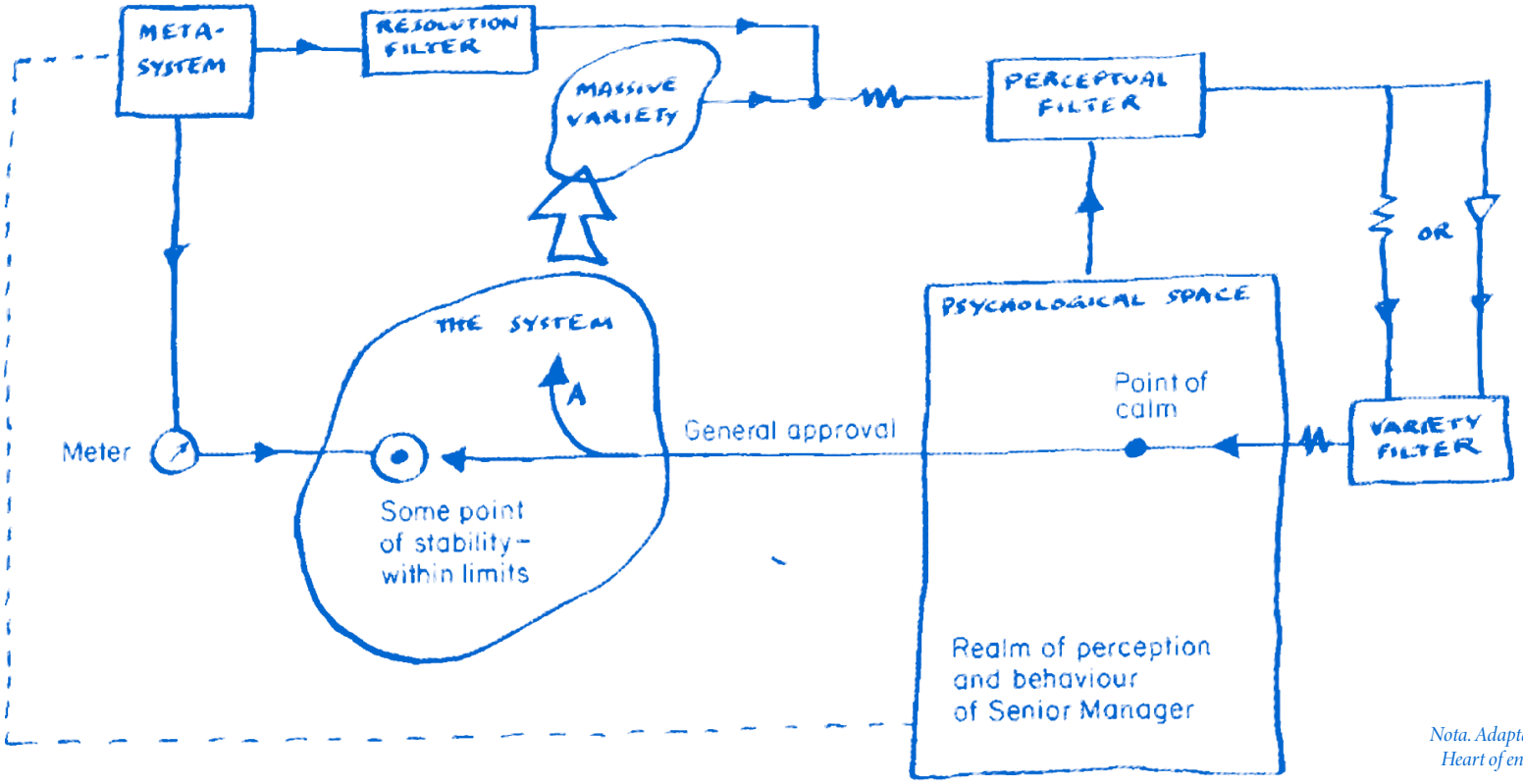
In the WD, it's crucial to understand that these barriers aren't independent; they feed into one another, creating the feedback loops we'll now analyze. These loops are the internal mechanics that sustain the Wicked Dynamic.

3. Holistic Diagnosis: The Innovation Ecosystem Under the Systemic Lens (Insights from Holistic Diagnosis)

To intervene in a system, one must first understand it.

Following the Systemic Design methodology, the first step is therefore to conduct a deep diagnosis that goes beyond listing its parts. The goal is not merely to describe the elements of the innovation ecosystem (its actors, institutions, policies, etc.) but to uncover the relationships, behavioral patterns, and, most importantly, the mental models that shape its dysfunctional dynamics.

It is about applying a systemic lens to make visible the architecture of the underlying Wicked System (WS) that gives rise to the previously identified barriers. This holistic diagnosis forms the foundation of the Awareness phase of the SDI model and is the groundwork upon which any meaningful intervention can be built.



Nota. Adaptada de "Figure 63. Handling incipient instability, stage 1", del libro Heart of enterprise (p. 383), por S. Beer, 1995, John Wiley & Sons. Copyright 1995 por John Wiley & Sons.

3.1. The Wicked System (WS) Map of Innovation

The contemporary innovation ecosystem, which should theoretically drive progress and resilience, often operates as a Wicked System (WS). Its internal logic, instead of fostering genuine novelty and profound transformation, perpetuates a cycle of "low-impact hyperactivity." This involves a frantic pace of workshops, methodologies, and projects that rarely alter the system's fundamental structures but serve to meet the organization's self-imposed innovation Key Performance Indicators (KPIs).

This WS is defined by a network of interdependent actors, each operating under a set of linear incentives and mental models that collectively reward speed over depth, the appearance of innovation over its substance, and short-term individual gain over the long-term health of the system.

Ecosystem Resources: Capital in Imbalance

To diagnose the architecture of the Wicked System (WS), the SDI model proposes, as a first methodological step, analyzing the flow and management of the resources that sustain it. The health or dysfunction of a system is often revealed in how its key capitals are valued, distributed, and transformed.

Inspired by multiple capital frameworks, such as the International Integrated Reporting Framework (International Integrated Reporting Council [IIRC], 2021), SDI identifies four types of resources or "capitals" whose flow and management determine the health of the innovation ecosystem:

Financial Capital

This includes money, investments, and credit. It's the most visible resource and, within the logic of the Wicked Dynamic, often the most overvalued, frequently considered the sole "real" form of value.

Knowledge Capital

This encompasses data, information, intellectual property, research, and crucial technical and tacit know-how. It serves as the fundamental fuel for innovation.

Human Capital

This refers to talent, skills, experience, creativity, and, importantly, the well-being of the individuals who make up the system. It's the engine that transforms knowledge into action.

Social Capital

This is the trust, relationships, collaborative networks, shared norms, and reputation. It's the invisible connective tissue that enables other forms of capital to flow and combine productively.

In this context, the Wicked Dynamic (WD) manifests as a structurally distorted management of these capitals. The system is designed to maximize and accumulate Financial Capital, often at the cost of degrading, extracting, or depleting the other three. Knowledge Capital is instrumentalized, valued only if it has an immediate and profitable market application, discarding basic research or the exploration of uncertain futures. Human Capital is treated as a consumable resource, subjected to the pressure of short-term efficiency, leading to burnout, demotivation, and brain drain.

Finally, and perhaps most damagingly, Social Capital is systematically eroded: the logic of extreme competition and transactional relationships replaces trust and long-term collaboration.

Understanding this imbalance mechanism is vital to holistically identify the system in which these behaviors are embedded, and, consequently, to enable an intervention aimed at rebalancing and regenerating these capitals.

The Cycle of Capital Flow and Mutation in the Wicked Dynamic

The flow of these capitals, within the logic of the Wicked Dynamic (WD), is neither linear nor virtuous. On the contrary, capitals transform and degrade in a cycle that reinforces the system's structural imbalance. In the context of the innovation ecosystem, the SDI perspective identifies the following dysfunctional flow:

Origin - Knowledge and Talent Generation

The cycle begins in academia and society at large, where Knowledge Capital (research, ideas) is generated, and Human Capital (professionals, designers) is formed.

In this stage, value is potential and abstract, a latent resource for future innovation.

Attraction and Filtering by Financial Capital

Actors like venture capital investors and large corporations, guided by a short-term logic, act as the primary filters of the system.

They selectively inject Financial Capital, prioritizing ideas (Knowledge Capital) and talent (Human Capital) that promise rapid, scalable financial returns.

Knowledge that isn't easily commercialized, or talent seeking a purpose beyond immediate profit, is often ignored, marginalized, or deemed "non-viable."

Conversion into Superficial Innovation

MSMEs, operating under market pressure and with limited access to capital, often resort to a transactional consulting market to quickly convert an idea into a product.

In this process, Knowledge Capital is standardized and simplified to minimize risk. Human Capital, such as that of a designer, is instrumentalized to execute a tactical and aesthetic task.

The primary objective is the rapid conversion to Financial Capital through sales, meeting funders' expectations and market urgency.

Extraction and Degradation of Value

If this superficial innovation achieves initial success, the Financial Capital generated is often extracted by the dominant actors in the cycle (investors, large clients, consultants).

However, this process degrades the other fundamental capitals: Human Capital is depleted in a frustrating, low-impact process; Knowledge Capital isn't deepened, as there was no true research and development, but rather a rapid application; and Social Capital erodes, since the client relationship was purely transactional and the superficial solution didn't generate long-term loyalty or trust.

Reinforcement of Imbalance (Cycle Closure)

The eventual failure or poor performance of superficial innovation reinforces the short-term manager's mental model: the belief that "innovation is a risky expense.

This negative outcome makes them even more reluctant to invest in the internal building of Human and Knowledge Capital, and more dependent on external "solutions" and short-term Financial Capital for the next round of innovation.

The cycle closes, and the Wicked Dynamic (WD) perpetuates itself, stronger than before, creating the need for the injection of new capitals.

This vicious cycle demonstrates how the overvaluation of Financial Capital isn't simply a matter of priorities; it's a structural mechanism that actively degrades other resources vital for healthy, sustainable innovation. This guides all actors in the ecosystem, often unconsciously, to perpetuate the Wicked Dynamic (WD).

Ecosystem Actors and Their Behavioral Patterns: The Rational Logic of Dysfunction

While this capital cycle demonstrates systemically dysfunctional behavior, its persistence isn't irrational: On the contrary, it emerges from a series of behaviors and decisions that are a totally rational response to the incentives and logic of the Wicked System in which actors operate.

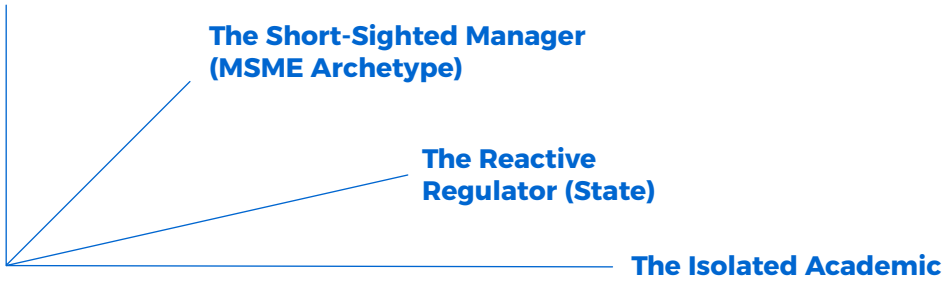
Each archetype within the innovation ecosystem, from the investor to the consultant and the MSME manager, acts in a way that optimizes their position and results within the existing rules of the game, even if the aggregate outcome of these individual actions is the degradation of the system as a whole.

Therefore, to deeply understand the mechanics of the Wicked Dynamic, it's crucial to analyze not only capital flows but also the mental models and behavioral patterns of the actors driving them. What follows isn't a critique of individuals, but an analysis of the roles the system forces them to play.

Understanding that these dysfunctional behaviors are, in many cases, a logical adaptation to a flawed environment, demonstrates the fundamental importance of awareness in recognizing the system as the first step toward its transformation.

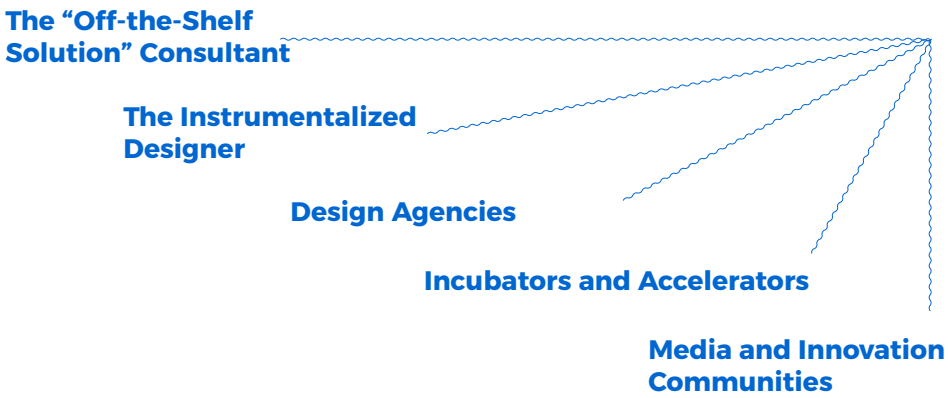
Below, these archetypes are presented in the hierarchical order in which they typically influence the ecosystem, to reveal how their actions, decisions, and priorities, though logical in their own context, collectively perpetuate the Wicked Dynamic.

The Impatient Investor (Venture Capital)



Key Players (Core Archetypes of the Wicked Dynamic)

These are the players whose position and operational logic define and reinforce the fundamental architecture of the Wicked System.



Present Actors (The Extended "Design Economy" Ecosystem)

These actors operate within the logic established by the central archetypes. Their behaviors, though often well-intentioned, ultimately reinforce the existing dynamic.

The Impatient Investor (Venture Capital)

Capital Management: Their focus is on maximizing Financial Capital in the shortest possible time. They act as the main filter of the system, deciding which knowledge and talent receive resources to thrive.

Behavior Pattern and Symptom of the Wicked Dynamics (WD): Their "return at all costs" logic forces startups to "burn" Human Capital (through unsustainable work cultures) and sacrifice building Social Capital (long-term relationships with customers and community) in pursuit of rapid growth metrics. By ignoring the value of purpose and systemic impact, they create an irresolvable tension for organizations with a mission beyond profit.

The Short-Sighted Manager (MSME Archetype)

Capital Management: Lives in perpetual scarcity of Financial Capital. This constraint forces chronic underinvestment in Human Capital (difficulty attracting and retaining talent) and Knowledge Capital (lack of time and resources for R&D or strategic training). Their Social Capital is often limited to immediate operational networks.

Behavior Pattern and Symptom of the WD: Their behavior is reactive and survival-focused. Innovation becomes an operational expense to solve immediate crises, not an investment to build capabilities. They adopt methodologies superficially because they cannot afford the time and resources for deep cultural change, remaining trapped in a low-impact innovation cycle.

The Reactive Regulator (State)

Capital Management: Allocates Financial Capital (subsidies, funds) in a fragmented manner and often disconnected from a long-term systemic strategy.

Behavior Pattern and Symptom of the WD: Their policies often fund "innovation activities," but not the long-term building of Human or Social Capital. Being reactive, they intervene to "fix" market failures only after they become evident, rather than proactively cultivating an ecosystem where all four capitals can flourish in balance. Their complex bureaucratic requirements often exclude SMEs, which are the ones that need support the most.

The Isolated Academic

Capital Management: Is a prolific generator of Knowledge Capital, but this capital largely remains isolated within the walls of the institution.

Behavior Pattern and Symptom of the WD: The academic incentive system (publications, papers) does not effectively reward the conversion of this knowledge into Financial Capital (through technology transfer) or Social Capital (through sustained collaboration with industry). This isolation is a structural consequence that creates a "relevance gap," preventing valuable academic knowledge from effectively fertilizing the business ecosystem.

In the Wicked Dynamic (WD), it can be understood that these barriers are not independent; they feed into each other, creating the feedback loops that will be analyzed below.

The "Off-the-Shelf Solution" Consultant

Capital Management: Their business model focuses on packaging and reselling standardized Knowledge Capital. They extract Financial Capital from MSMEs in exchange for generic solutions and prefabricated methodologies.

Behavioral Pattern and Symptom of the WD: By offering external, transactional solutions, they erode the incentive for MSMEs to invest in their own Human and Knowledge Capital. This perpetuates a model of dependency that weakens their clients' internal innovation capacity, keeping them in a cycle of needing external consulting.

The Instrumentalized Designer

Capital Management: Their Human Capital (creativity, synthesis skills, empathy) is the main resource.

Behavioral Pattern and Symptom of the Wicked Dynamics: Within the Wicked Dynamics, this capital is treated as a commodity to be executed tactically in the final phases of the process (aesthetics, communication). They are denied the opportunity to apply their strategic skills to define problems, understand the system, and facilitate collaboration from the beginning.

Design Agencies

Capital Management: Their business model forces them to package their Knowledge Capital into marketable and standardized services (a branding, a campaign, a product redesign).

Behavioral Pattern and Symptom of the Wicked Dynamics: The nature of their contracts, often project-based, limits their ability to build Social Capital through deep and long-term relationships with clients. They focus on delivering a "deliverable" rather than catalyzing cultural transformation.

Incubators and Accelerators

Capital Management: They act as intermediaries who convert the Human and Knowledge Capital of startups into an attractive format for the Financial Capital of investors.

Behavioral Pattern and Symptom of the Wicked Dynamics: They often adopt and impose the short-term logic of the "Impatient Investors," focusing on rapid growth metrics and preparing for the next funding round, rather than building sustainable long-term business models.

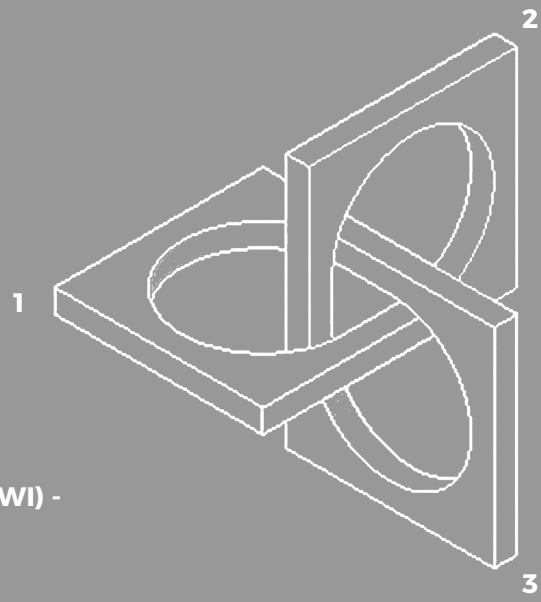
Media and Innovation Communities

Capital Management: They build narratives and manage the flow of information, influencing the ecosystem's perceived value.

Behavioral Pattern and Symptom of the Wicked Dynamics: They reinforce the primacy of Financial Capital as the main metric of success (celebrating funding rounds, "unicorn" valuations, multimillion-dollar acquisitions), while the creation of Social Capital and real impact on the community or environment often take a back seat, treated as an "inspirational" anecdote rather than the core of success.

The Feedback Loops of the Wicked Dynamic

The interaction of these actors and their capital management generate a series of feedback loops that constitute the mechanics of the Wicked Dynamic (WD). To understand it, we can break it down into three interconnected loops, each corresponding to a component of the formula WD = WS(WP(WI)).



Loop 1: The Wicked System (WS) - The Reductionist Mindset Loop

Media and Innovation Communities, alongside business schools, promote a dominant narrative of success centered on rapid growth and financial return (overvaluation of Financial Capital).

This narrative shapes the expectations of the Impatient Investor, who actively seeks startups that fit this model, and the Short-Sighted Manager, who aspires to emulate it.

The Reactive Regulator, in turn, designs public policies that support this type of "visible" and easily measurable innovation.

The highly publicized success of a few startups that fit this mold validates and reinforces the original narrative, solidifying the reductionist mindset as the only "correct" way to innovate and marginalizing any other definition of value. The system convinces itself that its logic is the only possible one.

This fundamental loop creates and reinforces the worldview that underpins the entire dysfunctional system.

Loop 2: The Wicked Problem (WP) - The Knowledge Fragmentation Loop

The reductionist mindset of the WS leads the Short-Sighted Manager to undervalue (and underinvest in) the long-term building of Knowledge or Social Capital.

This causes the Isolated Academic to find no channels or incentives to translate their knowledge into practical applications, reinforcing their isolation and the abstraction of their work.

The lack of collaboration and trust (erosion of Social Capital) between industry and academia becomes a chronic Wicked Problem (WP). Companies don't access the knowledge they need for deep innovation, and academia doesn't benefit from market feedback.

This deficit in deep innovation makes MSMEs even more vulnerable to market pressure, pushing them to seek even faster, more superficial solutions, thus reinforcing the cycle.

This loop illustrates how the Wicked System generates intractable problems, such as the gap between knowing and doing.

Loop 3: The Wicked Innovation (WI) - The Tactical Solution Loop

Faced with the WP of a lack of genuine innovation, the Short-Sighted Manager, with limited resources, seeks a quick and tangible solution.

The "Off-the-Shelf Solution" Consultant and the transactional Design Agency offer a Wicked Innovation (WI): a packaged methodology or a design sprint that promises rapid results without addressing the underlying capacity deficit. The Instrumentalized Designer acts as the executor of this tactical solution.

The intervention produces a superficial result (a prototype, a report) that creates the illusion of progress but fails to solve the underlying problem and often fails in the market.

The failure of the WI consumes the MSME's scarce Financial Capital and reinforces its mental model that "innovation is a useless expense," making it even more reluctant to invest in real capabilities and more prone to seek the next "magic solution" in the future. The loop closes, perpetuating the Wicked Dynamic (WD) in its entirety.

This loop shows how the system "solves" its problems with interventions that, in reality, make them worse.

3.2. From Diagnosis to Challenge: The Mandate for Action

The Holistic Diagnosis isn't an end in itself; its value lies not in merely describing complexity, but in its ability to transform understanding into action. Following the Systemic Design methodology, once "complexity has been understood" through mapping capitals, actors, and their feedback loops, the next step is to "address the challenges."

This transition is crucial: it means reframing the identified problems not as insurmountable obstacles, but as strategic design challenges that invite intervention.

The loops and behavioral patterns described previously aren't just observations; they're symptoms of a systemic structure that needs to be transformed. From the SDI perspective, the fact that the system is corrupted and its current dynamic generates a repetitive problem isn't a limitation to change; on the contrary, it's the perfect space for identifying opportunities.

The following table synthesizes the key insights from the diagnosis and translates them into concrete design challenges. While this example focuses solely on the innovation ecosystem, these challenges constitute the mandate for action and the foundation upon which the SDI Roadmap will be built a proposal that seeks to resonate and be reflected in other interactive systems like this one.

These challenges don't allow for simple solutions. They demand an approach that is, by nature, systemic, collaborative, and transformative. The SDI Roadmap presented next is precisely designed to provide that approach.

Systemic Challenges Identified	*Strategic Challenges for SDI Intervention*	*Synthesis of the Challenge*
The Cycle of Superficial Innovation: MSMEs are caught in a reactive loop that prioritizes speed over impact, reinforcing aversions to risk and underutilizing their innovative potential. Here, innovation is perceived as an expense, not an investment in capability	*How can we empower Micro, Small, and Medium-sized Enterprises (MSMEs) to shift from tactical, survival-driven innovation to a strategic capacity for systemic value creation? This involves leveraging their limited resources as an advantage for agility, low-cost experimentation, and deep collaboration.*	*Fostering Business Resilience and Strategic Capability: The goal is to develop new internal capacities within organizations, reducing their reliance on external, often superficial, solutions.*
The Academia-Industry Relevance Gap: There's a structural chasm between advanced knowledge generated in universities and the practical needs of businesses. This results in an ecosystem where neither academia nor industry fully realizes its potential impact.	*How can we design a market or platform that efficiently and mutually beneficially connects the concrete challenges of businesses with the advanced knowledge of academia? The goal is to transform research into practical impact and market feedback into relevant research.*	*Activating Knowledge Transfer and Applied Value: The challenge lies in building functional bridges that translate academic knowledge into practical solutions, and conversely, allow market feedback to inform relevant research.*
The Extractive Investment Trap: The dominant funding model is misaligned with long-term value creation. It incentivizes unsustainable growth and undermines the core purpose of organizations, particularly B Corps	*How can we co-create and scale funding and investment models that value and reward long-term resilience and Systemic Benefit-Value? This means aligning capital with the regeneration of social and environmental ecosystems.*	*Developing a Regenerative Finance Paradigm: This involves shifting capital from a short-term, extractive logic towards one that invests in the long-term health and regeneration of the entire system.*
Instrumentalization of Design: The role of design and designers is systematically reduced to a tactical, superficial function in the final phases of the innovation process. This prevents their strategic contribution to problem definition and systemic transformation.	*How can we redesign organizational processes and decision-making culture to integrate systemic design as a transversal strategic capability, empowering designers to act as transformation managers from the beginning to the end of the innovation cycle?*	*Positioning Design as a Transversal Strategy: The aim is to elevate design from a merely tactical function to a leadership capability that drives organizational and systemic transformation.*
Fragmented Governance: Public policies and innovation support instruments operate in isolation and reactively. They lack a systemic vision that fosters inter-sectoral collaboration and long-term capacity building.	*How can we design more adaptive and collaborative governance mechanisms that foster the creation of resilient innovation ecosystems? This includes articulating public policies that act as catalysts for strategic alliances rather than merely funding isolated projects.*	*Fostering Collaborative and Ecosystemic Governance: This means improving the articulation and cooperation between public and private actors to build a more resilient innovation environment.*

Table 3: From Need to Challenge, Note: This table is an original creation.

3.3. From Challenges to Opportunities: Design as a Lever for Transformation

The diagnosis of the Wicked Dynamic, while revealing a landscape of systemic dysfunction, isn't a sentence of failure. From a systemic design perspective, its value lies not in describing the pathology, but in its ability to uncover a map of latent opportunities for intervention; Every problem, every vicious loop, and every identified structural tension isn't a dead end, but an invitation to apply design knowledge at strategic points to trigger positive, regenerative change. The fundamental opportunity, therefore, isn't to "fix" the broken parts of the system, but to redesign the relationships between them.

This chapter's research reveals that the most powerful opportunity lies in applying systemic design to reconfigure the very structure of organizations, particularly within the "grey zone" of MSMEs, using B Corps as the ideal archetype of early adopters. Instead of continuing to import external, packaged "solutions," which risks introducing new Wicked Innovations, the true leverage for change consists of building the internal capacity for these organizations to become conscious, collaborative, and resilient innovation systems. The ultimate goal is for them to naturally attract the resources needed to nurture their operations and, in turn, facilitate the restoration of the regenerative properties of the ecosystems they belong to.

The following table, therefore, represents the core of this methodological transition. It transforms the previously identified strategic challenges into concrete design opportunities, establishing the conceptual framework upon which the SDI model's Roadmap will be built.

Strategic Challenge	*Systemic Design Opportunities*
Empower MSMEs to transition from reactive to strategic innovation.	*Designing Internal Innovation Capabilities* *We can implement processes and roles within MSMEs that foster a culture of continuous experimentation and learning. This leverages their agility to quickly prototype not just products, but entire business models, using design as a strategic function rather than a cosmetic expense.*
Close the relevance gap between academia and industry.	*Designing Collaborative Knowledge Ecosystems* *We can create platforms and facilitate strategic alliances that act as "translators" between academic language and market needs. This involves co-designing applied research projects and technology transfer models that generate value for both academia and industry.*
Overcome the trap of extractive and short-term investment.	*Designing New Investment and Value Measurement Models* *We can collaborate with impact investors and B Corps to develop investment vehicles with "patient capital" and dashboards that measure "Return on Resilience" and Systemic Benefit-Value, moving beyond purely financial ROI.*
Transcending the instrumentalization of design.	*Designing Design's Strategic Role in Governance* *We can integrate systemic designers into leadership teams and strategic decision-making processes. Their role isn't to execute, but to facilitate systemic awareness, catalyze collaboration, and safeguard the long-term vision.*
Overcoming the fragmentation of public governance.	*Designing Public Policies as Enabling Platforms* *We can shift from point-in-time subsidies to policies that encourage the creation of networks and alliances. The government's role is redefined as an ecosystem catalyst, investing in the social infrastructure (trust, collaboration) that sustains long-term innovation.*

Table 4: From Challenge to Opportunity, Note: This table is an original creation.

Systemic Problems	Strategic Challenge	Goal	Opportunity
The Cycle of Superficial Innovation	*Empower MSMEs to transition from reactive to strategic innovation.*	*Fostering Business Resilience and Strategic Capability*	***Designing Internal Innovation Capabilities*** *We can implement processes and roles within MSMEs that foster a culture of continuous experimentation and learning. This leverages their agility to quickly prototype not just products, but entire business models, using design as a strategic function rather than a cosmetic expense.*
The Academia-Industry Relevance Gap	*Close the relevance gap between academia and industry.*	*Activating Knowledge Transfer and Applied Value*	***Designing Collaborative Knowledge Ecosystems*** *We can create platforms and facilitate strategic alliances that act as "translators" between academic language and market needs. This involves co-designing applied research projects and technology transfer models that generate value for both academia and industry.*
The Extractive Investment Trap	*Overcome the trap of extractive and short-term investment.*	*Developing a Regenerative Finance Paradigm*	***Designing New Investment and Value Measurement Models*** *We can collaborate with impact investors and B Corps to develop investment vehicles with "patient capital" and dashboards that measure "Return on Resilience" and Systemic Benefit-Value, moving beyond purely financial ROI.*
Instrumentalization of Design	*Transcending the instrumentalization of design.*	*Positioning Design as a Transversal Strategy*	***Designing Design's Strategic Role in Governance*** *We can integrate systemic designers into leadership teams and strategic decision-making processes. Their role isn't to execute, but to facilitate systemic awareness, catalyze collaboration, and safeguard the long-term vision.*
Fragmented Governance	*Overcoming the fragmentation of public governance.*	*Fostering Collaborative and Ecosystemic Governance*	***Designing Public Policies as Enabling Platforms*** *We can shift from point-in-time subsidies to policies that encourage the creation of networks and alliances. The government's role is redefined as an ecosystem catalyst, investing in the social infrastructure (trust, collaboration) that sustains long-term innovation.*

From all these design opportunities, a fundamental and enabling one emerges: the application of the SDI model to the organization's own internal structure to reconfigure it as a growth and resilience strategy. To build internal capabilities, forge meaningful alliances, attract patient capital, and strategically integrate design, the organization must first transform its own "operating system." It must shift from a linear and reactive logic that perceives innovation as an expense to a systemic and proactive one that understands it as a fundamental investment in its own capacity for adaptation and evolution.

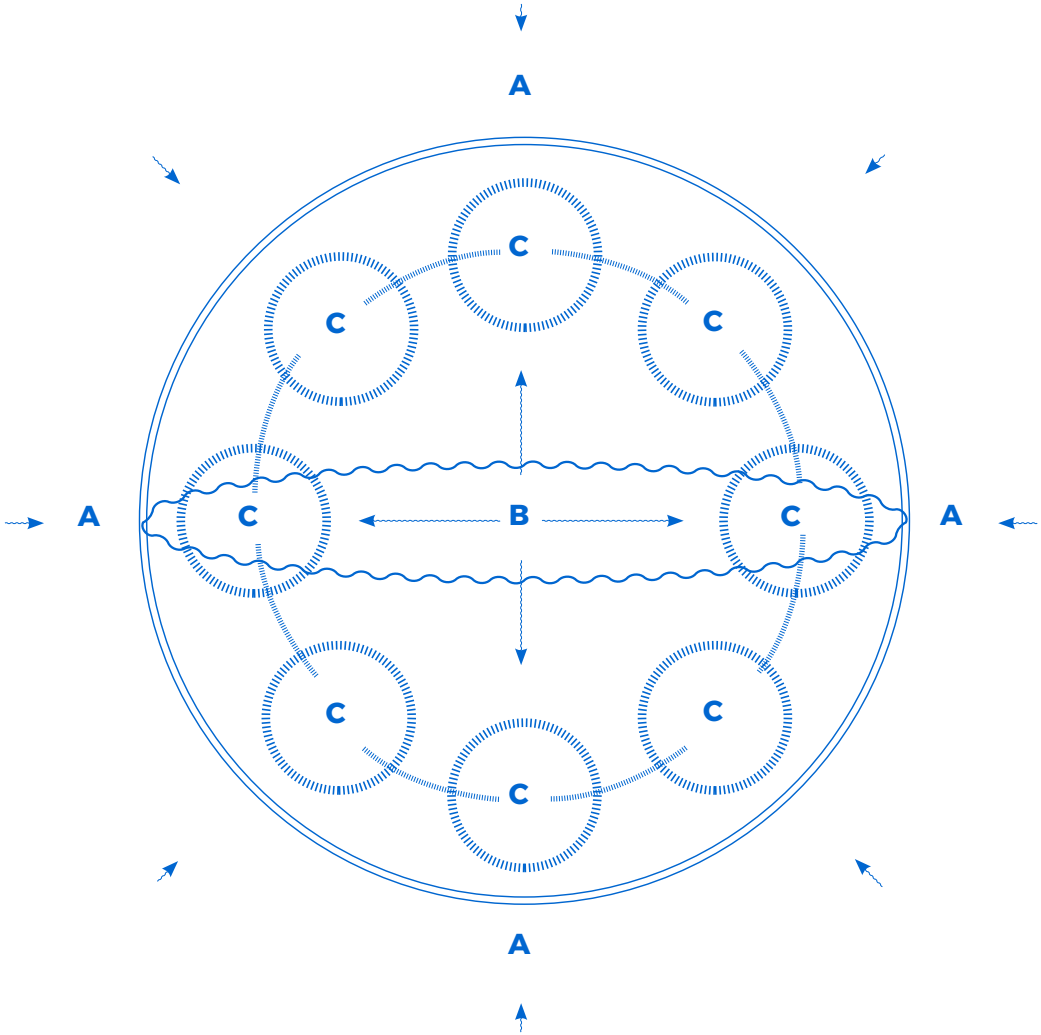
Therefore, the Roadmap detailed below will focus on this primordial opportunity. It is not presented as an external solution to be imposed, but as a framework for self-transformation. It is a path designed for organizations themselves, especially those in the "grey zone," to become the conscious drivers of the change the ecosystem needs, learning to manage their own complexity to prosper sustainably.

4. The SDI Roadmap: A Framework for Systemic Transformation

Facing the diagnosis of the Wicked Dynamic, inaction is an act against human nature. This section translates the theoretical SDI model into an actionable roadmap, a practical framework designed to guide organizations, especially those with a defined purpose, through a transformation process.

This path is structured into the three phases of the SDI model: Awareness, Collaboration, and Transformation. These phases work in symbiosis with systemic design synergy, design opportunities, and ecosystem needs, and are designed to counteract, step by step, each dimension and component of the Wicked Dynamic.

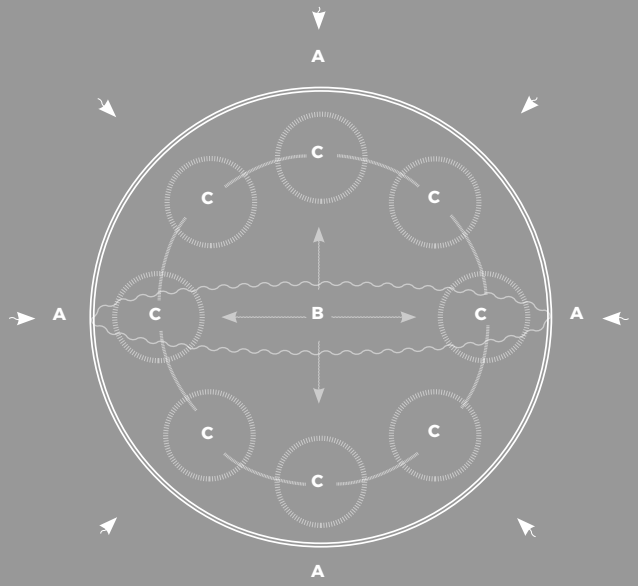
Nota. Adaptada de una ilustración de la mitología de Yggdrasil, por u/Ok-Volume1204, 2023, de la publicación en línea "After 6 six months of research and drawing, I completed this piece..." (Reddit, https://www.reddit.com/r/mythology/comments/17xe26v/after-6-six-months-of-research-and-drawing-i/).



Phase A: Awareness
Countering the Wicked System (WS)

Phase B: Collaboration
Addressing the Wicked Problem (WP)

Phase C: Transformation
Preventing Wicked Innovation (WI)



Phase A: Awareness
Countering the Wicked System (WS)

The first and most crucial step is to dismantle the flawed perception that sustains the Wicked System. The goal is to transform from an unconscious actor trapped within the system to a conscious participant who understands their role, the roles of others, and, fundamentally, the hidden dynamics that govern the whole. You can't change a system you don't see.

Systemic Mapping:
Internal and External

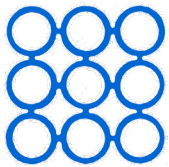
Action Module 1:
Diagnosing Mental Models and Causal Loops

Value Network
Analysis (VNA)

Action Module 2:
Visualizing Hidden Capitals

Defining
Systemic Value

Action Module 3:
Operationalizing Purpose



Phase A: Awareness
Countering the Wicked System (WS)

Systemic Mapping:
Internal and External

The transformation starts at home, but with an eye on the outside. The organization begins a facilitated process to map itself and its immediate environment, making often-ignored interconnections visible.

Action Module 1:
Diagnosing Mental Models and Causal Loops

Step 1: Identify Mental Models

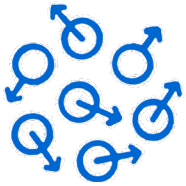
Through the systemic designer, unexamined beliefs that govern the organization are brought to the surface and questioned (e.g., "growth is always good," "competition is the sole driver," "failure is unacceptable").

Step 2: Causal Loop Mapping

Identify a persistent problem (e.g., high employee turnover, recurring customer complaints). Instead of seeking a linear cause, the feedback loops that perpetuate it are mapped, visualizing how different parts of the system influence each other and how yesterday's "solution" might be today's problem.

Step 3: Synthesize the "Collective Autopsy"

The results aren't archived; they're synthesized into a map that's shared with the organization. This map visualizes the true causes of the problems, serving as a communication artifact and a starting point for action.



Phase A: Awareness
Countering the Wicked System (WS)

Value Network Analysis (VNA)

This module transcends traditional accounting and linear value chain analysis. It maps the multidimensional flows of capital to understand the system's true balance.

Action Module 2:
Visualizing Hidden Capitals

Step 1: Map Tangible and Intangible Flows

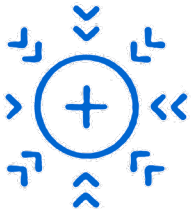
Using the Value Network Analysis (VNA) methodology, the process visualizes not only money flows (Financial Capital) but also flows of Knowledge Capital (where is know-how generated and blocked?), Human Capital (where is talent depleted or cultivated?), and Social Capital (where is trust built or destroyed?).

Step 2: Identify Value Paradoxes

This step involves evaluating the alignment of the mapped flows with the system's proposition and objective. It identifies value paradoxes and decisions that optimize one form of capital at the expense of another. Additionally, assets are compared based on their difficulty of reconstruction, local availability within the territory, and cost.

Step 3: Establish a "Systemic Balance Sheet"

A new type of balance sheet is created that clearly shows how decisions impact all four capitals. This makes the true costs and benefits of each action visible, fundamentally shifting the basis for future decision-making.



Phase A: Awareness
Countering the Wicked System (WS)

Defining
Systemic Value

With a clear understanding of its system, the organization is prepared to redefine how its alignment with its purpose will be evaluated in an operational and measurable way.

Action Module 3:
Operationalizing Purpose

Step 1: Translating the Vision-Mission

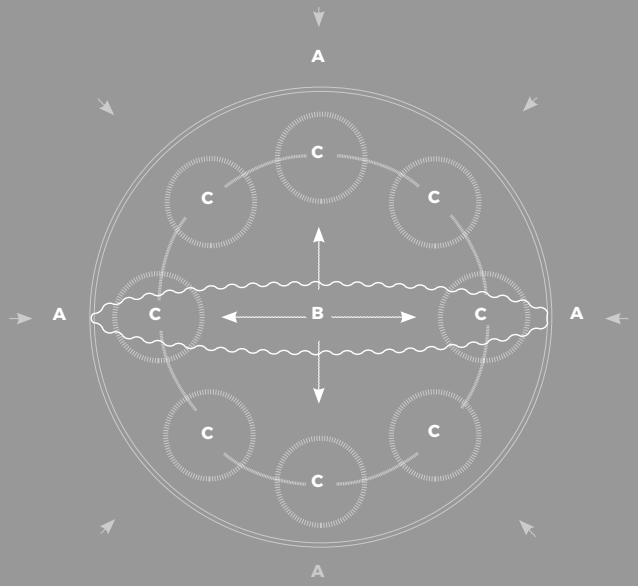
The management team, along with representatives from other stakeholders (employees, clients, suppliers), answers the fundamental question: How does our vision of "systemic value-benefit" translate into concrete actions?

Step 2: Creating a Decision Manifesto

The answers result in a practical manifesto that guides the organization's areas in decision-making processes, ensuring their alignment with the long-term objective.

Step 3: Designing the New Scorecard

New KPIs (Key Performance Indicators) are defined that will measure the success (of innovation) based on the creation of Systemic Value. These indicators are made public and transparent (to the associative ecosystem), creating the foundations for a new culture of accountability and decision-making..



Phase B: Collaboration
Addressing the Wicked Problem (WP)

Once an organization achieves systemic awareness, the next step is to move beyond individual analysis and build the collective capacity to act. Wicked Problems, by their interconnected nature, are immune to unilateral solutions.

This phase, therefore, focuses on transforming the network of actors from a competitive battlefield into a collaborative and autopoietic ecosystem, capable of generating and managing its own resource flows to address shared challenges.

Forming
Autopoietic Alliances

Action Module 4:
Building Strategic Alliances

Creating Communities of Practice (CoPs)
as Containers for Collaboration

Action Module 5:
Activating the Community of Practice

Designing Governance Models
and Shared Value

Action Module 6:
Formalizing Shared Value

Phase B: Collaboration
Addressing the Wicked Problem (WP)

Forming
Autopoietic Alliances

With the clarity gained in Phase A, the organization can identify and convene strategic partners. The goal is no longer a transaction but forming an alliance to address a shared Wicked Problem. The key shifts from "What do I gain?" to "What can we solve together that's impossible (or inefficient) to solve separately?"

Action Module 4:
Building Strategic Alliances

Step 1: Identify the Shared Wicked Problem

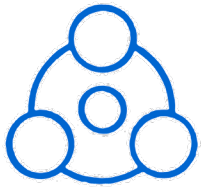
Based on the systemic map, a pattern interconnecting various ecosystem actors is identified. The problem is then defined by visualizing its impact on multiple actors.

Step 2: Map the Ecosystem of Relevant Actors

Key people and organizations whose participation is vital to address the problem from multiple fronts are identified, including decision-makers, investors, and implementers. Their roles within the autopoietic organization will be defined, specifying each one's contribution to the process.

Step 3: Define a Transformative Collective Purpose

The alliance consolidates around a primary objective that, while coexisting with individual interests, transcends them, guiding the actions of those involved toward a shared goal.



Phase B: Collaboration
Addressing the Wicked Problem (WP)

Creating Communities of Practice (CoPs) as Containers for Collaboration

The alliance needs a structured space to operate. Communities of Practice (CoPs) are established as regular, facilitated forums where different actors can safely share knowledge and co-create solutions. These CoPs aren't informal meetings; they are the operational engine of the alliance.

Action Module 5:
Activating the Community of Practice

Step 1: Establish a Neutral and Facilitated Space

A location (physical or virtual) is chosen that isn't dominated by any single actor, with the systemic designer acting as a facilitator to ensure equitable participation.

Step 2: Design Exchange Rituals

Workshops and working sessions are scheduled with a clear agenda, focused on sharing data, jointly analyzing problems, and iteratively prototyping solutions.

Step 3: Catalyze "Creative Friction"

The facilitator ensures that technical knowledge, tacit knowledge, and market insights meet, challenge each other, and combine to generate genuine and contextually relevant innovations, even if they aren't immediately applicable.

Phase B: Collaboration
Addressing the Wicked Problem (WP)

Designing Governance Models and Shared Value

For collaboration to be sustainable, it must be fair and transparent. The alliance, aided by the systemic designer, dedicates time to explicitly define how the costs, risks, and, crucially, the benefits of the collaboration will be distributed. The goal is to create a model that aligns incentives and transforms competition into synergy.

Action Module 6:
Formalizing Shared Value

Step 1: Dialogue on Resource Distribution

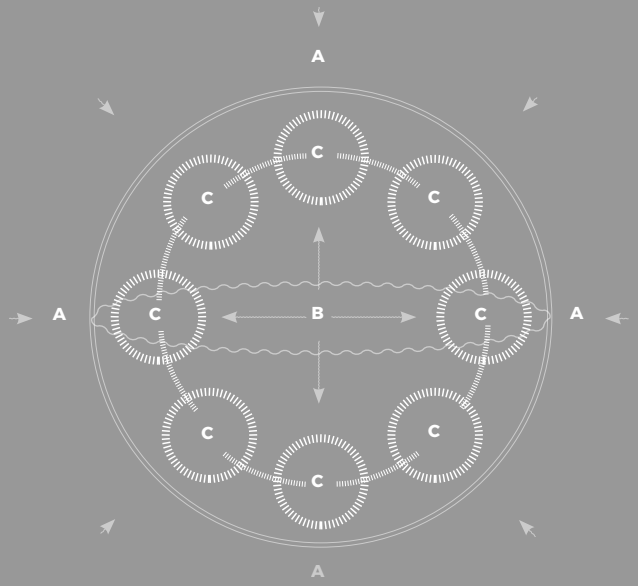
The resources contributed by each actor (capital, knowledge, time, networks) are identified, and agreements are established for the equitable distribution of project costs and risks.

Step 2: Co-design the Collaboration Vehicle

The legal and operational structure that best suits the alliance's purpose is explored and defined.

Step 3: Establish Systemic Success Metrics

Success indicators are defined that go beyond financial metrics and reflect the health of the ecosystem.



Phase C: Transformation
Preventing Wicked Innovation (WI)

Systemic change doesn't happen with just one project; it must take root in an organization's culture, processes, and structures for regenerative innovation to become the default way of operating. This phase focuses on building the "organizational infrastructure" that will sustain long-term transformation, preventing reliance on Wicked Innovations.

Adopting Systemic Value Metrics

Action Module 7:
Implementing a Systemic Scorecard

Prototyping Policies and Business Models

Action Module 8:
Strategic Prototyping of Regenerative Models

Integration of Systemic Governance

Action Module 9:
Institutionalizing the Systemic Vision

Phase C: Transformation
Preventing Wicked Innovation (WI)

Adopting Systemic Value Metrics

We must transcend the tyranny of financial ROI as the sole guiding star. Success is redefined and measured with a comprehensive scorecard that evaluates the health of the system as a whole.

Action Module 7:
Implementing a Systemic Scorecard

Step 1: Co-design Metrics

Facilitated by the systemic designer, the alliance of stakeholders from Phase B comes together to define what "success" means in systemic terms. Indicators are co-created to measure not only Growth and Efficiency but also the Resilience and Agility of the ecosystem.

Step 2: Building the Systemic Value Dashboard

Design a visual dashboard that monitors new metrics, encompassing not just economic benefit, but also revenue diversification, alliance strength, resilience to shocks, and agility for learning and unlearning.

Step 3: Integration into Decision Cycles

This new scorecard will be formally incorporated into reporting cycles (semiannual, quarterly, etc.) and strategic planning meetings, ensuring that decisions are made by considering their impact on all four capitals.

Phase C: Transformation
Preventing Wicked Innovation (WI)

Prototyping Policies and Business Models

Design transforms into a tool for strategic experimentation. Instead of merely prototyping a new product, the organization learns to prototype and test new business models and internal policies.

Action Module 8:
Strategic Prototyping of Regenerative Models

Step 1: Identify a Prototyping Opportunity

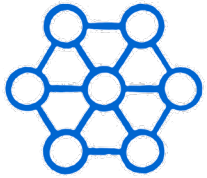
Based on insights from previous phases, a key business area is selected to experiment with a transition toward a more circular or regenerative model.

Step 2: Design and Execute a Low-Risk Pilot

A small-scale prototype of the new model is launched and subjected to rigorous testing to evaluate its viability and performance under natural conditions.

Step 3: Measure, Learn, and Iterate

Data from the pilot (financial, customer satisfaction, environmental impact) is collected to assess its viability and systemic impact. Based on the learning, the decision is made whether to scale the model, pivot to a new iteration, or discard it.



Phase C: Transformation
Preventing Wicked Innovation (WI)

Integration of Systemic Governance

Transformation is formalized within the organization's power structure and accountability processes. Senior leadership explicitly assumes responsibility for the well-being of the ecosystem it operates within.

Action Module 9:
Institutionalizing the Systemic Vision

Step 1: Adapt Reporting and Communication

Adopt reporting frameworks that reflect holistic value creation, such as Integrated Reporting or B Corp standards. This transparently communicates performance across social and environmental domains.

Step 2: Create and Empower a Systemic Leadership Role

Design a new role within the executive team, like a Chief Ecosystem Officer or Chief Growth Officer. This isn't a public relations manager; it's a strategic leader whose function is to cultivate the health and productivity of key alliances.

Step 3: Establish a Stakeholder Council

Formalize an advisory council comprised of representatives from the Phase B alliance (customers, suppliers, community, academia). This council meets periodically to review the organization's systemic performance and guide strategic decision-making, ensuring systemic logic remains at the core of governance.

5. The Intervention Project: The SDI Platform

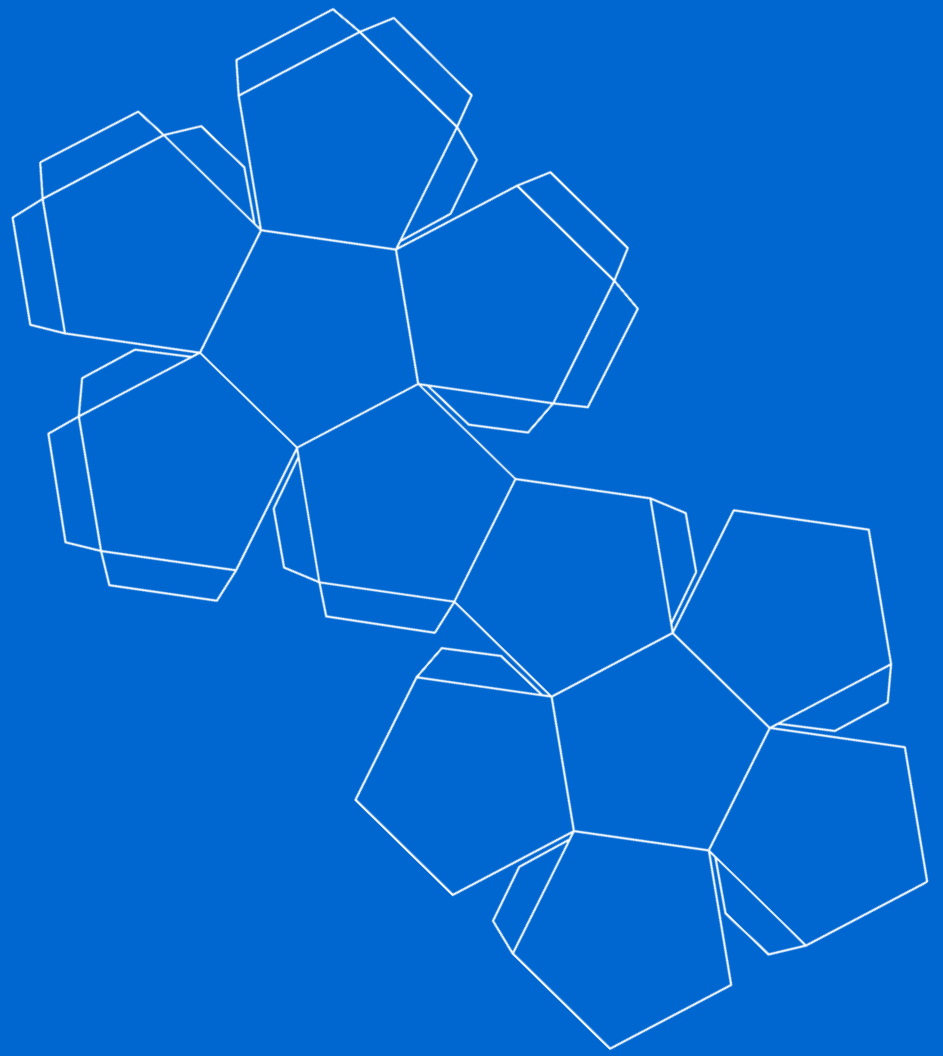
To catalyze the widespread adoption of this roadmap and break down barriers to knowledge and collaboration, a systemic intervention project is proposed: the design and development of a platform to serve as the operational infrastructure and nervous system of the SDI model.

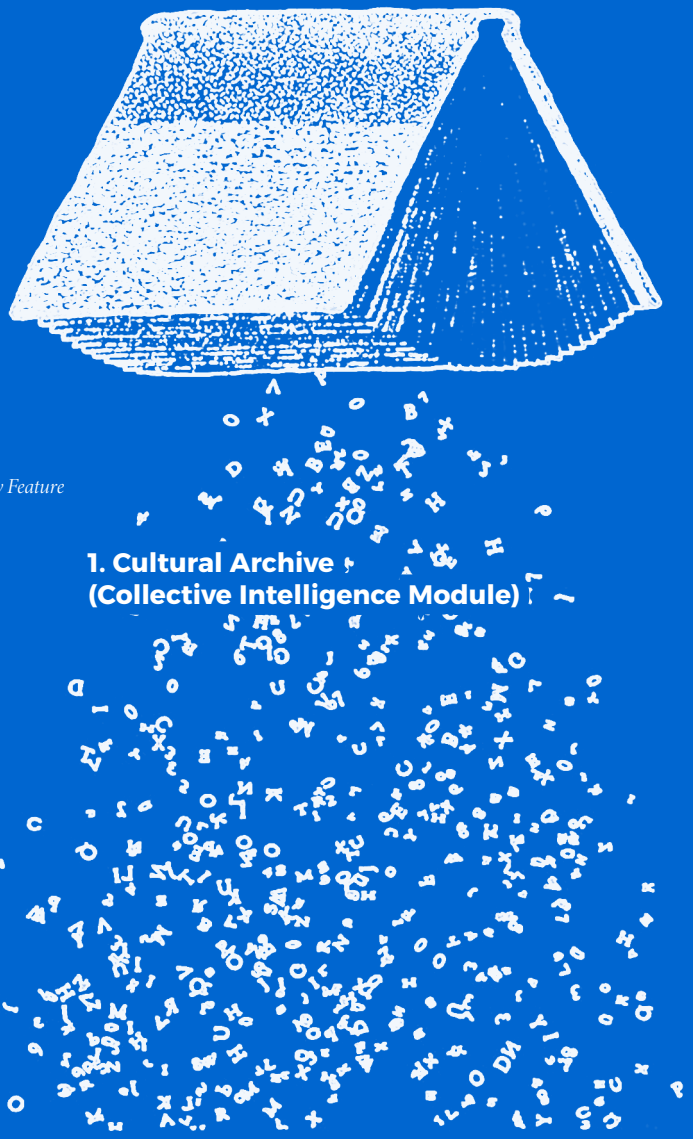
Vision

A society driven by the system itself through innovation, where components don't need to compete destructively with each other. Instead, they collaborate to co-create systemic value, understanding that the health of the whole is the condition for the prosperity of the parts. In this paradigm, innovation ceases to be a weapon in a zero-sum game and transforms into the ecosystem's collective capacity to continuously learn, adapt, and regenerate acticng as an autopoiesis structure. It's in this scenario where the designer can, finally, offer their deepest impact: enable the system to be self-aware and evolve sustainably.

Mision

Identify and intervene the WD to nurture "an innovation enviroment for innovation models." SDI platform won't prescribe solutions. Instead, it'll facilitate the conditions for systemic, collaborative, and autopoietic innovation to emerge. At its core, it's about building collective intelligence, a space to connect and share the operational legacy of businesses, turning individual experience into a common asset. It will act as a positive feedback loop for the entire ecosystem, connecting those with problems to those who might have solutions.





Key Feature

1. Cultural Archive
(Collective Intelligence Module)

Similarly, within the research conducted for this thesis, other opportunities were identified. These will be explored as modules to be integrated into the platform, developed as projects progress and the SDI model is incorporated:

2. Resource Map
(Awareness Module)

3. Challenges and Opportunities Marketplace
(Collaboration Module)

4. Business Model Digital Twins
(Transformation Module)

5. Systemic Value Dashboard
(Measurement Module)

1. Cultural Archive
(Collective Intelligence Module)

Insight from Needfinding: The Untapped Potential of Operational Legacy

Every day, businesses generate immense Knowledge Capital through their operations: projects that fail, processes that work, cultures that evolve. This "operational legacy" is an asset of incalculable potential value, yet it's systematically undervalued and, consequently, lost over time.

Currently, this capital is managed haphazardly and is directly tied to the synthesis capabilities of individuals who have other operational priorities. This situation limits a company's ability to learn and adapt, leading to the repetition of past mistakes and the high cost of "understanding the context" from scratch every time innovation is needed or staff changes.

This vulnerability intensifies when we realize that most problems affecting a company's operations aren't directly tied to the specifics of its products or services. Instead, they are transversal issues common across the entire economic sector. Since organizations commonly go through similar problem-solving processes, it's rational to consider sharing and facilitating the transfer of information to streamline this. While the exact solution may vary for each organization, the problem framing, research, and development efforts undertaken by each, when brought together on a common platform, have the potential to create a invaluable resource. This could break current limitations and maintain a constant flow of innovation.

Functionality:

This module is the platform's core. It's a structured space where participating organizations can document and share their learnings. It's not just about success stories but, crucially, about failures, strategic pivots, cultural practices, and lessons learned. This creates "project stories" that detail not only what decisions were made but also why and how. This helps us understand positive and negative behavioral patterns and their impact on the economic sector, providing a solid database for conducting holistic analysis.

Value proposition:

For designers and innovators, this radically transforms the research process. Instead of tedious discovery for every new project, they can consult the database to answer questions like: "What business models have been attempted in this sector, and why did they fail?" or "What are the common cultural patterns in companies that successfully scale their impact?" This allows field research to focus on validating opportunities already informed by deep practical knowledge, drastically accelerating the innovation cycle and reducing risk.

Integrating the Cultural Archive into Daily Operations

Implementing this module isn't simply adopting a digital product; it's about establishing a new cultural practice within the organization: the habit of structured reflection. It's fundamentally an analog process, yet it's accompanied by a technological platform that facilitates, scales, and enhances innovation.

Module Integration:
From Operational Legacy to Active Knowledge

Analog Steps:

Step 1: The Project Closure Ritual

At the end of every significant project or initiative (regardless of success), the team gathers. The goal isn't to assign blame, but to answer key questions: What was the initial hypothesis? What unexpected things did we learn? Why did we pivot at that specific point? What mental models limited or propelled us? This ritual transforms experience into explicit knowledge.

Technological Facilitation via SDI Platform:

The platform provides guided templates and frameworks for these sessions. A facilitator (or project leader) can use the platform in real-time to document responses, following a structure designed to capture the most relevant learnings. This ensures the information is consistent and comparable across different projects.

Step 2: Knowledge Synthesis and Curation

A specific role within the organization (the systemic designer) is tasked with taking the raw notes from these sessions and "translating" them into a coherent, easily digestible "project story." Superfluous details are removed, and key lessons, patterns, and "gems" of knowledge are extracted.

The platform uses AI tools for semantic analysis and automatic tagging. When notes are uploaded, the AI can suggest tags (e.g., "business model failure," "user adoption success," "regulatory barrier"), identify recurring patterns, and connect the story with other similar projects in the database, automating much of the curation work.

Step 3: Active Archive Consultation

Before starting any new project, the innovation team's first step is to consult the archive. It becomes part of the standard process to research what the organization (and others in the network) has done in the past in similar domains. This is done through conversations, reading previous project reports, and speaking with project participants.

The platform transforms this consultation into a process that takes seconds. Through a smart, conversational search interface, users can ask complex questions in natural language (e.g., "Show me all service projects for the elderly that failed due to technology adoption issues"). The platform doesn't just return documents; it can synthesize key findings from multiple sources.

Step 4: The Feedback Loop

The knowledge extracted from the archive informs the new project's hypothesis. In turn, once this new project concludes, its learnings are documented and reincorporated into the archive, enriching the collective knowledge. It's a learning cycle that strengthens with each iteration.

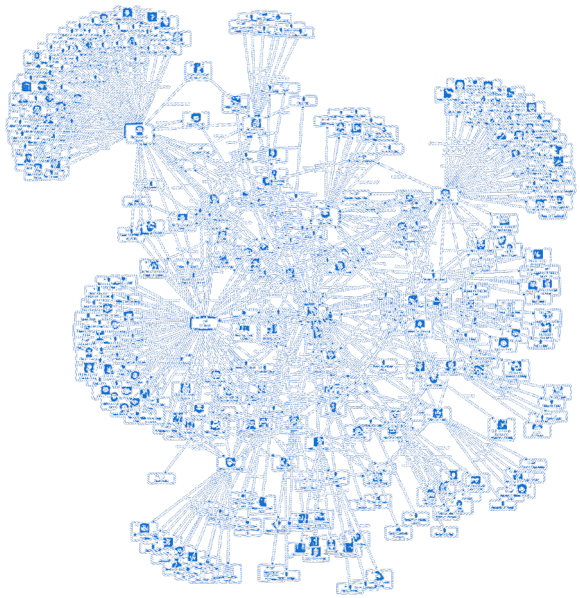
The platform automates this feedback loop. When a new project is initiated on the platform, it can "recommend" relevant past projects. Upon completion, the platform notifies the team to carry out the documentation process, ensuring the learning cycle remains active and doesn't solely depend on individual discipline.

2. Resource Map (Awareness Module)

Needfinding Insight:

As revealed in our research, there's a common need among organization managers to identify and leverage readily available resources within their local area that often go unnoticed. By operating in a "bubble," many businesses become isolated from the activities, flows, and trends that impact their industry, both positively and negatively.

This results in a constant lack of information and intermittent engagement with the environment, making it hard to spot and seize opportunities when they arise.



Mapear recursos, Nota. Adaptada de Social Network [Diagrama], por N. Cummings, 2010, Flickr (https://www.flickr.com/photos/chanceprojects/4388266976). CC BY-SA 2.0.

Functionality:

This module allows organizations (MSMEs, NGOs) to map their own value networks, identify key local actors (other businesses, research centers, cooperatives, underutilized resources like industrial waste), and visualize the flows of matter, energy, knowledge, and capital. The platform doesn't just display static data; it illustrates the relationships and flows between system nodes.

At its core, this module aims to facilitate community asset mapping. In its analog form, this involves facilitated workshops where local stakeholders (businesses, NGOs, citizens, local government) collaboratively identify and list available resources;; ranging from residents' skills and underused spaces to industrial waste that could serve as raw material for another process. It's an exercise in collectively "seeing" one's own territory with fresh eyes.

The technological platform acts as a catalyst for this process. It's envisioned as a visual and interactive Software-as-a-Service (SaaS) tool, built on georeferenced and, ideally, open-source databases.

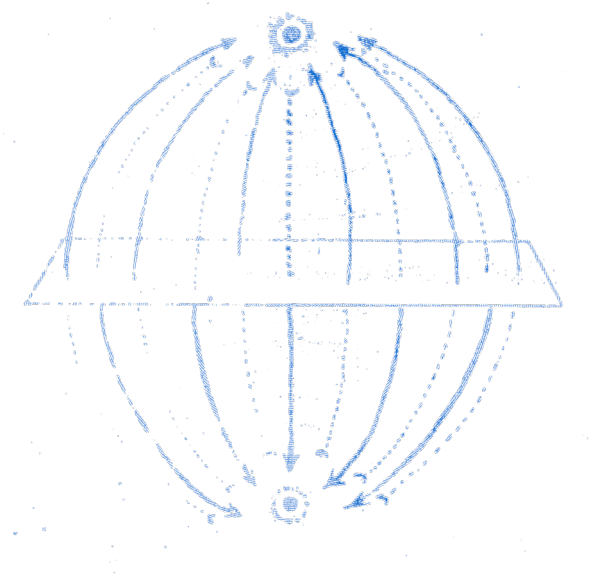
Value proposition:

This tool democratizes and significantly reduces the cost of the first phase of systemic diagnosis (Awareness). It enables businesses to "see themselves" within their real context, uncovering connections, synergies, and collaborative opportunities that were previously invisible or too expensive to identify.

3. Challenges and Opportunities Marketplace (Collaboration Module)

Needfinding Insight:

The diagnosis highlighted the "Academia-Industry Relevance Gap" as a key dysfunctional loop. Industry struggles to find applicable knowledge, while academia often generates knowledge that doesn't find a path to impact. The ecosystem lacks an efficient mechanism to connect a concrete need with an existing capability if they aren't within the same immediate network.



Intercambio, Nota. Adaptada de "Fig. 71", una ilustración del libro A New Concept of the Universe (1953) de Walter Russell. La imagen fue recuperada de la página de Flickr del usuario esaruoho (2008).

Functionality:

This module is designed as a dynamic marketplace where companies can post "Systemic Challenges" they can't solve alone. For example, a company might post, "We need 100% compostable packaging for our product that meets European regulations," or "We're looking to valorize 3 tons of organic waste from our production monthly." On the other side, academia, startups, and other NGOs can respond with "Opportunities"; such as a new biomaterial developed in a lab, a cooperative logistics model for waste collection, or expert knowledge in industrial composting. The platform facilitates the matchmaking between needs and capabilities.

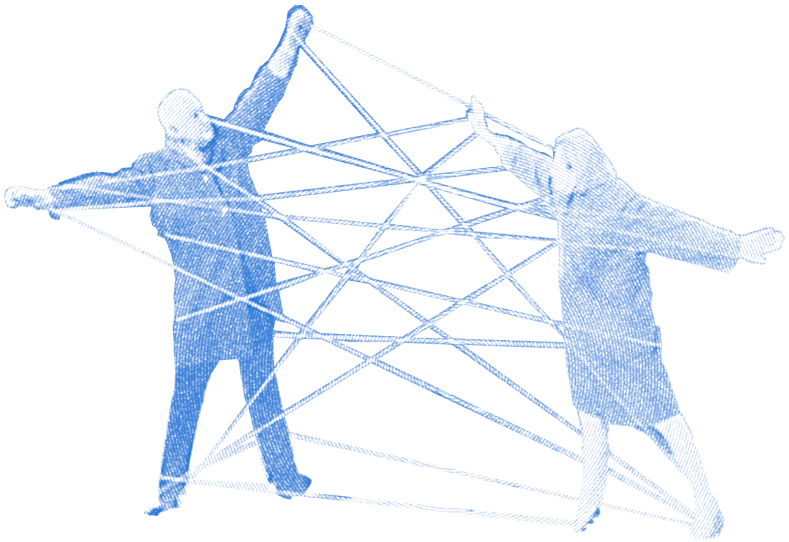
Value proposition:

This module aims to bridge the academia-industry gap in a practical, action-oriented way. It creates an efficient marketplace for applied knowledge, facilitating the formation of autopoietic alliances based on real needs and complementary capabilities. It allows actors to look beyond their immediate network and find the ideal partner for specific innovations, regardless of their geographical location.

4. Business Model Digital Twins (Transformation Module)

Needfinding Insight:

Aversion to risk and the fear of failure, especially acute in resource-limited MSMEs, are cultural barriers that inhibit radical innovation. Experimenting with new collaborative business models is perceived as too costly and complex, leading organizations to remain in their operational comfort zone, even if it's inefficient.



Twins, Nota. Adaptada de Faire le point [Fotografía], por G. Garcin, 1999, sitio web del artista (http://www.gilbert-garcin.com/).

Functionality:

This module acts as a digital "sandbox" where alliances formed on the platform can model and simulate new collaborative business models. It includes templates for governance agreements, tools to simulate shared cash flows, and calculators to estimate the systemic impact (social and environmental) of their projects.

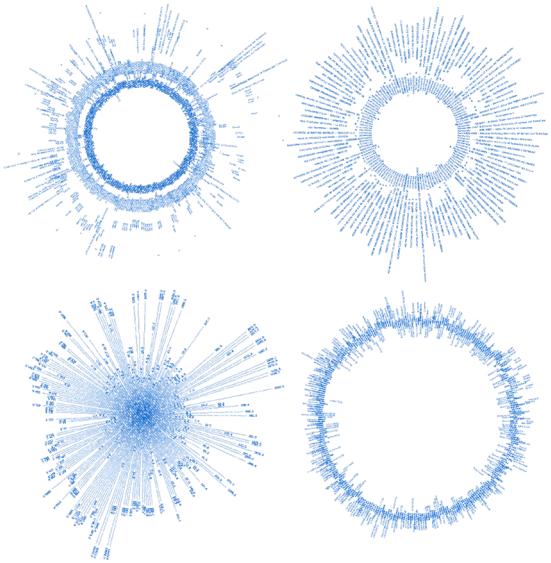
Value Proposition:

This module significantly reduces the risk and uncertainty of radical innovation by allowing experimentation and learning in a virtual environment before committing significant resources. It provides alliances with the tools to design not only the solution itself, but also the governance structures and business models that will sustain long-term collaborative change.

5. Systemic Value Dashboard (Measurement Module)

Needfinding Insight:

The Wicked Dynamic persists because the system is set up to measure and reward only one type of value: financial. Without a credible, standardized, and accessible way to measure impact on other capitals (Human, Social, Knowledge), any talk about "purpose" or "triple bottom line" remains a statement of good intentions with no strategic weight in decision-making.



Visualizar, Adaptada de un gráfico del proyecto Intellectual Capital Report 2019 [descripción breve del gráfico], diseñado por Process Studio para FH Technikum Wien, 2019 (https://process.studio/works/intellectual-capital-report-2019/).

Functionality:

This module is a customizable dashboard that helps organizations track and report their progress using systemic value metrics. It integrates with existing accounting and management systems to automate data collection as much as possible. It presents key indicators across Resource Efficiency, Sustainable Growth, Organizational Resilience, and Adaptive Agility.

Value proposition:

This tool makes the new paradigm of success tangible and manageable. It provides the data needed for strategic decision-making aligned with a long-term purpose. It also facilitates transparent and credible communication with impact investors, conscious customers, and the community, proving that the organization doesn't just "say" it creates systemic value, but actually "measures" and "manages" it.

Nota. Adaptada de "Figure 4. A reconfigured galaxy" [Diagrama], de D. W. Bernstein, 2014, Contemporary Music Review, 33(5-6), p. 562 (https://doi.org/10.1080/07494467.2014.998419). La figura es un análisis de la obra Cartridge Music de John Cage.

The SDI model proposes a measurement approach that evaluates the health, resilience, and adaptive capacity of the system as a whole. It achieves this through a comprehensive scorecard that monitors Key Performance Indicators (KPIs) across five interconnected dimensions. Together, these dimensions offer a complete view of Systemic Benefit-Value.

Overall, this dashboard of indicators provides a holistic and dynamic view. It allows an SDI-guided organization to measure what truly matters: not just the benefit it extracts, but the value it creates for the entire system.

Human Capital and Culture

This dimension measures the health of the primary engine of innovation: its people. It assesses whether the organization fosters an environment that cultivates talent and promotes a culture conducive to experimentation and collaboration.

Key Talent Retention Rate

This measures the percentage of high-performing employees with critical skills who remain in the organization over a specific period. High retention indicates robust Human Capital.

Employee Satisfaction and Engagement Index (eNPS)

This evaluates the level of employee engagement and loyalty, a prerequisite for an innovative and collaborative culture.

Investment in Training and Development per Employee

This quantifies the organization's commitment to developing its team's skills, serving as a direct indicator of investment in Human and Knowledge Capital.

Psychological Safety Index

This measures (through anonymous surveys) employees' perception of safety in expressing ideas, disagreeing, and admitting mistakes without fear of reprisal. It forms the foundation of internal Social Capital.

User Experience and Market Adaptation

This dimension evaluates whether innovation is generating real value for its users and if the organization can adapt to changing market dynamics.

Net Promoter Score (NPS) and Customer Satisfaction (CSAT)

These measure customer loyalty and satisfaction, respectively, providing a direct pulse on the perception of value delivered.

Customer Lifetime Value (CLTV)

This calculates the total value a customer brings during their relationship with the company, indicating the ability to build long-term relationships (Social Capital) rather than one-off transactions.

New Feature/Service Adoption Rate

This measures how quickly and effectively customers adopt new innovations, validating their relevance and utility in the market.

Operational Efficiency and Innovation

This dimension measures the organization's capacity to execute its processes efficiently and to continuously translate ideas into tangible results.

Innovation Rate (% of Novelty)

This measures the percentage of revenue derived from products or services launched in a recent period (e.g., the last 3 years). It's a direct indicator of innovative vitality, but adapted to the entire process, not just the launch.

Innovation Cycle Time (Idea-to-"Market")

It measures the time it takes for an idea to transform into a product or service launched on the market (or not), evaluating the agility and efficiency of the process.

Resource Efficiency (Material and Energy)

Instead of just measuring costs, this evaluates the optimization of natural resource use and waste reduction. It's a key indicator of circular design and sustainability.

Stakeholder Value and Sustainability

This dimension explicitly broadens the focus, measuring an organization's impact on its wider ecosystem.

Social Return on Investment (SROI)

This is a methodology for measuring the extra-financial social, environmental, and economic value generated, translating the impact into a monetary ratio.

Customer Lifetime Value (CLTV)

This calculates the total value a customer brings throughout their relationship with the company. It indicates the organization's ability to build long-term relationships (Social Capital) rather than focusing solely on one-off transactions.

Carbon Footprint Reduction

These are quantitative indicators of the direct environmental impact of an organization's operations and products. It's a key measure of progress towards sustainability goals.

Supply Chain Resilience Index

This evaluates the diversification and strength of relationships with suppliers, measuring the system's vulnerability to external shocks and its capacity to adapt to disruptions.

B Impact Score

For B Corporations, this is a standardized and audited metric that evaluates the company's performance across five areas: governance, workers, community, environment, and customers. It provides a comprehensive view of overall systemic impact.

Strategic Financial Performance

This dimension doesn't eliminate financial metrics; instead, it recontextualizes them, focusing on those that reflect long-term sustainability and strategy.

Diversification of Revenue Streams

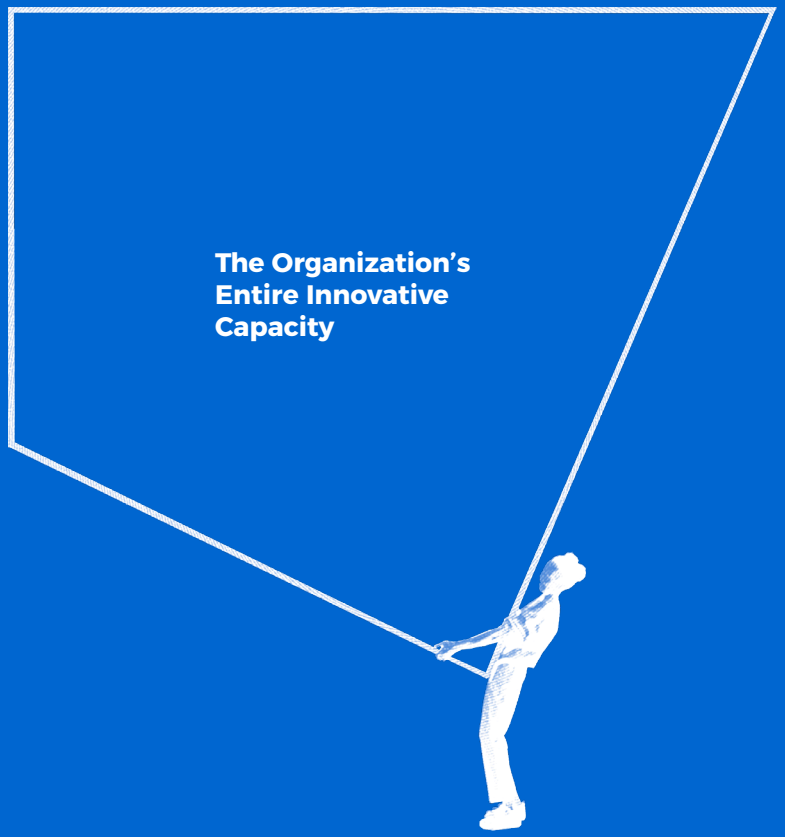
This measures the percentage of revenue generated from different product lines, services, or markets. It's a key indicator of financial resilience.

Customer Acquisition Cost (CAC) vs. Lifetime Value (LTV)

The ratio between LTV and CAC (LTV/CAC) is a powerful indicator of a business model's sustainability. A healthy ratio (typically >3) suggests that value is being created efficiently.

Profit Margin per Sustainable Product Line

This allows for evaluating whether innovations with a clear sustainability component are also financially viable, thereby validating the regenerative business model.



Nota. Adaptada de
Side view of young woman carrying large red block [Fotografía], por K. Vedfelt, 2020, Getty Images (https://www.gettyimages.com.mx/detail/foto/side-view-of-young-woman-carrying-large-red-imagen-libre-de-derechos/1227305034).

It's crucial to emphasize that the proposed SDI platform modules, while presented as a new solution to the Wicked Dynamic, don't emerge from a theoretical vacuum. They are, in fact, the formalization and systematization of practices already being carried out by the most resilient and innovative organizations.

Currently, companies that successfully navigate the complexity of the WD do so precisely through representations or analog prototypes of these very functionalities, albeit on different scales and with different mechanics.

These practices, in their current market state, are fundamentally "artisanal." They rely heavily on the Human Capital of exceptional individuals: leaders with a systemic vision, designers with facilitation skills, managers with deep networks, and on Social Capital built through years of trusting relationships.

Organizations build their own "cultural archives" within their team's memory, differentiating themselves and acquiring unique identities. They map their resource ecosystems through intuition and experience, and experiment with new business models, assuming high costs and risks. These processes are precisely what grant them value and sustain their competitiveness in a hostile market.

However, this dependence on individual talent and non-scalable processes constitutes their primary vulnerability. The SDI platform proposal doesn't seek to invent these practices; rather, it aims to build the infrastructure to enhance, democratize, and make them more resilient. The goal is to transform what is today an art dominated by a few into a systemic capability accessible to many, reducing reliance on individual heroism and strengthening the ecosystem as a whole.

6. The Role of the Systemic Designer as a Manager of Transformation

Implementing this roadmap and ensuring the platform's success hinges on a fundamental redefinition of the designer's role. They can no longer be a reactive service provider, hired at the final stages to "beautify" an already defined solution. They must become a strategic leader, a transversal participant throughout the entire innovation cycle, serving as the fundamental support for the process within the organization.

Within the SDI framework, the designer is a multifaceted actor embodying different roles in each phase, directly responding to the ecosystem's challenges:

In the Awareness Phase, The designer is the Cartographer of Complexity

Their main skill here isn't creativity in the traditional sense, but synthesis. They're the expert at translating overwhelming amounts of quantitative and qualitative data, along with actors' perceptions and mental models, into clear, understandable visual maps. Their job is to make the invisible visible, allowing the system to see itself for the first time and grasp the roots of its own dysfunction.

In the Collaboration Phase, The designer is the Architect of Participatory Processes

Their focus shifts to designing human interactions. They facilitate co-creation workshops, build the trust and psychological safety needed for honest dialogue, and ensure all voices, especially the most marginalized, are heard and integrated. Their job is to build the relational bridges over which collaboration will flow and collective intelligence will emerge.

In the Transformation Phase The designer is the Catalyst and Custodian of the System

At this stage, their role is to help change materialize and endure. They prototype new business models, design new internal rituals and processes that will embed the systemic culture, and help communicate the new value narrative. Their job is to cultivate the conditions for the system to sustain itself autonomously and healthily in the long term.

Competency Matrix for the Systemic Transformation Manager

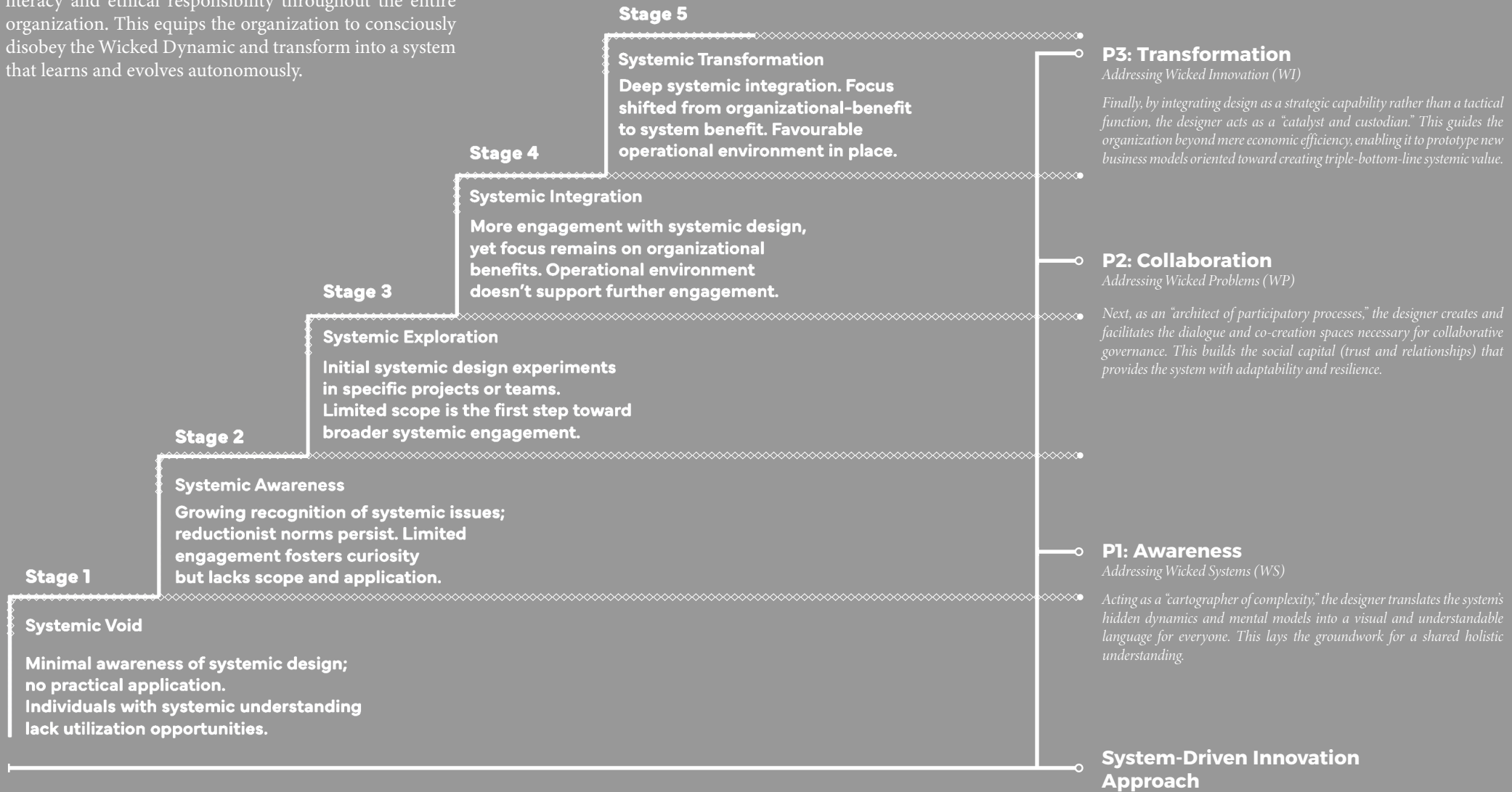
To achieve this structural redefinition, the designer must strengthen a specific set of capabilities. The following matrix details the key skills and methodological tools for each phase of the SDI intervention, serving as a reference framework for evaluating and developing this new role.

SDI Phases	*Designer's Role in SDI*	*Key Skills*	*Methodological Tools*
A. Awareness	*Cartographer of Complexity*	*Analytical thinking, visual synthesis, active listening, and both qualitative and quantitative research are crucial. They use these to dissect complex information and present it clearly.*	*Systems mapping, causal loop diagrams, the Iceberg Model, and Value Network Analysis.*
B. Collaboration	*Architect of Participatory Processes*	*Facilitation, co-design, empathy, negotiation, and consensus-building are paramount. These skills enable them to foster effective collaboration among diverse stakeholders.*	*Co-creation workshops, empathy mapping, the design of Communities of Practice, and governance modeling*
C. Transformation	*Catalyst and Custodian of the System*	*Adaptive leadership, rapid prototyping (of models, not just products), storytelling, and change management are vital. These allow them to drive and sustain profound systemic transformations.*	*Business model prototyping, balanced scorecards, the design of organizational rituals, and strategic communication.*

Table 5: SDI Systemic Designer Skills, Note: This table is an original creation.

The Designer's Role in the Systemic Maturity Scale

The systemic designer is the fundamental catalyst for an organization's advancement along its systemic maturity scale. Through this continuous process, the designer doesn't just implement solutions; they foster systemic literacy and ethical responsibility throughout the entire organization. This equips the organization to consciously disobey the Wicked Dynamic and transform into a system that learns and evolves autonomously.



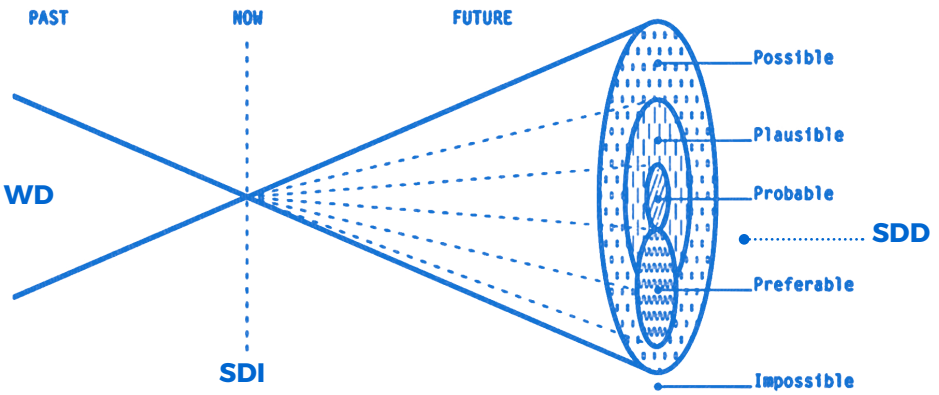
Nota. Tomado de "Figure B" (System maturity scale), de A little booklet on systemic design (2024), por E. Saarelainen.

6.1. The Value of Investing in SDI: From Risk Management to Systemic Value Creation

Adopting the SDI model and its roadmap isn't just an academic exercise; it's a strategic investment decision. However, for an organization to commit to this path, it needs to understand the value it generates. The investment logic behind SDI fundamentally differs from traditional venture capital or project evaluations based solely on financial ROI. Instead of a high-risk bet on a single outcome, investing in models like SDI is a deliberate process of reducing systemic risk and creating holistic, resilient value (Rockefeller Philanthropy Advisors, 2025).

The Systems Thinking for Impact Investing Primer (Rockefeller Philanthropy Advisors, 2025) provides an excellent framework for understanding this new logic. It argues that systems thinking offers an "imperative opportunity" for investors to enhance their strategies, moving from individual transactions to unlocking "deeper, broader, and more lasting positive impact," thereby re-framing risk and responsibility at the system level. This approach resonates with the need for "patient capital," a model that prioritizes long-term impact and financial sustainability over immediate financial returns, especially relevant for social innovation (Acumen, n.d).

The SDI model operationalizes this opportunity. Each phase of the roadmap is designed not only to generate an outcome but to build the capitals (Financial, Human, Social, Knowledge) that strengthen an organization's adaptive capacity:



Nota. Adaptada del diagrama del "Cono de Futuros", propuesto por J. Voros, 2003, del artículo "A generic foresight process framework", Foresight, 5(2).

Investing in Awareness Reduces the Risk of Developing Irrelevant Solutions

The initial investment in the Awareness phase is essentially an investment in intelligence and risk reduction (de-risking). By funding the time and facilitation needed for systemic mapping and value network analysis, the organization isn't just generating a product; it's gaining something far more valuable: a deep understanding of its own ecosystem. This helps avoid costly Wicked Innovations that stem from poorly defined problems. The return on this investment is strategic clarity and the ability to identify true leverage points, where future investments will have the maximum impact with minimum effort.

Investing in Collaboration Reduces the Risk of Implementation by Building a Support Network and Distributing the Load

Here, the investment transforms. Instead of a single actor bearing all the risk of a project, the SDI model promotes co-investment within an Autopoietic Alliance. This principle of "sharing risks and benefits" is fundamental. Partners don't just contribute financial capital; they invest diverse resources: the MSME brings its market knowledge and agility, academia contributes its research rigor, and the NGO offers its social capital and community legitimacy. This is an example of how different forms of capital can be "strategically combined." The result is catalytic capital: the combined investment can unlock opportunities and address Wicked Problems that would be insurmountable for any individual actor. The risk is distributed, and the potential reward (the Systemic Benefit-Value) is amplified for everyone.

Investing in Transformation Reduces the Risk of Obsolescence by Creating a Culture of Continuous Learning

The investment in this phase is an investment in long-term capacity and resilience. It funds the construction of the organizational infrastructure (new roles, new processes, new metrics) that will enable the organization and its ecosystem to adapt and thrive continuously. This requires what in impact investing is called "longer time horizons" and "patient, flexible capital." The return isn't a profit spike in the next quarter, but the building of a lasting competitive advantage based on the ability to learn faster than the competition and co-evolve with the environment.

This model aligns with emerging "systemic investing" practices, which aim to transform entire systems to produce long-term results for people and the planet (Center for Sustainable Finance and Private Wealth, 2025).

Therefore, investment in SDI shouldn't be measured by the short-term return of a single project, but by the system's increased capacity to thrive in uncertainty. It's about a transition from managing reactive failure to proactively stewarding resilience.

To evaluate the value of this investment, new perspectives, aligned with a systemic vision, must be adopted:

From ROI to Return on Resilience

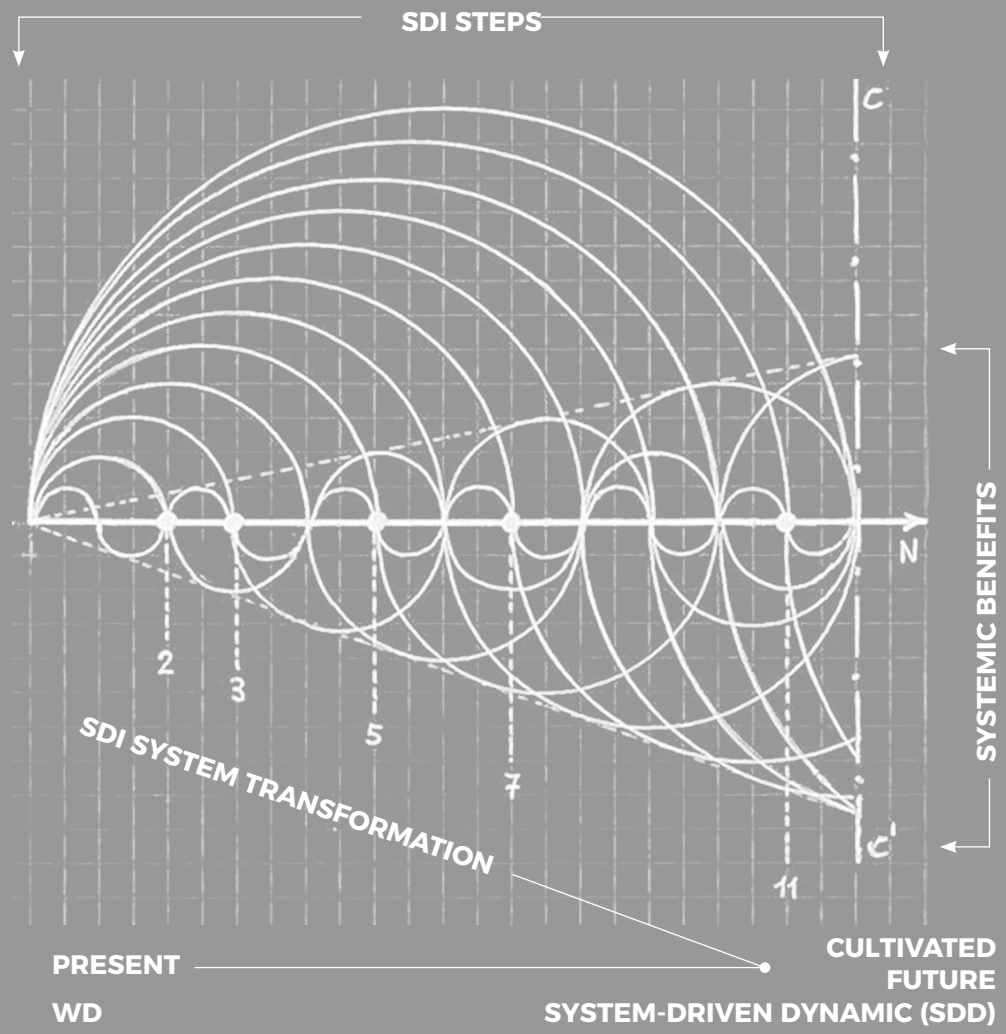
Success isn't measured solely by financial returns, but by the increase in the system's resilience. Metrics like the diversification of revenue streams, reduced dependence on a single supplier or customer, and the strength of collaborative alliances become key performance indicators (Sheffi, 2015; Lengnick-Hall et al., 2011).

From Attribution to Contribution

In a complex system, it's nearly impossible to "attribute" a result to a single cause or investment. SDI adopts a logic of contribution. The question isn't "What part of this success is mine?" but "How has our investment contributed to the overall health of the ecosystem?" This shift in mindset fosters collaboration instead of competition for credit, strengthening the system's fabric.

Valuing Social and Knowledge Capital

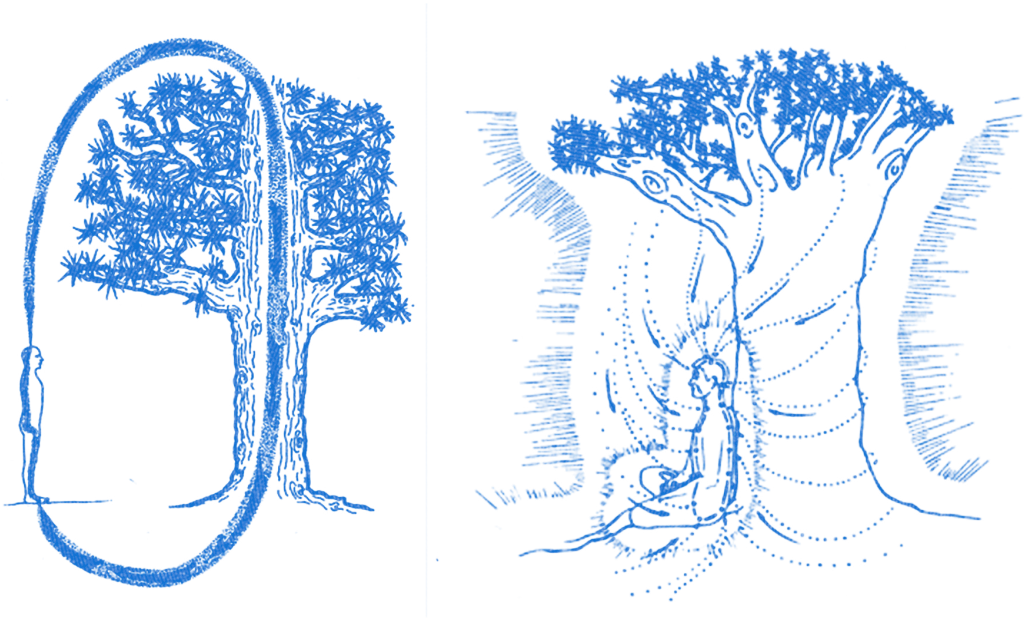
Investing in SDI creates assets that don't appear on a traditional balance sheet: trust among actors, shared knowledge, and the ability to collaborate effectively. These intangible assets are, however, the most potent source of resilience and future innovation. Their value, though difficult to quantify, is the true engine of long-term sustainability.



Nota. Adaptada de un diagrama que ilustra la secuencia de los números catalanes, por N. Berry, 2013, del post de blog "Catalan numbers" (Data Genetics, http://datagenetics.com/blog/august12013/index.html).

In essence, investing in the SDI model means investing in a system's ability to thrive amidst uncertainty. It's a strategy that recognizes the long-term health of the individual part (the organization) is inseparable from the health of the whole (the ecosystem). By sharing risks, benefits, and, critically, a common purpose, organizations adopting SDI don't just become more profitable and sustainable; they transform into active custodians of the vitality of the systems they depend on.

7. Conclusion:
Towards Innovation and Design-Conscious Systems



Aware of and integrated, Nota. Adaptada de las Figuras 2-34 y 2-35 del libro The Alchemist's Tao Te Ching, por M. Chia. Recuperado del artículo "How to befriend a tree", s.f., Dharma Cafe.

This thesis has deliberately charted a course, an intellectual and practical journey that has moved from diagnosing a deeply rooted systemic dysfunction; the Wicked Dynamic, to designing a transformative intervention. This journey has not been merely descriptive but propositional, seeking to unravel the underlying causes of stagnation and vulnerability in organizations and offer a viable counterpoint.

The Wicked Dynamic, characterized by its cycle of reactivity, resource depletion, and strategic myopia, has been identified not as individual failure but as an emergence of organizational design patterns that prioritize short-term efficiency over long-term resilience and adaptability.

The SDI Roadmap and the conceptualization of System-Driven Innovation (SDI) projects should not be interpreted as prescriptive or universal solutions, but as a scaffold, a framework, and, more importantly, a philosophy of action.

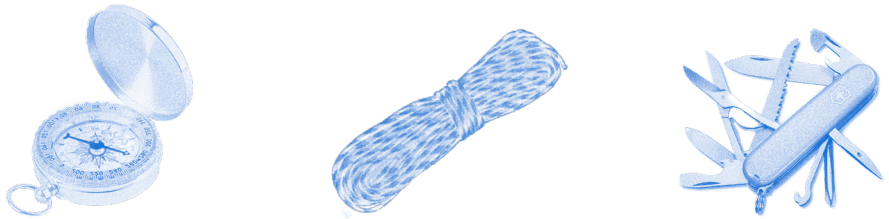
They are an invitation to conscious experimentation and continuous co-creation. They represent the conviction that it is possible to build an alternative for those organizations, especially MSMEs and B Corporations, that seek not only to survive but to thrive by cultivating their own resilience.

For MSMEs, often constrained by resources and exposed to market volatility, SDI offers a way to institutionalize innovation without incurring large investments. For B Corporations, with their inherent commitment to triple impact (people, planet, prosperity), SDI provides a framework to integrate innovation in a way that amplifies their systemic purpose, transcending mere corporate social responsibility to become a driver of regenerative change.

The objective of this research has not been to provide a map with a fixed destination, but a compass and a set of tools to navigate the inherent complexity of current dynamic environments, allowing each organization to chart its own course toward vitality and relevance.

The analysis presented throughout this thesis compels us to confront an inescapable truth: to escape the Wicked Dynamic, it is not enough to try harder, faster, or with greater efficiency within the same linear structures. That is, in itself, a symptom of the problem, a first-order trap that perpetuates the cycle. A fundamental paradigm shift is required, a qualitative leap that is, in essence, an act of conscious, "second-order design."

1 - AWARENESS **2 - COLLABORATION** **3 - TRANSFORMATION**

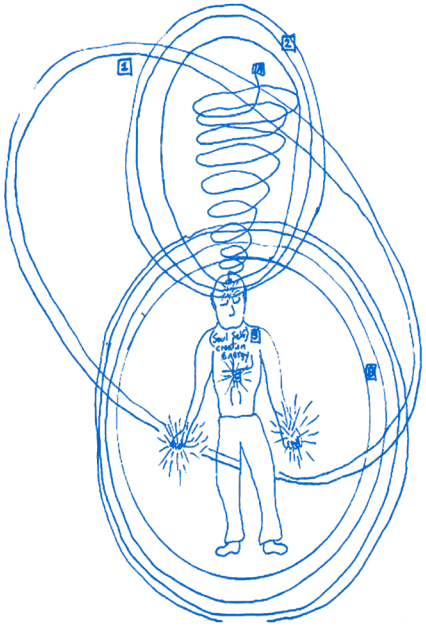


Herramientas de: Awareness - Collaboration - transformation para la supervivencia.

The accumulated evidence compels us to transition from the reactive management of problems; where organizations act like firefighters extinguishing blazes, to the proactive stewardship of resilience; where they anticipate and adapt to disturbances, and even transform them into learning opportunities.

It urges us to move from the short-term extraction of value which depletes resources and relationships towards the regenerative creation of systemic value where value is generated circularly, benefiting all actors in the ecosystem and the environment.

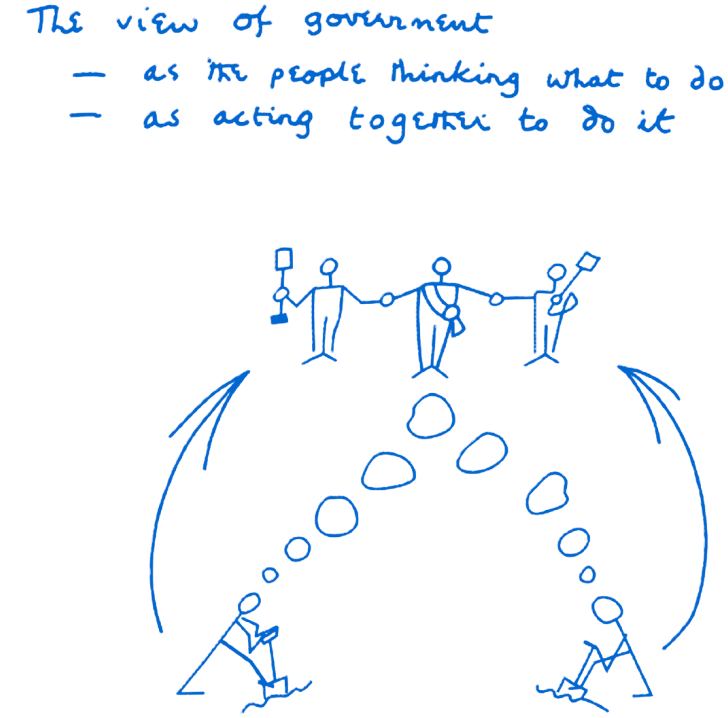
And, crucially, it pushes us from the relegation of design to a cosmetic and superficial service (a layer of varnish over already made decisions) towards its integration as a central strategic capability, a driver of decision-making and organizational configuration from its foundations. This is not merely process optimization; it is an ontological reconfiguration of what we understand by "value," "organization," and "innovation," redefining their limits and possibilities.



Nota. Adaptada de "Diagram 2" (2005) del libro Breaking Free of Earth's Gravity, por A. Vela. Recuperado de la página web del autor, s.f. (AuraBlueAngel).

In this new paradigm, a re-defined and vital role emerges for the designer. They are no longer the technician who executes a predefined solution, but the leader who facilitates the emergence of solutions, co-creating with the system and its actors. By acting as a manager of autopoietic innovation, the designer becomes an architect of the conditions for possibility: the gardener who cultivates the soil of trust through radical transparency and genuine participation, who designs the channels for knowledge to flow through collaborative platforms and continuous feedback loops, and who protects the ecosystem so that collaboration flourishes, creating safe spaces for experimentation and constructive failure.

This is a stance that demands not only new and complex skills (synthesis of complex information, facilitation of difficult dialogues, adaptive leadership in uncertainty) but also a deep ethical commitment. It is the awareness that every act of design is a political act that shapes realities, distributes power, and defines futures, and the stoic decision to assume that responsibility (See note A diagram), not with the arrogance of control, but with the humility of one who serves the vitality of the system.



Nota A. Adaptada de un diagrama sobre la relación entre el gobierno y las personas, del libro Brain of the firm (2. ed., p. 248), por S. Beer, 1981, John Wiley & Sons. Copyright 1981 por John Wiley & Sons.

It is accepting that our work (As designers) is not just to create artifacts, but to weave the relationships and narratives that will allow a more desirable future to emerge.

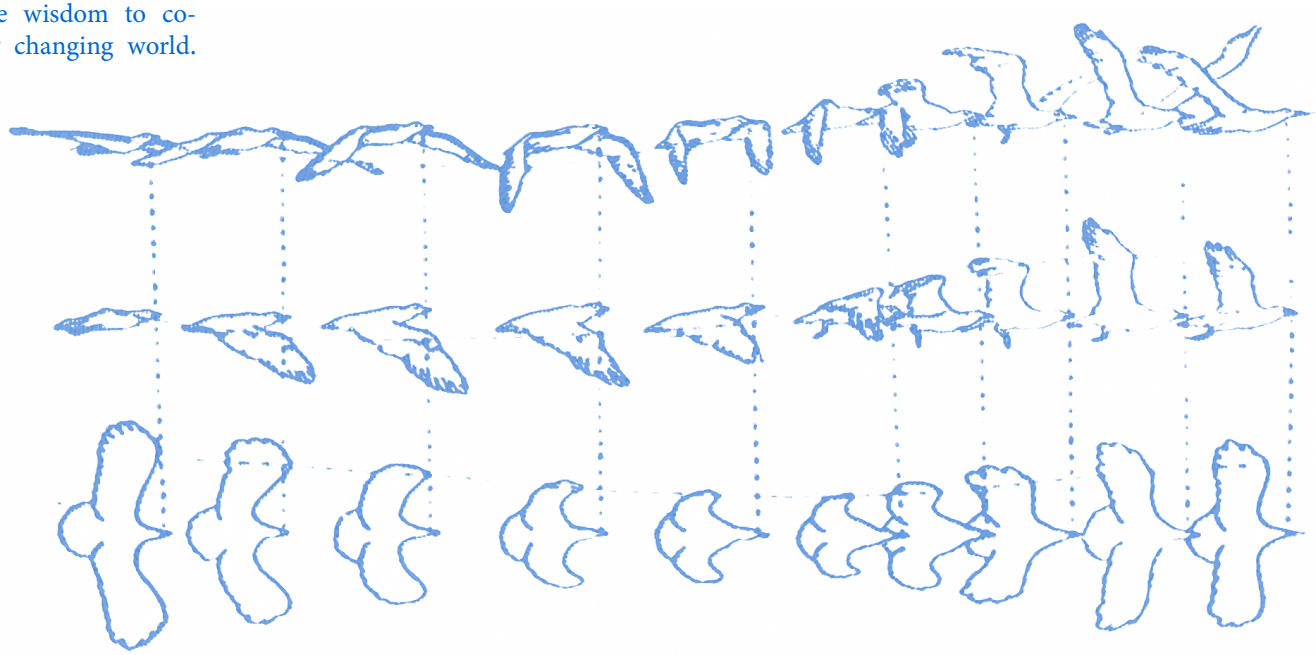
The final proposal of this thesis is, therefore, an invitation to action, based not on blind faith in technology or magical solutions, but on a deep understanding of living systems and a hopeful vision of their potential. Hope here is not naive optimism that ignores challenges, but a conviction born from the understanding that living systems, including our organizations and societies, are inherently innovative and possess a latent capacity for regeneration.

One only needs to observe the resilience of nature to understand this truth. Our current crises are not an inevitable destiny, but the result of a failed design logic that we ourselves have imposed upon them, prioritizing fragmentation and exploitation.

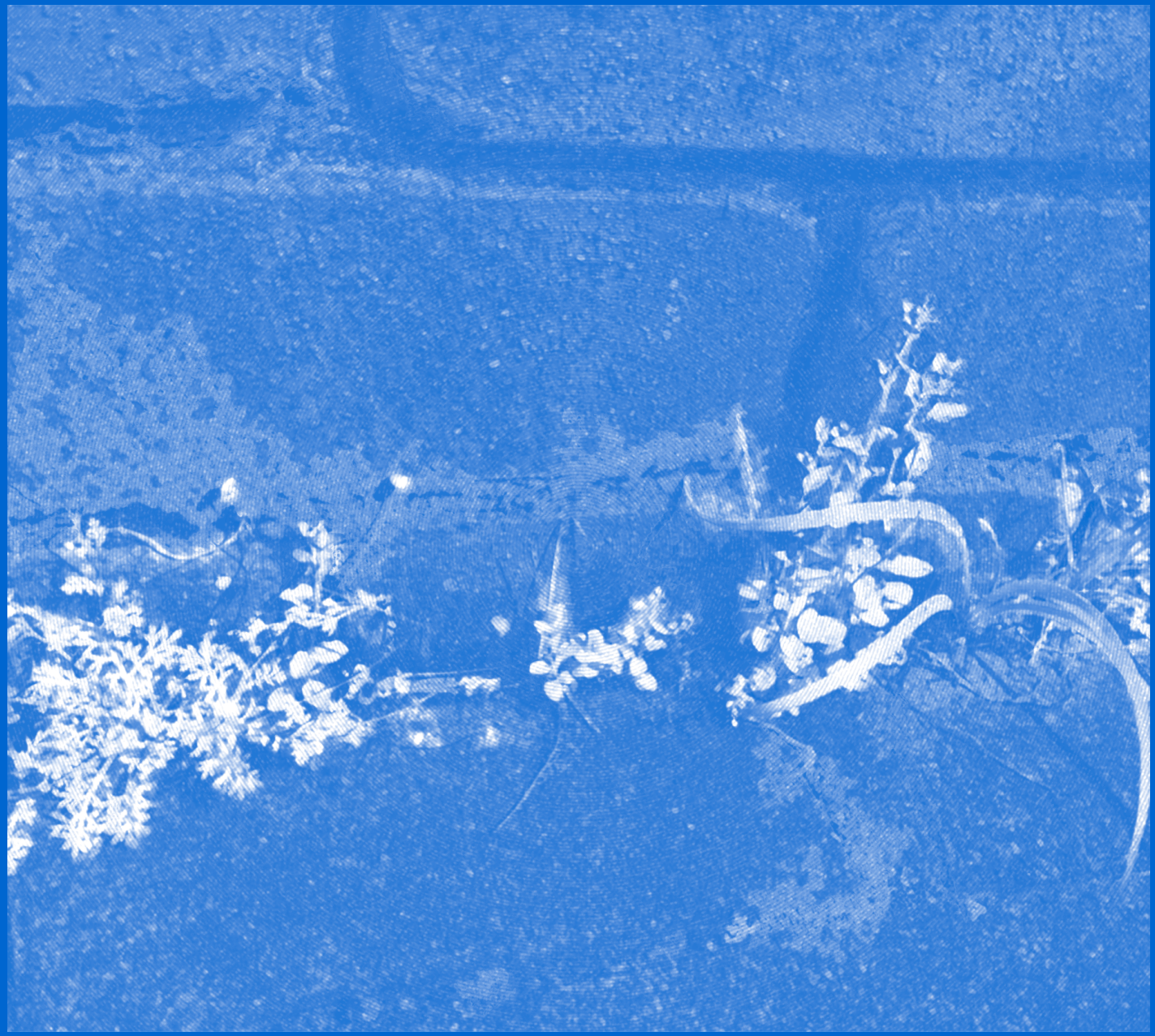
The true competitive advantage and prosperity in the 21st century will not come from efficiency in executing predefined solutions, but from the wisdom to co-create systems that can learn, adapt, and thrive in a constantly changing world.

Using design to design systems that learn to design better futures for themselves is not just an opportunity; it is the imperative of our time.

The task that now calls us, as leaders, managers, and designers, is to commit to becoming the architects of those possible futures, building organizations that not only survive but flourish and contribute to a broader systemic well-being.



Nota. Adaptada de "Tableau synoptique des attitudes successives d'un Goéland au vol projetées sur trois plans différents" (Fig. 102), por E.-J. Marey, 1890, de Le vol des oiseaux. Physiologie du mouvement (p. 173). La obra se encuentra en dominio público.



The natural thing is always to find a way.

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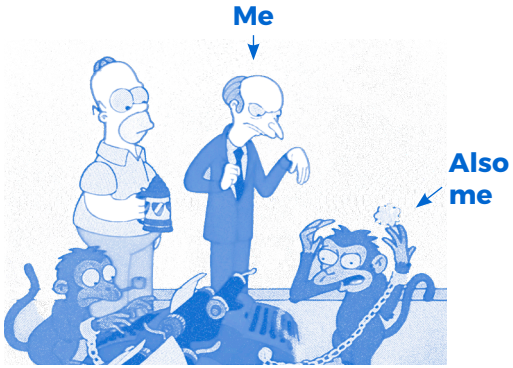

Este es el trabajo de mil monos con mil maquinas de esccribir, pronto habran terminado el modelo de innovación mas grande de la historia...

Veamos; "Innobavamos tan contentos...."
Innovavamos con B Grande?!. Mono tonto, estupido!.

Con cariño, José tomás.

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