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EDITORIAL

Architecting the Hybrid Mind: The Dual Mandate of Experimental Innovation

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The conventional approaches to innovation are proving inadequate. In today's world, marked by rapid technological advancements and complex challenges, we must critically reassess our understanding of technological innovation. A tension between two essential forces shapes the current landscape. On one side lies the "Structural Imperative", the overwhelming pressure to accelerate technology maturity, bridge the precarious "Valley of Death" between research and commercialization, and utilize robust, repeatable methodologies to systematize the creative process. This imperative drives the adoption of Artificial Intelligence (AI), Deep Tech, standardized New Product Development processes (Cocchi et al., 2024), and complex funding instruments, such as the ATTRACT project (Vignoli & Wareham, 2024b). It demands that innovation be treated not as a random act of genius, but as a disciplined and measurable process capable of solving planetary challenges, such as climate change, aging societies, and food security (Vignoli & Wareham, 2024a).

On the other side lies the "Human Imperative", the critical need to safeguard and enhance the diverse and intrinsic cognitive capabilities of the workforce, specifically critical reasoning, creativity, and flexibility (Bogers et al., 2018), against the growing risk of cognitive offloading and dependency on algorithmic outputs. As we build tools that can "think" for us, we face the "Quiet Erosion" of the very cognitive abilities required to solve complex problems (Anonymous, 2025). The human mind, with its unique, diverse, and non-linear processing abilities, remains the only mechanism capable of true "sensing," or the ability to recognize novel connections in uncertain environments.

The articles in this issue suggest that the future of effective innovation does not lie in the dominance of algorithmic efficiency over human cognition, nor in rejecting automation. Instead, success depends on a "Hybrid Intelligence" model (Dellermann et al., 2019) where formal innovation processes are rigorously applied to speed up execution and reduce risk, while simultaneously leveraging linguistic and contextual diversity to create the "cognitive friction" necessary for high-quality decision-making. Consequently, the challenge for leadership is to design organizations that are ambidextrous—capable of balancing the closing behaviors required for efficiency and execution with the opening behaviors needed for exploration and creativity (Xi et al., 2025). Together, these aspects provide a comprehensive perspective on the journey of an idea, from a simple spark of cognitive potential to a transformative force that reshapes our world, starting with the most fundamental element: the innovator's mind.

STRUCTURING THE SPARK: A METHODOLOGY FOR MAKING THE ABSTRACT TANGIBLE

In the Methodological Note "From Abstract to Artifact: Using LEGO® SERIOUS PLAY® as an Experimental Methodology in Design Science", Opdenakker and Cuijpers (2025) argue for the "Material Turn" in innovation. The authors present LEGO® SERIOUS PLAY® (LSP) not as a game, but as a rigorous experimental methodology rooted in constructionism. The article introduces LSP as a tool built on a four-step iterative cycle: questioning, where a facilitator poses a challenge; constructing, where participants build 3D models using LEGO® bricks; sharing, where each person explains the meaning behind their model; and reflecting, where the group synthesizes the insights gained. This process is designed to foster co-creation and make tacit knowledge explicit by enabling participants to "think with their hands," moving beyond the conceptual "black box" where creative solutions are often mysteriously born.

By transforming abstract strategy into a physical artifact, LSP provides a structured method in Design Science for collaborative creation. This focus on structuring creative output leads logically to the next critical stage: developing those structured ideas into viable innovations ready for the market.

THE COGNITIVE CORE: CULTIVATING CONFIDENCE AND UNLOCKING NEW PERSPECTIVES

While methodologies like LSP provide external scaffolding for creativity, the internal engine remains

the human mind. It is a product of cognitive traits, such as flexibility, divergent thinking, and confidence, which we know can be nurtured (Velázquez et al., 2015). The research in this collection argues for the need to cultivate, measure, and utilize creativity and fundamental cognitive skills through structured means, contrasting this with the risk of losing those skills to over-reliance on technology. Creativity is emphasized as a crucial ability for addressing uncertain and complex challenges, particularly in higher education and in the context of the fifth industrial revolution. This section explores these foundational cognitive elements, revealing a mental landscape that is far more malleable than we might initially assume.

Drawing from "Personalised creativity development through design thinking," Jackson and colleagues (2025) present a pedagogical model for fostering creative confidence. The study proposes that the structured, iterative process of design thinking—empathising, defining, ideating, prototyping, and testing—can bridge the gap between an individual's latent cognitive traits and the development of a core belief in their own creative abilities. By engaging in a series of "small successes" within this framework, students move from viewing creativity as a fixed talent to understanding it as a trainable skill, thereby overcoming the fear of failure that so often stifles new ideas.

Complementing this perspective, Calvo and Goekoop's "The Effect of First and Second Language Use on Divergent Thinking in Problem Solving" (2025) investigates how a simple shift in cognitive context can unlock new creative pathways. The study's central argument is that for frequent users, thinking in a second language can be a distinct advantage. This linguistic shift provides a separation from the conditioned associations and emotional weight embedded in one's native tongue, which can increase cognitive flexibility—the ability to generate a variety of approaches—and originality. The mind, freed from its habitual patterns, can explore solutions that might otherwise remain unseen.

These findings present two powerful, complementary levers for enhancing cognitive capacity. Jackson's model provides a framework for building internal creative confidence through structured, deliberate practice. Calvo's work, in contrast, reveals the power of breaking external cognitive frames by shifting the linguistic context, proving that the boundaries of our thinking are often self-imposed artifacts of habit. From this internal, individual space of nurtured potential, we can then turn to the external, collaborative methods used to harness that creativity for collective action.

FROM IDEA TO IMPACT: THE DYNAMICS OF TECHNOLOGY VALORISATION

Once a creative solution is developed, it must overcome the challenge of transforming from a promising concept into a market-ready innovation. Many early-stage research inventions get stuck in the "funding gap," unable to progress due to their nascent stage. This section examines the specific mechanisms and dynamic capabilities that impact the effectiveness of this vital translation process, showing that success is not a matter of chance but rather the result of intentional, context-aware strategies.

In "What Drives the Effectiveness of Proof-of-Concept Projects?", Resio, Paolucci, and Marullo (2025) examine Proof-of-Concept (PoC) programs, which they define as critical learning instruments designed to advance the technology readiness of research inventions. Their analysis of 94 PoC projects moves beyond funding to identify two key dynamic capabilities that research teams must develop to navigate this phase successfully.

The paper's most critical insight is that the effective combination of these capabilities is contingent on the nature of the invention itself. The authors reveal that a one-size-fits-all approach is ineffective. For science-based inventions, which are grounded in fundamental knowledge, the priority must be on developing sensing capabilities to scan the external environment and identify the most valuable application. Conversely, for engineering-based inventions, which typically address specific needs within a defined market, the focus should be on seizing to align the invention with market requirements to gain legitimacy with potential partners. This nuanced understanding provides a robust framework for navigating the path from idea to impact. Still, it also raises a crucial question about the very tools we use in the process.

A CAUTIONARY REFLECTION: THE QUIET EROSION OF INGENUITY

Finally, this issue includes a profound counterpoint in our "IdeaSquare Coffee Paper" series. Titled "The Quiet Erosion", this manuscript serves as an artifact from a potential future, compelling us to examine whether the tools we use to assist our thinking are insidiously undermining it.

The manuscript's central metaphor is the Sorites Paradox, also known as the Heap Paradox. If you remove one grain of sand from a heap, is it still a heap? The process continues, "one grain at a time," until nothing is left, yet it is impossible to identify the single grain whose removal destroyed the heap. The article applies this concept to the gradual, imperceptible decline of human skills resulting from our increasing reliance on technology. The risk of cognitive outsourcing completely contrasts with this effort to build structure for creativity. Over-reliance on tools like calculators, GPS, and Artificial Intelligence (AI) can lead to the quiet erosion of fundamental skills, such as mental math, spatial awareness, and the ability to critically reason and solve complex problems.

The article's message is not a Luddite rejection of technology, but a crucial warning about the

consequences of outsourcing our thinking without awareness. This cautionary tale sets the stage for our concluding thoughts on the future of innovation.

THE FUTURE ARCHITECTURE OF EXPERIMENTAL INNOVATION

This collection maps the innovation lifecycle not as a series of discrete stages, but as a continuous architectural challenge. The journey begins in the cognitive substrate of the individual, where creative confidence can be methodically constructed. From this foundation, abstract thought finds tangible form through collaborative methodologies that translate internal vision into shared artifacts. Finally, this structured creativity is guided through the unforgiving gauntlet of market valorization, a process governed by distinct dynamic capabilities for sensing opportunity and seizing value. The conflict between "exploitation" (efficiency, execution, AI automation) and "exploration" (creativity, diversity, human reasoning) can be managed through Ambidextrous Leadership (Zacher et al., 2016). Ambidextrous leaders possess the ability to switch between "opening behaviors" (encouraging risk-taking, diversity, and divergent thinking) and "closing behaviors" (monitoring performance, setting goals, and enforcing efficiency).

This journey, however, is shadowed by the central challenge posed by "The Quiet Erosion." As we build ever-more-sophisticated tools to aid us, we are confronted with a critical question: How do we design and use these tools to augment human ingenuity without causing it to atrophy? This is the paradox at the heart of 21st-century innovation: the tools designed to accelerate innovation possess the latent capacity to degrade the human engine that invented them. The "Dual Mandate" is not a choice between the speed of execution and the depth of human cognition; it is a requirement to integrate them into a cohesive system.

Organizations that prioritize robust methodologies will successfully bridge the "Valley of Death" and accelerate technology maturity. However, those who fail to safeguard human cognitive abilities simultaneously face a "competence crisis." They risk creating a workforce that is dependent on algorithmic outputs they can no longer critically evaluate, trapped in homogenized thought, and without the mastery experiences necessary for deep skill retention.

The path forward lies in leveraging diversity—both linguistic and contextual—as a deliberate organizational choice. By fostering informational diversity, organizations stimulate the "Type 2" deliberative thinking that AI often bypasses (Allen & Thomas, 2011). Combined with Ambidextrous Leadership that balances exploration and exploitation (Xi et al., 2025), this approach ensures that formal processes do not stifle human creativity.

This issue does not offer easy answers, but it sharpens the questions we must ask ourselves as researchers, educators, and innovators. In looking toward the future, we leave the reader with two critical challenges that emerge from the synthesis of these works:

- What new experimental approaches can we develop to simultaneously structure the creative process while actively strengthening, rather than replacing, the core cognitive skills of innovators?
- As we rely more on AI for seizing opportunities—optimizing, executing, and scaling solutions—how do we ensure we do not erode our capacity for sensing—the foundational human ability to discover, explore, and perceive novel connections in the world around us?

The imperative for the experimental innovation community is therefore clear: we must architect the next generation of processes and tools with the explicit goal of preserving the cognitive agency of the innovator. The alternative is an erosion that will leave us with nothing but the illusion of progress. As we push the boundaries of scientific research and technological development, we must remember that innovation, at its core, is a human act. We invite you to explore these ideas further, perhaps over a coffee at IdeaSquare—a space dedicated to the "alchemy of ideas"—where the collision of human curiosity and structural rigor continues to spark the future.

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