ACM GreekCHI-CYCHI Symposium 2026

Designing Generative Friction: Retaining Human Sensemaking and Epistemic Governance in AI-Augmented Design Practice

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Abstract

The integration of Generative Artificial Intelligence (GenAI) into strategic design practice structurally reconfigures innovation processes. Situated within an ongoing doctoral research program, this study examines how frictionless interaction paradigms—frequently championed as "calm computing"—suggest a degradation of the abductive sensemaking capacity of design practitioners, inducing cognitive overreliance and strategic homogenization. To address this epistemic vulnerability and advance responsible human-computer interaction (HCI), this project proposes **Generative Friction** as a deliberate sociotechnical affordance. During its theoretical foundation phase, an Integrative Literature Review synthesized a curated corpus of 37 high-impact empirical and theoretical articles. The findings indicate that hyper-ergonomic GenAI interfaces catalyze heuristic processing and atrophy anticipatory reflective judgment. Furthermore, traditional retrospective bureaucratic controls prove ineffective, often driving design teams to adopt covert practices (Shadow AI) that expose organizations to systemic convergence. To counteract these dynamics and foster human-centered technological adoption, the research formalizes **the Double Relational Oscillation (DRO) model**, positing a dynamic equilibrium between algorithmic divergence and reflective human convergence. We argue that Epistemic Governance must be embedded directly at the HCI level through specific design affordances, such as ontological framing and semantic justification devices. By injecting procedural resistance, Generative Friction interrupts passive algorithmic assimilation, safeguarding the strategist's interpretive authority and ensuring that innovation remains ethical, sustainable, and anchored in human intentionality.

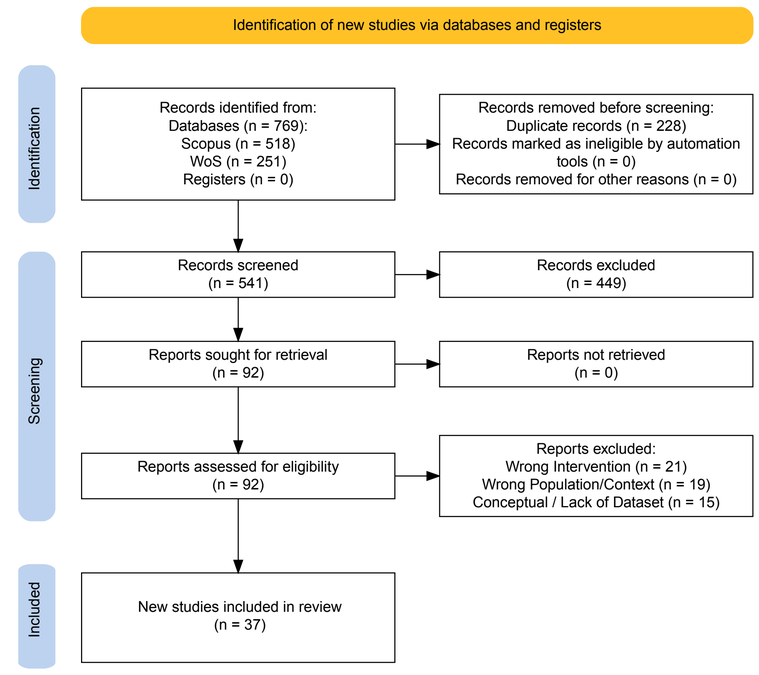


Figure 1. PRISMA 2020 flow diagram (Page et al., 2021) detailing the literature selection and screening process. The flowchart illustrates the sequential application of the PICOC eligibility matrix, evidencing the systematic exclusion of classic predictive solutionism to analytically isolate the sociotechnical impact of Generative AI on cognitive agency and Epistemic Governance (n = 37).

Background, Research Program, Stage of Research

Situated within the doctoral program at the Universitat Politècnica de València (UPV), this research addresses the structural tension between cognitive automation and decision-making in design ecosystems. The theoretical foundation has been consolidated through an Integrative Literature Review (ILR), delimiting the boundaries of Epistemic Governance. Following Institutional Ethics Committee approval, the research is currently transitioning into its empirical phase, initiating a qualitative Multiple-Case Study within the Valencian innovation ecosystem to audit how strategists retain interpretive authority when confronted with AI.

Research Objectives and Research Questions

The primary objective is to empirically analyze and validate how design teams apply human judgment to govern the stochastic outputs of the machine.

RQ1: How does the interactive hyper-fluency of Generative AI alter cognitive agency and the strategist's sensemaking in real-world organizational environments?

RQ2: What human-computer interaction (HCI) design mechanisms interrupt heuristic processing and establish effective Epistemic Governance?

Motivation, Relevance, and Connection to the State of the Art

The technology industry imposes the "calm computing" paradigm, designing generative interfaces oriented toward the total elimination of operational friction to maximize predictability (Guasselli, 2025). Sociotechnical literature warns that extrapolating this hyper-ergonomics to strategic design induces severe "algorithmic myopia": by delegating ideation to high-speed probabilistic systems devoid of situated understanding, the executive is exposed to profound cognitive overreliance (Keding & Meissner, 2021). This instrumental inertia masks an ontological asymmetry between the machine's syntactic processing, which leans toward statistical mimicry, and the human creation of embodied meaning, or sensemaking (Verganti et al., 2020). Retrospective bureaucratic policies prove inoperative against this immediacy, catalyzing covert practices (Shadow AI) that threaten to displace the discipline's reflective core toward a "shallow edit mode" (Parsons, 2026; Vallé et al., 2026).

Main Contributions to the Field

The conceptual framework formalizes **the Double Relational Oscillation (DRO) Model.** Grounded in enactive cognitive science, this framework reconceptualizes linear automation as a dialectical movement driven by two vectors: a centrifugal force of stochastic magnitude (algorithmic divergence) and a centripetal force of sensemaking (reflective human convergence). Under this paradigm, Generative Friction operates as an active resistance mechanism that safeguards reflective judgment.

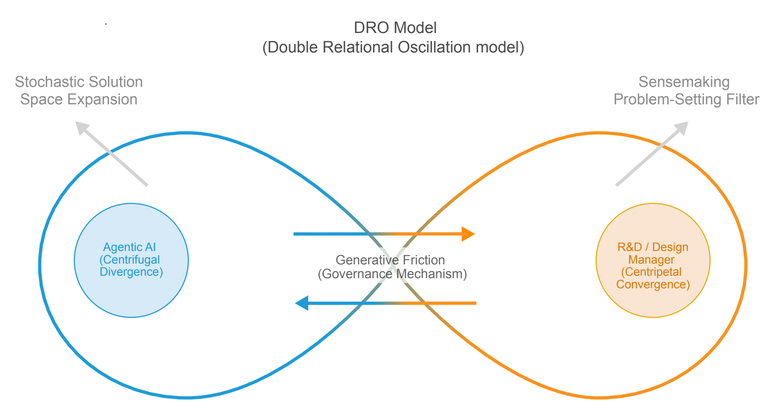


Figure 2. The Double Relational Oscillation (DRO) Model. This conceptual architecture illustrates the dialectical tension between the stochastic magnitude of Agentic AI (Centrifugal Divergence) and the retention of problem-setting by the human strategist (Centripetal Convergence). Within this paradigm, Generative Friction operates as the core governance mechanism that interrupts passive assimilation, forcing a contextual evaluation filter prior to design convergence.

Innovation Potential, Applications, and Advancement of Current Knowledge

The substantive advancement lies in shifting Epistemic Governance from administrative committees directly to the human-computer interface architecture. This intervention redefines the contemporary strategist's value: transitioning from an instrumental problem-solver to a critical curator. By embedding procedural resistance, the framework facilitates the preventive unmaking of stochastic outputs, ensuring that design reclaims the ethical authority to audit the project prior to its materialization.

Proposed Methodology

The design articulates two interdependent phases. The theoretical phase (completed) consisted of an Integrative Literature Review executed under PRISMA 2020 standards with a PICOC matrix, analytically isolating the disruption of Generative AI within a corpus of 37 articles. The empirical phase (ongoing) deploys a descriptive and explanatory Multiple-Case Study, structured under a logic of theoretical replication.

Implementation Approach, Including Context and Technologies

The fieldwork is situated within the entrepreneurial ecosystem, encompassing startups, strategic design agencies, and manufacturing SMEs. The technological intervention analyzed corresponds strictly to Generative and Agentic Artificial Intelligence (post-2022 LLMs) embedded within ideation and new product development (NPD) workflows.

Experimental Design, Evaluation Criteria, Sample, and Data (Or Preliminary Results if Available)

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Expected Impact and Added Value

By transmuting cognitive vulnerability into a governed dialectical process via a sociotechnical "Ulysses Contract," Generative Friction consolidates as the architectural safeguard protecting the firm's idiosyncratic creative variance against market-driven algorithmic standardization.

Current Progress, Future Research Plan, and Open Questions for Discussion

With the theoretical model established and the ethical protocol approved, the imminent ethnographic immersion will empirically measure agency tensions.
Open questions for discussion:

1. What interaction variables permit the operational coding of "human-first sequencing" boundaries directly into creative software APIs without stifling iterative agility?
2. During "digital archaeology" in corporate repositories, what heuristic traceability conclusively differentiates a genuine act of critical human curation from a mere algorithmic shallow edit?

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