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The Future End of Design Work: A Critical Overview of Managerialism, Generative AI, and the Nature of Knowledge Work, and Why Craft Remains Relevant

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Abstract
This article examines the transformation of design work under the influence of managerialism and the rise of Generative Artificial Intelligence (GenAI). Drawing on John Maynard Keynes's projections of technological unemployment and the evolving nature of work, it argues that despite advancements in automation, work has not diminished but rather devalued. Design, understood as a type of knowledge work, faces an apparent existential crisis. GenAI grows adept at mimicking the output of creative processes. The article explores how the fear of the end of design work fueled by the rise of GenAI is rooted in a misunderstanding of design work. This misunderstanding is driven by managerialism—an ideology that prioritizes efficiency and quantifiable outcomes over the intrinsic value of work. Managerialism seeks to instrumentalize and automate design, turning it into a controllable procedure to generate quantifiable creative outputs. The article argues why design work cannot be turned into a procedure and automated using GenAI. Advocates of these systems claim they enhance productivity and open new opportunities. However, evidence so far shows that flawed GenAI models produce disappointing outcomes while operating at a significant environmental cost. The article concludes by arguing for a robust theory of design—one that acknowledges the unique ontological and epistemic boundaries of design work and underscores why design cannot be reduced to a procedural output.

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Introduction

In an essay published in 1930, John Maynard Keynes[1] pondered what would happen if, in a hundred years, automation solved what he regarded as humanity's most pressing problem: the struggle for subsistence. For Keynes, if machines solved that "economic problem" by becoming so efficient as to put everyone out of work, humanity would be left with more leisure time. However, the resulting "technological unemployment" would be problematic. Without the need to toil for survival, people would lose their traditional sense of purpose, and society — particularly the working class — would spiral into a generalized existential crisis.

The deadline for Keynes's forecast is approaching, but machines have not yet solved the economic problem, nor have they completely put humans out of work. Automation — broadly understood as the delegation of tasks to autonomous mechanical or computational systems to achieve certain goals[2] — has indeed increased significantly over the last few decades. Industrial robotics has taken over many aspects of industrial and agricultural labor but has not entirely replaced human workers.[3] Moreover, while agriculture, industry, and energy remain vital sectors for every society, the most developed regions of the world now largely depend on the outputs of knowledge work or, as Peter Drucker[4] put it, "work that applies vision, knowledge, and concepts — work that is based on the mind rather than on the hand." In these same economies, recent decades have also witnessed the consolidation of the creative economy, which Greg Hearn[5] characterizes as "the creation capture and consumption of intangible value through the application of creative, technological and innovation know-how." In this context, creative work — based on "replicative or novel aesthetic and/or expressive knowledge, either separately or in synthesis with other forms of knowledge"[6] — plays an increasingly important role.

Until recently, the idea that automation could take over knowledge and creative jobs seemed far-fetched. However, the most recent boom in the field of artificial intelligence (AI) has called that assumption into question. A paradigm shift in the design of AI systems — combining machine learning (ML) methods (usually self-supervision) for natural language processing (NLP) with vast amounts of data — has given rise to "foundation models"[7] potentially adaptable to a broad range of downstream tasks. Foundation models form the basis for generative large language models (LLMs) such as ChatGPT, Stable Diffusion, and DALL-E, which are trained on billions of parameters. Coupled with powerful data processing and storage infrastructure and user interface components, these generative AI systems (henceforth GenAI) have become surprisingly adept at producing meaningful, seemingly new, human-like text, images, audio, or video[8] in response to simple prompts. This capacity of GenAI systems to instantly generate synthetic media — and also to interact with users in a manner that we would call intelligent if done by a human (to paraphrase John McCarthy et al.'s definition of AI)[9] — has led many to believe these systems will radically change knowledge work and, particularly, creative work.

Along with art (e.g., illustration, photography, music, or writing) and programming, design is one of the creative industry segments seemingly poised to be most affected by GenAI systems. Influential design consulting and training companies such as the Nielsen Norman Group (N/N) and the

1 John Maynard Keynes, "Economic Possibilities for Our Grandchildren," in *Essays in Persuasion* (1930; New York: W. W. Norton & Company, 2011), 358–73.

2 Deborah G. Johnson and Mario Verdicchio, "AI Anxiety," *Journal of the Association for Information Science and Technology* 68, no. 9 (2017): 2267–70, https://doi.org/10.1002/asi.23867; John Danaher, "Toward an Ethics of AI Assistants: An Initial Framework," *Philosophy & Technology* 31, no. 4 (2018): 629–53, https://doi.org/10.1007/s13347-018-0317-3.

3 Vasso Marinoudi et al., "Robotics and Labour in Agriculture. A Context Consideration," *Biosystems Engineering* 184 (August 2019): 111–21, https://doi.org/10.1016/j.biosystemseng.2019.06.013; Khalid Hasan Tantawi, Alexandr Sokolov, and Omar Tantawi, "Advances in Industrial Robotics: From Industry 3.0 Automation to Industry 4.0 Collaboration," in *2019 4th Technology Innovation Management and Engineering Science International Conference (TIMES-iCON)*, Bangkok, Thailand, 2019, 1–4, https://doi.org/10.1109/times-icon47539.2019.9024658.

4 Peter F. Drucker, *Landmarks of Tomorrow: A Report on the New "Post-Modern" World* (New York: Harper & Row, 1959), 129.

5 Greg Hearn, "The Future of Creative Work: Creativity and Digital Disruption," in *The Future of Creative Work*, ed. Greg Hearn (Cheltenham, UK: Edward Elgar Publishing, 2020), 2, https://doi.org/10.4337/9781839101106.00007.

6 Greg Hearn and Marion McCutcheon, "The Creative Economy: The Rise and Risks of Intangible Capital and the Future of Creative Work," in *The Future of Creative Work*, ed. Greg Hearn (Cheltenham, UK: Edward Elgar Publishing, 2020), 17, https://doi.org/10.4337/9781839101106.00009.

7 Rishi Bommasani et al., "On the Opportunities and Risks of Foundation Models," arXiv, submitted on August 16, 2021, https://doi.org/10.48550/ARXIV.2108.07258.

8 Stefan Feuerriegel et al., "Generative AI," *Business & Information Systems Engineering* 66, no. 1 (2024): 111–26, https://doi.org/10.1007/s12599-023-00834-7.

9 John McCarthy et al., "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence, August 31, 1955," *AI Magazine* 27, no. 4 (2006): 12–14, https://doi.org/10.1609/aimag.v27i4.1904.

Interaction Design Foundation (IDF) have thus begun advocating for incorporating GenAI in UX/UI practice, reinforcing the idea that adoption of the technology is inevitable. Jakob Nielsen, for example, has portrayed AI as an urgent problem for designers to address, suggesting that those who do not embrace AI risk becoming metaphorical bugs—"outdated and squashed" on the windshield of AI-driven innovation.[10] The IDF has been promoting training in "AI for design" with the now ubiquitous tagline, "AI is not going to take your job, but someone using it will surely do." This view implies that technological unemployment may come for creative work, suggesting that design as we know it could radically change or even end.

There is, nonetheless, mounting evidence that the promises of GenAI systems should be critically examined. Foundation models operate not through reasoning but through sophisticated stochastic guesswork.[11] However plausible and human-like their outputs might seem, it is crucial to remember they are not a consequence of reasoning and understanding but the result of probabilistic estimations of the likelihood that a given piece of information (token) follows from the previous one. The inability of LLMs to grasp the meaning of the data they process[12] makes them inept at dealing with uncertainty and outliers—i.e., anything not present in their training data—and thus irremediably prone to "hallucinate."[13] Hallucinations are outputs that are "completely untethered" from the inputs;[14] they are fabrications that may be syntactically and grammatically correct but semantically and factually wrong. Hallucinations can manifest as plausible but incorrect facts, made-up references, or fabricated details. They are unpredictable and emerge when a model attempts to fill gaps in its knowledge base. Thus, some researchers have argued that models such as ChatGPT do not hallucinate but are fundamentally "bullshit machines."[15] Recent studies seem to support such portrayal, as they provide evidence that larger, more powerful, and more finely tuned models are more prone to output erroneous but convincingly plausible responses when confronted with information that was not present in their training dataset.[16]

To mitigate hallucinations and prevent temporal degradation (i.e., aging), models have to be constantly retrained with fresh data.[17] However, the new data cannot be synthetic (i.e., generated by an AI); otherwise, models can rapidly collapse, meaning they can lose information, hallucinate more frequently, and end up with a significantly hampered capacity to learn.[18] Some researchers have likened this phenomenon to mad cow disease.[19] Just as bovine spongiform encephalopathy (BSE) in cattle is caused by feeding them contaminated animal by-products—which leads to irreversible neurological damage—models retrained on synthetic outputs instead of human-made sources suffer from of data contamination that deteriorates their performance and compromises their integrity. As more synthetic data is released into the wild and mingles with human-generated content, the likelihood that models could be exposed to this problem increases.

Most worryingly, given the challenges imposed by climate change, GenAI systems consume staggering amounts of energy and water[20] during training and usage, making them anything but sustainable. Training each generation of models, such as ChatGPT, requires vast amounts of electricity,[21] which

10 Jakob Nielsen, "UX Needs a Sense of Urgency about AI," *Jakob Nielsen on UX*, June 15, 2023, https://jakobnielsenphd.substack.com/p/ux-needs-a-sense-of-urgency-about.

11 Emily M. Bender et al., "On the Dangers of Stochastic Parrots: Can Language Models Be Too Big?," in *FACCT '21: Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (New York: ACM, 2021), 610–23, https://doi.org/10.1145/3442188.3445922; Stephen Wolfram, "What Is ChatGPT Doing … and Why Does It Work?," Stephen Wolfram Writing, February 14, 2023, https://writings.stephenwolfram.com/2023/02/what-is-chatgpt-doing-and-why-does-it-work/.

12 J. Mark Bishop, "Artificial Intelligence Is Stupid and Causal Reasoning Will Not Fix It," *Frontiers in Psychology* 11 (January 2021): article no. 513474, https://doi.org/10.3389/fpsyg.2020.513474; Iman Mirzadeh et al., "GSM-Symbolic: Understanding the Limitations of Mathematical Reasoning in Large Language Models," arXiv, submitted on October 7, 2024, https://doi.org/10.48550/ARXIV.2410.05229.

13 Ziwei Xu, Sanjay Jain, and Mohan Kankanhalli, "Hallucination Is Inevitable: An Innate Limitation of Large Language Models," arXiv, submitted on January 20, 2024, https://doi.org/10.48550/arXiv.2401.11817; Sourav Banerjee, Ayushi Agarwal, and Saloni Singla, "LLMs Will Always Hallucinate, and We Need to Live with This," arXiv, submitted on September 9, 2024, https://doi.org/10.48550/ARXIV.2409.05746.

14 Katherine Lee et al., "Hallucinations in Neural Machine Translation," *ICLR* (2018): 1–18, available at https://clarafy.github.io/research/neurips_irasl_2018.pdf.

15 Michael Townsen Hicks, James Humphries, and Joe Slater, "ChatGPT Is Bullshit," *Ethics and Information Technology* 26, no. 2 (2024): article no. 38, https://doi.org/10.1007/s10676-024-09775-5.

16 Lexin Zhou et al., "Larger and More Instructable Language Models Become Less Reliable," *Nature* 634 (September 2024): 61–68, https://doi.org/10.1038/s41586-024-07930-y.

17 Daniel Vela et al., "Temporal Quality Degradation in AI Models," *Scientific Reports* 12, no. 1 (2022): article no. 11654, https://doi.org/10.1038/s41598-022-15245-z.

18 Ilia Shumailov et al., "AI Models Collapse When Trained on Recursively Generated Data," *Nature* 631 (July 2024): 755–59, https://doi.org/10.1038/s41586-024-07566-y.

often comes from non-renewable sources. For example, the training of GPT-3 alone was estimated to require close to 5.4 million liters of water for cooling the data centers.[22] Water consumption is also necessary for the everyday operation of GenAI, as it remains standard practice for maintaining the temperature and stability of servers.

As GenAI use becomes more widespread, energy and water demands escalate accordingly, with some researchers noting that the computational power required for training and using GenAI doubles roughly every six months.[23] The energy demand is so high that plans to decommission coal-powered plants in the United States have been postponed,[24] and Microsoft is considering developing next-generation nuclear reactors to power its data centers.[25] Moreover, to stay competitive, companies developing GenAI must continually upgrade their data center hardware. Consequently, it has been projected that the largest GenAI models, such as ChatGPT, Claude or Llama, could generate an additional 2.5 million metric tons of annual e-waste.[26] These circumstances clearly undermine efforts to transition toward cleaner, renewable energy sources, signaling that the environmental costs of GenAI far outweigh its potential benefits.

Lastly, GenAI systems can be easily misused for nefarious purposes,[27] ranging from conducting simple scams to more damaging activities, such as creating non-consensual sexually explicit deepfakes. While most commercial GenAI services have guardrails against that misuse, these protections do not always work as expected.[28]

Despite these problems, GenAI continues to be heavily promoted as a profoundly transformative technology poised to revolutionize every aspect of human life, especially creative work — as illustrated by a now infamous interview with Ermira Murati, OpenAI's former CTO.[29] That tension may be partially explained by the fact that the current AI boom, like blockchain technology before, is exhibiting the characteristic signs of a "tech bubble": (1) a massive increase in stock prices, (2) a surge in initial public offerings fueled by competitor's fear of missing out, (3) poor or inexistent regulatory frameworks, and (4) overblown media attention.[30]

In this position article, we argue that the desire to view GenAI as a net positive force — one that augments creativity, introduces new forms of expression, and enhances problem-solving, particularly for designers — stems from a distorted and problematic understanding of automation, work, creativity, and design. The push to delegate design work to GenAI systems while overlooking the shortcomings and negative impact of the technology represents the latest expression of the managerialist instrumentalization of design, a trend that gained momentum two decades ago with IDEO's repackaging of design thinking as a five-stage methodology.

Managerialism is an ideology that regards the knowledge, practices, and social relations developed within any organization as secondary and subservient to management techniques and knowledge. It is the one-dimensional belief that every organization, regardless of its field, can be managed as a corporation. Thus, managerialism prioritizes efficiency, productivity, control, and quantifiable outcomes over any other aspect of work, such as autonomy, responsibility, collaboration, and skill. While managerialism, as a phenomenon, has been widely discussed,[31] and its degrading effects on

19 Sina Alemohammad et al., "Self-Consuming Generative Models Go MAD," arXiv, submitted on July 4, 2023, https://doi.org/10.48550/ARXIV.2307.01850.

20 Kate Crawford, "Generative AI's Environmental Costs Are Soaring and Mostly Secret," *Nature* 626 (February 2024): 693, https://doi.org/10.1038/d41586-024-00478-x; Pengfei Li et al., "Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models," arXiv, Submitted on April 6, 2023, https://doi.org/10.48550/ARXIV.2304.03271.

21 Sasha Luccioni, Yacine Jernite, and Emma Strubell, "Power Hungry Processing: Watts Driving the Cost of AI Deployment?," in *FAccT '24: Proceedings of the 2024 ACM Conference on Fairness, Accountability, and Transparency* (New York: ACM, 2024), 85–99, https://doi.org/10.1145/3630106.3658542.

22 Li et al., "Making AI Less 'Thirsty.'"

23 Jaime Sevilla et al., "Compute Trends across Three Eras of Machine Learning," in *2022 International Joint Conference on Neural Networks (IJCNN)*, Padua, Italy, 2022, 1–8, https://doi.org/10.1109/ijcnn55064.2022.9891914.

24 Saijel Kishan, "AI Needs so Much Power that Old Coal Plants Are Sticking Around," *Bloomberg*, January 25, 2024, https://www.bloomberg.com/news/articles/2024-01-25/ai-needs-so-much-power-that-old-coal-plants-are-sticking-around.

25 Justine Calma, "Microsoft Is Going Nuclear to Power Its AI Ambitions," *Verge*, September 26, 2023, https://www.theverge.com/2023/9/26/23889956/microsoft-next-generation-nuclear-energy-smr-job-hiring.

26 Peng Wang et al., "E-waste Challenges of Generative Artificial Intelligence," *Nature Computational Science* 4 (2024): 818–23, https://doi.org/10.1038/s43588-024-00712-6.

27 Nahema Marchal et al., "Generative AI Misuse: A Taxonomy of Tactics and Insights from Real-World Data," arXiv, submitted on June 19, 2024, https://doi.org/10.48550/ARXIV.2406.13843.

28 Eric Hal Schwartz, "ChatGPT Just (Accidentally) Shared All of Its Secret Rules — Here's What We Learned," *TechRadar*, July 5, 2024, https://www.techradar.com/computing/artificial-intelligence/chatgpt-just-accidentally-shared-all-of-its-secret-rules-heres-what-we-learned.

29 Dartmouth Engineering, "AI Everywhere: Transforming Our World, Empowering Humanity," YouTube video, 51:41, June 2024, https://youtu.be/yUoj9B8O-pR8?si=K136qfHxYQCuP3Vh&t=1768.

work are well documented,[32] its impact on design work has been scarcely analyzed.

We argue that while technological automation has not led to the end of work, the emergence of AI-driven automation may significantly alter the perceived value and conditions of knowledge work. Additionally, we examine how managerialism is hijacking design and undermining a legitimate conception of design methods—resulting in the instrumentalization of design practice. Design is particularly vulnerable to managerialism because it has not yet solidified its claim as a legitimate discipline, with its own knowledge, methods, and ways of inquiry.

Design Thinking and the Restructuring of Design

A quick search in Google's Ngram Viewer[33] shows a surge in the frequency of the term "design thinking" in the early 2000s. The surge roughly coincides with IDEO's promotion of its consultancy services—built around its particular brand of design thinking—and the founding of the Hasso Platner Institute at Stanford University in 2004, better known as the d.school. Over the following decades, IDEO's design thinking[34] became ubiquitous in both the professional and academic worlds.

According to the proponents of IDEO's design thinking (henceforth, DT2), the way designers approach problems is uniquely creative. Once turned into a methodology, this designer mindset can be particularly effective for generating economic value and addressing complex problems in any (business) domain while maintaining a human-centered focus. However, as Kimbell[35] notes, DT2 literature consistently ignores the academic lineage of design thinking. As a result, DT2 proponents often fail to recognize that the conceptual origins of the belief in a "designerly" way of seeing things emerged from longstanding discussions about what design is and how best can it be practiced. These discussions happened between the 1960s and early 1970s, at the height of what has been called the Design Methods Movement (DMM), and led, among other things, to the founding of the Design Research Society and the emergence of the very notion of design thinking. We will refer to this broader view as DT1.

Literature that endorses DT2 presents design thinking as encompassing "everything good about designerly practices"[36] without being tied to a specific domain of design.[37] It portrays designers not as makers but as cultural consultants and interdisciplinary mediators, and design not as the shaping of things but as an instrument for creativity—a process of coming up with novel and potentially valuable ideas. By prioritizing thinking, DT2 reinforces the "Platonic dogma"[38] that sees thinking and doing as fundamentally separate epistemic processes, asserting the superiority of "knowing that" (thinking) over "knowing how" (practice).

The core idea behind DT2 is that, once familiar with its principles and method, one does not need to be trained as a designer to use design thinking. DT2 can then be characterized as a portable framework imbued with the language and sensibilities of neoliberalism (which privileges private enterprise above all), allowing non-designers to instrumentalize design. Over the last two decades, DT2 has become popular in management and business schools, where

30 Luciano Floridi, "Why the AI Hype Is Another Tech Bubble," *Philosophy & Technology* 37 (November 2024): article no. 128, https://doi.org/10.1007/s13347-024-00817-w.

31 William G. Scott and David K. Hart, "The Exhaustion of Managerialism," *Society* 28 (March 1991): 39–48, https://doi.org/10.1007/bf02695594; Thomas Klikauer, "A Preliminary Theory of Managerialism as an Ideology," *Journal for the Theory of Social Behaviour* 49, no. 4 (2019): 421–42, https://doi.org/10.1111/jtsb.12220; Thomas Klikauer, "What Is Managerialism?," *Critical Sociology* 41, no. 7 (2013): 1103–19, https://doi.org/10.1177/0896920513501351.

32 André Spicer, *Business Bullshit* (New York: Routledge, 2018); David Graeber, *Bullshit Jobs: A Theory* (New York: Simon & Schuster, 2018).

33 "Google Books Ngram Viewer," accessed October 10, 2024, https://books.google.com/ngrams/graph?content=%22design+thinking%22,%22user+experience%22,%22UX%22&year_start=1980&year_end=2022&case_insensitive=true&corpus=en&smoothing=4.

34 It is fundamental to distinguish the historical, academic understanding of "design thinking" from IDEO's five-step methodology. For an overview of the term's evolution, see Lucy Kimbell, "Rethinking Design Thinking: Part I," *Design and Culture* 3, no. 3 (2011): 285–306, https://doi.org/10.2752/175470811x13071166525216; and Rodrigo Hernández-Ramírez, "On Design Thinking, Bullshit, and Innovation," *Journal of Science and Technology of the Arts* 10, no. 3 (2018): 45–57, https://doi.org/10.7559/citarj.v10i3.555. In a recent paper, Nigel Cross essentially restated the same arguments, noting there are two types of design thinking: one, prevalent in design-based scholarly literature, which refers to the study of designers' cognition and processes. The other adopts the discourse and methods of IDEO and presents a simplified version of *designerly thinking* aimed at business applications and business-oriented media. See Nigel Cross, "Design Thinking: What Just Happened?," *Design Studies* 86 (May 2023): 101187, https://doi.org/10.1016/j.destud.2023.101187.

35 Kimbell, "Rethinking Design Thinking."

36 Ibid., 289.

37 The reality, however, is that both design thinking and design in general owe much to graphic design, as Harland and Meron recently argued. See Robert Harland and Yaron Meron, "Design Thinking: Standing on the Shoulders of … Graphic Design!,"

it is regarded as a strategic skill for business growth (i.e., innovation) and, implicitly, as a mechanism to level the field between creative workers and managers. Like management, DT2 is (1) based on simple principles and methods that anyone can learn and (2) can be applied regardless of the domain of action. In this manner, DT2 seemingly demystifies and democratizes creativity by portraying it as the result of a well-structured yet simple iterative process. In this light, anyone, especially managers, can use DT2 to realize their creative potential, regardless of skill or knowledge of creative work.

As DT2 consolidated within management culture, so did the notion that design — particularly human-centered design methods for user experience (UX) and DT2 techniques — was not only a desirable asset for organizations but could potentially determine their future. The newfound popularity of design in the business world significantly increased the expectations placed on designers and the field of design at large. Consequently, design education came under scrutiny by consultants who deemed it outdated and ill-prepared to train the designers that businesses needed. For example, Michael W. Meyer and Don Norman have argued that while designers can indeed develop innovative solutions for problems in several fields, they are unprepared for fully "realizing the value of design in the 21st century."[39] The reason, according to Norman, is that design education remains grounded on craft — or, as he describes it, focused on making "pretty things"[40] and reliant on tacit knowledge — rather than science, technology, and business, which makes the transference and application of design knowledge inefficient. Therefore, Meyer and Norman[41] argue design schools seldom "teach the most valuable elements of a designer's perspective and process," leaving graduates at a disadvantage in addressing the complexity of the tasks they should engage in. To address these shortcomings, they contend, contemporary design education should prioritize a view of design as thinking, coupled with knowledge and skills in psychology, quantitative research methods, coding, and business strategy, rather than continuing to emphasize craft skills like drawing or modeling.

In response to these circumstances, many design schools have incorporated some of these suggestions. Time dedicated to craft skills has been significantly reduced in curricula — as design students are no longer expected to be adept at drawing — and greater emphasis has been placed on acquiring human-centered design research methods. In some instances, a variation of DT2 has become the primary design methodology taught to students, who come to view the design process purely in terms of well-defined stages punctuated by phases of divergent and convergent thinking. For them, the Double Diamond diagram represents a recipe to follow rather than a descriptive model that can be used flexibly to frame the unfolding design process.

While the privileged position that design has seemingly gained in business contexts is unprecedented,[42] the desire to restructure design is not new. Current calls to orient design toward science and away from the arts echo debates nurtured by the DMM.

The core goal of the DDM was to make design more methodologically sound. It was a movement led by architects, designers, and scientists with a keen interest in design, the design process, and how designers think and

Design Issues 40, no. 3 (2024): 49–61, https://doi.org/10.1162/desi_a_00766.

38 Luciano Floridi, "A Defence of Constructionism: Philosophy as Conceptual Engineering," *Metaphilosophy* 42, no. 3 (2011): 282–304, https://doi.org/10.1111/j.1467-9973.2011.01693.x.

39 Michael W. Meyer and Don Norman, "Changing Design Education for the 21st Century," *She Ji: The Journal of Design, Economics, and Innovation* 6, no. 1 (2020): 13, https://doi.org/10.1016/j.sheji.2019.12.002.

40 Don Norman, "When You Come to a Fork in the Road, Take It: The Future of Design," *She Ji: The Journal of Design, Economics, and Innovation* 2, no. 4 (2016): 345, https://doi.org/10.1016/j.sheji.2017.07.003.

41 Meyer and Norman, "Changing Design Education for the 21st Century," 13.

42 It may be argued that the tenure of Peter Behrens at AEG, Dieter Rams at Braun, and Jony Ive at Apple are prior examples of the privileged position and influence that design held in those companies' business. However, the focus is on the generalized perceived value of design thinking as a portable method rather than the impact that design has on specific companies.

work. Initially, it was a descriptive enterprise aimed at mapping the epistemic foundations of design as a discipline. As John Z. Langrish[43] notes, in the early 1960s, the DMM was characterized by optimism about what design could become, which manifested in three beliefs: (1) that the world was improving after the upheaval of WWII, (2) that design could play a central role in this improvement, and (3) that the design process could be improved by making it more scientific. Ultimately, the idea that design could become as systematic and methodologically rigorous as the sciences was abandoned, and Christopher Alexander, a founding member of the DMM, famously recanted his earlier position on the matter.[44]

Six decades later, as neoliberalism consolidated worldwide, innovation—primarily understood as "commercialized invention"[45]—came to be regarded as the panacea for every socioeconomic problem, replacing "science" as the driver of progress. Accordingly, recent attempts to restructure design are no longer solely focused on making it more scientifically rigorous but instead of making it a more appropriate instrument for business. The beliefs now underpinning this new vision of design are that (1) the world could "get better" solely through (technological) innovation, (2) design is both the key to that innovation and solving the unforeseen problems it may cause, and (3) designing itself can be improved by making it more technological and business-oriented.

After the Covid-19 Pandemic, with the looming threat of climate change in the background, the emergence of GenAI has introduced a new set of anxieties affecting creative work and the expectations placed on design. In the last couple of decades, the tech industry grew, increasing the demand for UX/UI designers. Recently, however, there has been a surge in layoffs in the sector. In 2024, the American tech industry lost 74,672 jobs, adding to the more than 260,000 layoffs the previous year. In 2023, IDEO closed several of its offices worldwide and laid off a third of its employees,[46] signaling that DT2 might be losing its appeal. As with any complex economic situation, it is difficult to pinpoint the exact causes behind this crisis. Part of it could be that the tech industry is normalizing after the Covid-19 pandemic, as it emerged that many companies, including Google and Meta, were hoarding talent—hiring highly skilled workers not out of necessity but to prevent competitors from hiring them.[47] Nonetheless, it is also plausible that GenAI and the subsequent rise of concerns about technological unemployment are contributing factors, given that most companies are heavily investing in the technology and promoting its potential to replace human workers.[48] This is especially evident in the videogame industry, where concept artists are being laid off, and the few remaining ones are increasingly required to use GenAI to produce content that they then retouch with their own skills.[49]

From the preceding account, DT2 succeeded in making design appealing to business mindsets. However, in doing so, it contributed to trivializing the value of design as work. If all that is needed to solve problems using design and to direct designers is proficiency in the language and principles of DT2, it would logically follow that designing has finally been made uncomplicated. If anyone can successfully apply the same method of well-known steps across domains to improve their problem-solving and creativity, it suggests not only that

43 John Z. Langrish, "The Design Methods Movement from Optimism to Darwinism," in *Future Focused Thinking—DRS International Conference 2016*, ed. P. Lloyd and E. Bohemia (Brighton, UK: DRS, 2016), 54, https://doi.org/10.21606/drs.2016.222.

44 During an interview originally published in the Design Methods Group Newsletter in 1971, Christopher Alexander went so far as to say regarding (the future of) design methodology: "I would say forget it, forget the whole thing." see Christopher Alexander, "The State of the Art in Design Methods," in *Developments in Design Methodology*, ed. Nigel Cross (New York: John Wiley & Sons, 1984), 312, https://christopher-alexander-ces-archive.org/article/the-state-of-the-art-in-design-methods-interview-by-max-jacobson/.

45 That view of innovation is generally attributed to Joseph Schumpeter, see Benoı t Godin, *Innovation Contested: The Idea of Innovation over the Centuries* (New York: Routledge, 2015), 279, https://doi.org/10.4324/9781315855608.

46 Mark Wilson, "Design Giant IDEO Cuts a Third of Staff and Closes Offices as the Era of Design Thinking Ends," *Fast Company*, November 3, 2023, https://www.fastcompany.com/90976682/design-giant-ideo-cuts-a-third-of-staff-and-closes-offices-as-the-era-of-design-thinking-ends.

47 Some of these workers went on to note that they were effectively hired to do nothing, for example, see Emily Stewart, "How Some People Get Away with Doing Nothing at Work," *Vox*, May 24, 2023, https://www.vox.com/money/23733244/bullshit-jobs-work-employment-lazy-jobless-employed-nothing-to-do; Te-Ping Chen, "These Tech Workers Say They Were Hired to Do Nothing," *Wall Street Journal*, April 7, 2023, https://www.wsj.com/articles/these-tech-workers-say-they-were-hired-to-do-nothing-762ff158, which would put their activities under the "bullshit jobs" category (Graeber, *Bullshit Jobs*) that is discussed below.

48 The promotion has been, at times, reckless, as exemplified by an infamous interview in which Mira Murati, the now former CTO of Open AI, suggested that with the advent of Generative AI, "some creative jobs maybe will go away, but maybe they shouldn't have been there in the first place." See Dartmouth Engineering, "AI Everywhere," 29:28.

49 Brian Merchant, "AI Is Already Taking Jobs in the Video Game Industry," *WIRED*, July 23, 2024, https://www.wired.com/story/ai-is-already-taking-jobs-in-the-video-game-industry/.

design can be democratized but also that it can be proceduralized—meaning that designing can be automated. Thus, designing becomes purely an activity of thinking and curation, where the practical aspects of the trade can be delegated to machines. This, we argue, is the main assumption underpinning the belief that GenAI can effectively take over many aspects of design work. However, it betrays a skewed understanding of what creative work implies and, more importantly, of how designers develop their skills.

Design as Work and Working as Designing

In the broadest sense, work may be understood as a form of intentional and purposeful effort aimed at completing a meaningful task or series of tasks that, in principle, brings about some form of value (economic, social, moral) for both the worker and the context in which they operate. However, the precise meaning of the term is open for discussion,[50] as the specific activities that count—and hence are recognized socially and economically—as work are influenced by cultural and social factors.[51] The late Czech-born Brazilian philosopher Vilém Flusser,[52] for example, characterizes work as a kind of gesture[53]—"an unnatural expression of the effort to realize values" based on two major assumptions: (a) that the world is not as it should be and (b) that it can be changed. Interestingly, these two assumptions echo Herbert Simon's[54] characterization of designing as devising "courses of action aimed at changing existing situations into preferred ones."

For Simon, designing is fundamentally an intellectual activity; it involves planning some form of change in the world. His choice of words in this regard is telling: devising—which means to portion out, arrange, and plan—shares the same Latin root as dividing. Designing, in this sense, is analytical: an activity focused on addressing a problem by breaking it into its constituents and devising a plan for intentional change. Simon sees such activity as the common denominator across professions (including engineering, architecture, business, education, law, and medicine) and ultimately separates these fields from the sciences. It is important to note, however, that Simon's understanding of what an intellectual activity might be is not informed by (Platonic) theory vs. practice dualism but rather by pragmatism—as we will see below.

Oversimplifying, pragmatism is a philosophical tradition that rejects essentialism and thus regards theory as just another form of practice. Pragmatism stresses habits rather than beliefs; it privileges action and thus evaluates the consequences of beliefs and claims in terms of their consequences, not in terms of immutable axiomatic systems. From a pragmatist standpoint, concepts and ideas are tools or, rather, instruments, and the applicability and effectiveness of a tool ultimately depend on the situation in which it is used and the task that it aims to achieve.[55]

Simon's pragmatist heritage has been well documented by Richard Buchanan,[56] who has noted the strong resemblance between Simon's characterization of design and John Dewey's portrayal of logical inquiry as "the controlled or directed transformation of an indeterminate situation into one which is so determinate in its constitute distinctions and relations as to

50 Brent D. Rosso, Kathryn H. Dekas, and Amy Wrzesniewski, "On the Meaning of Work: A Theoretical Integration and Review," *Research in Organizational Behavior* 30 (January 2010): 91–127, https://doi.org/10.1016/j.riob.2010.09.001.

51 Stephen Fineman, *Work: A Very Short Introduction* (Oxford: Oxford University Press, 2012), https://doi.org/10.1093/actrade/9780199699360.001.0001; Stacy Hsueh et al., "What Counts as 'Creative' Work? Articulating Four Epistemic Positions in Creativity-Oriented HCI Research," in *CHI '24: Proceedings of the CHI Conference on Human Factors in Computing Systems* (New York: ACM, 2024), article no. 497, https://doi.org/10.1145/3613904.3642854.

52 Vilém Flusser, *Gestures, trans*. Nancy Ann Roth (1991; repr., Minneapolis: University of Minnesota Press, 2014).

53 Flusser defines a gesture as a symbolic "movement of the body or of a tool connected to the body for which there is no satisfactory causal explanation". Flusser, *Gestures*, 2.

54 Herbert Simon, *The Sciences of the Artificial*, 3rd ed. (Cambridge, MA: MIT Press, 2019).

55 For a thorough discussion of pragmatism, design, and technology, see Richard Coyne, *Designing Information Technology in the Postmodern Age: From Method to Metaphor* (Cambridge, MA: MIT Press, 1995); Don Ihde, *Postphenomenology and Technoscience: The Peking University Lectures*, a volume of *The SUNY Series in the Philosophy of the Social Sciences*, ed. Leonore Langsdorf (Albany, New York: SUNY Press, 2009); Joseph C. Pitt, "The Epistemology of the Very Small," in *Doing Philosophy of Technology: Essays in Pragmatist Spirit* (Netherlands: Springer, 2011), 189–97, https://doi.org/10.1007/978-94-007-0820-4_17.

56 Richard Buchanan, "Strategies of Design Research: Productive Science and Rhetorical Inquiry," in *Design Research Now: Essays and Selected Projects*, ed. Ralf Michel and Board of International Research in Design (Basel: Birkhäuser, 2007), 55–66, https://doi.org/10.1007/978-3-7643-8472-2_4; Richard Buchanan, "Thinking about Design: An Historical Perspective," in *Philosophy of Technology and Engineering Sciences*, ed. Anthonie Meijers, vol. 9 of *Handbook of the Philosophy of Science* (Amsterdam: Elsevier, 2009), 409–53, https://doi.org/10.1016/B978-0-444-51667-1.50020-3.

convert the elements of the original situation into a unified whole."[57] This connection reinforces our own view of designing as a form of research.[58]

More recently, Johan Redström[59] has also portrayed design as being fundamentally an analytical process. He explains that design as a specific domain emerged from a rupture between the acts of making (creating) and producing (multiplying), caused by the widespread introduction of machines into manufacturing. This rupture, Redström argues, shifted designers' focus from simply making artifacts to determining which of artifacts were "suitable and worthy of mass replication."[60] Consequently, the goal of design moved from producing a particular type of object (as artisans do) to creating the plans, models, and prototypes for machine-made production. Design, therefore, became a form of research and experimentation aimed at constructing "ultimate particulars."[61] A side effect of this transformation was that design also became an activity of knowledge creation, as designers developed a "profound willingness to question what making things is all about."[62]

Simon's pragmatism portrays design as a research-based intellectual activity and as an effort directed at solving problems—after all, why else an existing situation need to be changed if it were not perceived as problematic? Etymologically, a problem is a question to be addressed, but it is also something that is put forward, thrown, or projected—a proposition to be questioned and evaluated. Hence the importance that the notion of "project" (from the Italian, *progettare*) has for design. This relationship between problem, project, and proposition is why Richard Buchanan[63] argues that design can also be regarded as a kind of rhetorical art, with every designed artifact serving as an argument that embodies assumptions about how humans should carry out their lives. Buchanan's characterization is insightful as it highlights the historical relationship between artificiality and rhetoric, given that, etymologically, the terms "art" (from, *ars*, the Latin translation of the Greek *techne*) and "technology" (*techne* + *logos*) are closely related. As Aristotle used it, *technelogos* implied the capacity to address propositions (problems) through rhetorical means (art or technique)—that is, artificially.

The unnatural (i.e., artificial) drive to transform situations deemed problematic is the common ground of work and design, but also of machines and, by extension, *automation*. We note earlier that automation involves the delegation of tasks to machines. As Flusser[64] argued, machines, like tools, were originally conceived to overcome the resistance of nature;[65] they embodied human ingenuity and craftiness in addressing natural limitations related to human survival. In this sense, the purpose of machines was to efficiently change situations (problems) that required transformation for existential reasons—namely, the provision of food, dwelling, and clothing.

By synthesizing the previous accounts of work, design, and automation, a picture emerges describing work as an artificial expression of meaningful activities to change a problematic situation that needs to be changed. This view portrays automation as the delegation of those activities to machines, and design as the analysis required to understand and creatively plan a solution for that situation—thus bridging work and automation. This is why Simon portrayed design as the common denominator of professions and as central to organization theory. Simon's characterization, along with Christopher

57 John Dewey, *Logic: The Theory of Inquiry* (New York: Henry Holt, 1938), 104–5.

58 It may be correctly argued that neither Buchanan nor Dewey used the term research, but rather inquiry. Both terms are etymologically related, and both imply some form of seeking. Research is more concerned with wandering and circling, and inquiry (with a judicial undertone) is more concerned with truth. Dewey, after all, was talking about logic as specialized practice, not about design. Dewey, it is important to remember, did not grant reason, thinking, or inference the privileged position that the Platonic tradition did; he regarded them as other forms of practice. Consequently, he characterized science as a practice so specialized that it is hardly recognized as such. By choosing the term research, we are not implying that all designing is what has come to be known as (academic) Design Research, but rather that all designing involves the practice of intentionally, and systematically searching for something.

59 Johan Redström, "Certain Uncertainties and the Design of Design Education," *She Ji: The Journal of Design, Economics, and Innovation* 6, no. 1 (2020): 83–100, https://doi.org/10.1016/j.sheji.2020.02.001.

60 Ibid., 88.

61 Erik Stolterman, "The Nature of Design Practice and Implications for Interaction Design Research," *International Journal of Design* 2, no. 1 (2008): 55–65, http://www.ijdesign.org/index.php/IJDesign/article/view/240.

62 Redström, "Certain Uncertainties and the Design of Design Education," 89.

63 Richard Buchanan, "Design and the New Rhetoric: Productive Arts in the Philosophy of Culture," *Philosophy and Rhetoric* 34, no. 3 (2001): 183–206, https://doi.org/10.1353/par.2001.0012.

64 Vilém Flusser, *The Shape of Things: A Philosophy of Design*, trans. Anthony Mathews, 3rd ed. (1993; repr., London: Reaktion, 2012), 17.

65 Flusser, *Gestures*, 14.

Alexander's[66] and Donald Schön's,[67] has been instrumental in shaping the current view of designing as a distinct category of problem-solving.

Nonetheless, even though designing is an intellectual activity (and thus a kind of knowledge work), the knowledge that concerns design is fundamentally about form and function. Understanding a problem and planning its solution implies understanding its structure and its reasons — its logic. Crucially, as Lars Hallnäs[68] notes, in design, form is how things are built, both physically and conceptually (an argument, for example, has a form). Form has an expression, a meaning, and an effect, governed by aesthetic considerations that tell us how we should relate to that form — what we can and cannot do with it. Thus, in design, aesthetics has never been solely about shaping pretty things. Instead, it is about manipulating the aesthetics of physical and conceptual form to make a logic explicit. Aesthetics, understood not solely as beauty but as a logic of expression, is what most strongly guides a designer's judgments and decisions when they are traversing a problem space. While aesthetic considerations can be informed by cognitive science, business, sociology, and other sciences, a thorough understanding of form and expression is achieved through practice. In design, this understanding is obtained through craft, broadly understood as "the skill and mastery of working with materials and processes."[69]

The Importance of Craft for Design Knowledge

To consider design as merely problem-solving is not without contention. For example, Hugh Dubberly argues it could be misleading because it assumes that the problem is given and can be isolated from a broader complex "system in which it is embedded."[70] Additional issues include the assumption that the design process is linear, mistaking a correct answer for the solution space, confusing matters of reason and justification (what to do) with matters of method (how to do it), casting designers as experts across domains, confusing delivering with finishing, and assuming that systems can be treated in the same manner as discrete objects.

Design problems are not given; they must be shaped. The starting point of designing is often ambiguous, as it involves confronting an open situation that includes context, stakeholders, cultural circumstances, and technological constraints. Working on a problem means defining the situation while simultaneously exploring its potential solutions. In other words, it involves a co-evolution of the problem definition and the preferred solution[71] — hence Schön's[72] characterization of designing as a form of negotiation. Design situations are influenced by the circumstances, the people involved, their idiosyncrasies, and the available affordances and constraints. To that extent, every design situation is different, and its outcome is unpredictable. Because designing, unlike traditional craftsmanship, involves creating new things, no amount of prior experience or knowledge — even about similar situations — can guarantee a satisfactory solution. Glenn Parsons,[73] for example, has described this uncertainty as the "epistemological problem" of design, echoing Hume's problem of induction — which posits that we cannot make causal inferences concerning future events solely on the basis of a priori knowledge.[74]

66 Christopher Alexander, *Notes on the Synthesis of Form*, 7th ed. (1964; repr., Cambridge, MA: Harvard University Press, 1973).

67 Donald A. Schön, *The Reflective Practitioner: How Professionals Think in Action* (New York: Basic Books, 1983).

68 Lars Hallnäs, "On the Foundations of Interaction Design Aesthetics: Revisiting the Notions of Form and Expression," *International Journal of Design* 5, no. 1 (2011): 73–84, https://www.ijdesign.org/index.php/IJDesign/article/view/689/330.

69 Tim Marshall, "Craft," in *Design Dictionary: Perspectives on Design Terminology*, ed. Michael Erlhoff and Board of International Research in Design (Basel: Birkhäuser, 2008), 91.

70 Hugh Dubberly, "Why We Should Stop Describing Design as 'Problem-Solving,'" in *After the Bauhaus, Before the Internet: A History of Graphic Design Pedagogy*, ed. Geoff Kaplan (Cambridge, MA: MIT Press, 2022), 1877, available at https://www.dubberly.com/articles/why-we-should-stop-describing-design-as-problem-solving.html.

71 Kees Dorst and Nigel Cross, "Creativity in the Design Process: Co-evolution of Problem-Solution," *Design Studies* 22, no. 5 (2001): 425–37, https://doi.org/10.1016/S0142-694X(01)00009-6.

72 Schön, *Reflective Practitioner*, 55.

73 Glenn Parsons, *The Philosophy of Design* (Cambridge: Polity Press, 2015).

74 Leah Henderson, "The Problem of Induction," in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta and Uri Nodelman (Stanford: Stanford University, 2022), online, https://plato.stanford.edu/archives/win2022/entries/induction-problem/.

75 Buchanan, "Thinking about Design," 414.
76 Buchanan, "Strategies of Design Research," 64.
77 Richard Sennett, *The Craftsman* (New York: Penguin, 2009), 9.

Considering the intrinsic uncertainty of designing, craft remains a source of strength for the designer. As Buchanan has noted, prototyping (modeling) and drawing are the two traditional methods of design. The former, inherited from craftsmanship, allows designers to explore form, materials, and the relationships between parts and wholes—understanding the gestalt and, thus, the complexity of things. The latter, a skill shared with architecture and engineering, allows designers to visualize and externalize ideas, and "elevates the task of design thinking out of the hands of the craftsman."[75] Drawing is precisely what enables the kind of research and experimentation that Redström refers to, allowing for projection, planning, and communication beyond the constraints of the physical artifact. To paraphrase Buchanan,[76] drawings, models, and prototypes are "non-verbal materials" that not only characterize design work but also possess remarkable rhetorical power, helping stakeholders move beyond the rigidity and abstractness of purely verbal communication. Traditional craft skills are therefore not secondary to the thinking but rather the medium and embodiment of that thinking; they are the means to shape the problem space and shape its potential solutions.

As characterized by Buchanan, designing is a rhetorical inquiry in that the design process involves weighing competing arguments about the nature and form of the problem. Ultimately, the solution itself embodies an argument about appropriateness, form, and use. Along similar lines, sociologist Richard Sennett[77] views craftsmanship as a form of rhetorical dialogue, observing that "every good craftsman conducts a dialogue between concrete practices and thinking; this dialogue evolves into sustaining habits, and these habits establish a rhythm between problem-solving and problem finding." Sennett's characterization of craftsmanship, possibly influenced by Schön, transcends the traditional (and often derogatory) separation between manual labor and craftsmanship to encompass a broader conceptualization of work.

This perspective on craft highlights a concern with the materials and processes involved in any creation, whether tangible, like woodworking, or intangible, like software development. For Sennett, craftsmanship is not merely about the final product but about the dedication to continuous learning and improvement. In other words, the process of making things constitutes its own reward; craft is self-fulfilling. Craft, in this sense, involves ongoing skill development, where craftspeople continually refine their techniques and expand their tacit knowledge. This dedication to mastery and the pursuit of excellence distinguishes craft from the automatic, detached, task-oriented approach that often characterizes modern attitudes toward work.

The push to distance design from craft stems from an early desire to establish design as a legitimate intellectual pursuit that embraces changing technological circumstances. More recently, however, it has come to signal a profound misunderstanding of how designers acquire the knowledge of their trade and of what the academic tradition of design regards as design thinking. Hence, in our view, the thinking of designing cannot succeed in isolation from the craft of designing. To argue otherwise demonstrates the extent to which the managerialist belief—that one need not understand a

trade to manage it successfully—has permeated the contemporary understanding of design that dominates business contexts.

Managerialism, Pseudo-Productivity, and Bullshit Jobs

Managerialism is closely related to management, but the terms are not interchangeable. Management is a discipline with concepts that can be taught, a domain of knowledge that can be investigated through methodical research and practiced professionally. Its concerns are strategy, organizational structure, and control. Managers are people in organizations who make decisions about resource allocation; they practice management. Managerialism, on the other hand, originally referred to the belief system held by managers, heavily influenced by early twentieth-century American progressivism.[78] It was based on the notion that applying efficiency and rational principles to business and civil service could lead to material affluence and social harmony for most of the population. Over time, however, managerialism evolved into a one-dimensional, self-serving ideology that regards productivity and efficiency as the only measures of progress and is primarily concerned with perpetuating the power of managers.

Managerialism "combines management's generic tools and knowledge with ideology to establish itself systemically in organizations, public institutions, and society while depriving business owners (property), workers (organizational-economic) and civil society (social-political) of all decision-making powers."[79] Managerialism justifies the imposition of managerial processes and techniques to every area of human activity by claiming a monopoly on expertise—that is, on "the exclusiveness of managerial knowledge necessary to run public institutions and society as corporations."[80]

While the notion that any human organization should be managed like a for-profit company is central to managerialism, the core tenet of this ideology is that every human endeavor is amendable by managerial practices. In other words, managerialism not only argues that there is a single way to run organizations but also assumes that everything can be managed and controlled. Control, however, requires data; hence managerialism places importance on metrics, particularly the quantification of productivity. After all, management derives its authority from the idea that is a rational, objective discipline with universally applicable principles.

Managerialism's obsession with metrics frequently leads to their reification, resulting in a frantic chase for quantifiable outputs (regardless of their interest, relevance, or value) simply because they represent arbitrary measures of productivity. Consequently, managerialism promotes "pseudo-productivity,"[81] a phenomenon where observable activity is mistaken for meaningful effort. Pseudo-productivity is symptomatic of managers' anxiety that employees might engage in non-work-related activities while "on the clock." Hence, through micromanagement and an array of metrics that employees must comply with, managers gather evidence that employees are engaged in something—*anything*—marginally work-related,

78 Scott and Hart, "Exhaustion of Managerialism."
79 Klkauer, "What Is Managerialism," 1105.
80 Ibid.
81 Cal Newport, *Slow Productivity: The Lost Art of Accomplishment Without Burnout* (New York: Penguin, 2024).

reassuring them that employees are indeed working at all. It follows that managerialism is partly to blame for the emergence of what the late American anthropologist David Graeber[82] called "bullshit jobs."

Bullshit jobs tend to be white-collar and salaried, offering excellent conditions, and the people doing them are often respected professionals surrounded by prestige. Yet these jobs involve meaningless or unproductive tasks, such as paperwork, redundant administrative duties, or elaborate reporting processes that contribute little to the organization's goals. The defining qualities of a bullshit job are (a) being "so completely pointless that even the person who has to perform it every day cannot convince himself there's a good reason for him to be doing it," and (b) the jobholder feels obliged to pretend there is a good reason why their job exists even if they privately find this notion ridiculous.[83]

While most bullshit jobs are created from the outset, genuinely productive jobs are also being *bullshitized* due to managerialism's obsession with quantifying the unquantifiable and—more importantly—with automating work through computing.[84]

Computational automation involves abstracting processes, breaking them down into tasks, and translating the results into inputs that a machine can read.[85] For tasks governed by procedural logic (e.g., arithmetic), this is trivial. However, translating processes that involve judgment, common sense, and improvisation into machine-readable inputs is significantly more complex. This is why humans must perform the necessary semantic labor to "render the processes, tasks, and outcomes that surround anything of caring value into a form that computers can even recognize."[86] The rendering often takes the cumbersome forms, spreadsheets, and endless meetings to define metrics and clarify processes.[87]

Bullshit jobs are a consequence of the reification of productivity metrics and the need to justify managerial oversight. As an organization is overtaken by managerialism, meaningful work becomes swamped by administrative tasks, and countless new jobs are created to satisfy the growing demand for quantifying everyone's productivity. This is how managerialism has contributed to the bullshitization of knowledge work and creative work.

As design gained more prominence in business, managerialism further imposed its logic onto design practice. For example, designers working in the tech industry today have largely been "relegated to a place of formulaic processes."[88] The outputs they are expected to produce are no longer just artifacts or even experiences; instead, they are also required to provide quantifiable evidence that the methods used during the design process are rational, effective, and measurable—all under the guise of making design knowledge transferable, more efficient, and productive. Certainly, some of those tasks are necessary to understand the design situation and document the evolution of the design process. Nonetheless, the push to "turn design into a process-heavy, measurable function"[89] has significantly reduced the time designers have to actually do their jobs.

Furthermore, by downplaying and discouraging the traditional craft skills rooted in core competencies inherited from graphic and industrial design, managerialism has increasingly reduced design work to "a poor

82 Graeber, *Bullshit Jobs.*
83 Ibid., chapter 1.
84 Ibid.
85 Rodrigo Hernández Ramırez, "The Meaning of 'Good Design' in the Age of Smart Automation," *Journal of Science and Technology of the Arts* 12, no. 3 (2020): 100–114, https://doi.org/10.34632/jsta.2020.9490.
86 Graeber, *Bullshit Jobs*, chapter 7.
87 Alexandra Luong and Steven G. Rogelberg, "Meetings and More Meetings: The Relationship between Meeting Load and the Daily Well-Being of Employees," *Group Dynamics: Theory, Research, and Practice* 9, no. 1 (2005): 58–67, https://doi.org/10.1037/1089-2699.9.1.58; Steven G. Rogelberg et al., "Employee Satisfaction with Meetings: A Contemporary Facet of Job Satisfaction," *Human Resource Management* 49, no. 2 (2010): 149–72, https://doi.org/10.1002/hrm.20339; Derek Thompson, "White-Collar Work Is Just Meetings Now," *Atlantic*, July 9, 2024, https://www.theatlantic.com/ideas/archive/2024/07/white-collar-meetings-more-frequent/678941/.
88 Rune Madsen, "Product Design Is Lost," Design Systems International, April 17, 2024, https://designsystems.international/ideas/product-design-is-lost/.
89 Ibid.

man's version of an anthropology major where the act of design is mostly based on averaging user opinions."[90] The rise in managerial metrics and control results in job dissatisfaction among designers, who feel their skills are underutilized and their agency hampered. Additionally, it also eschews creative risks in favor of predictable outcomes, which eventually leads to homogenized solutions. Such an environment undermines the intrinsic value of design as a transformative discipline.

As managerialist expectations came to recast design as a thinking, procedural activity, designers in business contexts came to be viewed not as creative workers and makers of things but as consultants and strategists, curators, and interpreters of culture. In exchange for the prestige granted to design, businesses could benefit from the moral scaffolding that human-centered approaches bring to product and service design, and managers from the perception that implementing DT2 would increase creativity across the board. The reduction of designing to procedural thinking has significantly fueled the notion that automation could effectively take over design work.

GenAI, Is It Worth It for Design?

In previous sections, we discussed how the anxiety and the enthusiasm surrounding the potential of GenAI to revolutionize design stem from managerialism's narrow portrayal of design as a kind of procedural thinking detached from the tacit knowledge developed through craft. The charitable interpretation of this managerial *enframing*, to borrow Martin Heidegger's terminology[91] — is that by turning design into an instrument (embodied as pure method), the benefits of design can be democratized. However, the implications are more problematic: if designing is solely about process, that process can potentially be automated, meaning the fruits of design can be achieved without designers or, at best, with less skilled designers. In Flusserian terms, the understated possibility is that design can be reduced to a programmed function and designers to functionaries.

To counter this pessimistic view, one could argue that GenAI is not intended to supplant creative workers but rather to augment their capabilities. As suggested in previous sections, the notion that automation is mostly about enhancing people has been influential for design and related fields such as Human-Computer Interaction (HCI). However, this view overlooks that in a labor market, one actor's enhancement might imply another actor's diminishment — the "AI will not take your job, but someone using AI will" trope makes this zero-sum situation overtly clear. Furthermore, the fact that GenAI models were trained on unceded creative output scraped from the internet without consent is another example that illustrates our point, and to reinforce it, we can rely on the following vignette:

Alice is the senior managing editor at a publishing house with no artistic training. Bob is a freelance illustrator who regularly creates book covers for Alice. Alice begins experimenting with Midjourney and finds the results good enough. She decides to have her younger assistant, Mallory — also not an illustrator — generate the covers using Midjourney. Concluding that Bob's fees are too high, Alice terminates his contract. In a way, Midjourney

90 Ibid.

91 Martin Heidegger, "The Question Concerning Technology," in *The Question Concerning Technology and Other Essays*, trans. William Lovitt (1954; repr., New York: Garland Publishing, 1977), 3–35.

has democratized book-cover design and augmented Mallory's creativity, allowing her to produce illustrations in every conceivable visual style, *including those that resemble Bob's*, despite her lack of artistic skills. Bob is now without a job; indeed, "someone using AI" has replaced him.

An alternative scenario could involve a less scrupulous Bob using Midjourney to increase his productivity, accept more commissions, and even create illustrations in the style of Carlos, a famous illustrator he has long admired. Carlos, in turn, starts noticing illustrations eerily similar to his being sold for significantly less than his own rates, leading to a decrease in commissions.

In both cases, someone in the chain will benefit from someone else's loss. This outcome is partly due to the nature of our economic system, where such shifts are common, but also reflects a sentiment expressed in a popular quote circulating on social media: "The underlying purpose of AI is to allow wealth to access skill while removing from the skilled the ability to access wealth."[92]

Leaving aside the socioeconomic disruptions that GenAI can cause, we may turn our attention to the argument that this is not the first time a transformative technology has reshaped design. Surely computer-aided design (CAD), desktop publishing, and the internet have transformed the technical aspects of design. These technological developments have given rise to new subfields, such as interaction design and UX/UI. Software and digitization have also made many tasks easier for designers, as anyone who practiced design before the early 2000s can attest. However, we would argue that in every previous instance, the introduced technology was a tool or medium that a creative worker—not a technician—was still expected to wield, not (as with GenAI) a complex sociotechnical system explicitly introduced to partially or wholly replace the creative worker.

Given that design is a heterogeneous field, it may be further argued that different aspects of design work involve varying degrees of creativity and, therefore, that the more routinary tasks of designing might be less creative. The implication is that a designer—like unscrupulous Bob previously—could delegate those tasks to a GenAI system. This argument requires unpacking, and the response must be elaborated. First, the argument assumes that:

(1) there is an objective scale for evaluating creativity,
(2) routine and creativity are mutually exclusive,
(3) design tasks have different creative value, and
(4) they can be treated as discrete and judged independently within the design process.

Creativity is usually regarded as the capacity to generate ideas or things that are both new (original) and positively valuable.[93] Nonetheless, value is a matter of judgment; it is socially situated and hence does not exist as an intrinsic property of ideas or things. Therefore, we can reject premise (1). Creativity is judged against a tradition, and its value can change over time. This is why Alison Hills and Alexander Bird[94] argue that creativity is better characterized as "the set of linked dispositions of an individual (a) to have novel ideas (*originality*), (b) which are generated through use of the imagination (*imagination*), and (c) are many and varied (*fertility*), and (d)

92 https://x.com/Rahll/status/1835317659082133833.
93 Margaret A. Boden, "Creativity," in *The Routledge Companion to Aesthetics*, ed. Berys Gaut and Dominic McIver Lopes, 3rd ed. (2001; London: Routledge, 2013), 422.
94 Alison Hills and Alexander Bird, "Against Creativity," *Philosophy and Phenomenological Research* 99, no. 3 (2018): 694–713, https://doi.org/10.1111/phpr.12511.

to carry through these ideas to completion (*motivation*)." Both definitions highlight the importance of novelty for creativity, so it would be intuitive to conclude they support premise (2). However, to illustrate why we believe routine and creativity are not mutually exclusive, we present the following hypothetical situation:

Oscar and Peggy are two designers commissioned to redesign the visual identity of companies X and Y, respectively. Company X has a predetermined color palette and typographic choices, whereas Company Y has no constraints in that regard. Both Oscar and Peggy deliver successful solutions.

Given that vignette, could we determine which process was more creative? Is creating a color palette from scratch inherently more creative than applying an existing one to a new design? Was Paul Rand's decision to change the typography of IBM's logo from Beton Bold to City Medium in 1957 more creative than adding horizontal bars to it in 1972?

The fact that routine and the degree of creativity are not intrinsically in tension is evident in other domains. Kicking a ball is arguably the most routinary task for a soccer player, and playing the violin is the most routinary task for a professional violin player. Yet it would be nonsensical to suggest that their creativity is not directly tied to those routinary tasks. Moreover, it could be argued that their creativity manifests precisely because of their constant investment in these repeated tasks. Creativity is not a fixed attribute (arguing the contrary would be oxymoronic); rather, it must be developed. The belief that a designer can hone and sustain their creativity independently of routine design work—that is, of practice—is, in our opinion, symptomatic of the reductionist, managerialist recasting of designing as being purely about thinking. Creativity is not an attribute acquired once and then accessed at will; rather, it is a result of the frequent, practical, *intentional* interactions of a curious, caring mind with the materials of a given situation.

The analogies and vignettes hopefully clarify why we reject premises (2) and (3). However, someone might argue, for example, that since IBM's eight-stripe logo is likely one of the company's most valuable assets, this could be proof of its higher degree of creativity. To this, we would answer that the value—and therefore the perceived creativity—of any design, including a logo, is ultimately judged as a whole. Every design can be regarded as a complex system, both in terms of process and outcome; therefore, we cannot fully understand it by merely looking at its individual components. As Kurt Koffka[95] said, "the whole is something else than the sum of its parts." Consequently, premise (4) cannot be convincingly sustained. The implication is that knowing—to a sufficient degree of certainty—which specific design process tasks have more creative impact on the result is, at best, difficult, and therefore, abstracting them is even harder.

A final argument in favor of GenAI is that by interacting with these systems, designers could enhance their own creativity. The basis for that idea, in turn, are the notions that (a) GenAI systems could act as co-creators, helping designers visualize, test, and iterate ideas faster, or (b) they could offer designers alternative ways of looking at things, given the vast amount of data that models can handle. That notion relies on the belief that GenAI could exhibit some form of combinatorial creativity, which involves the "novel

95 Kurt Koffka, *Principles of Gestalt Psychology* (New York: Harcourt, Brace and Company, 1936), 176, available at https://archive.org/details/in.ernet.dli.2015.7888.

combination (or extensions) of familiar ideas."[96] This belief is seemingly corroborated by the fact that most GenAI models are capable of mimicking visual styles and remixing them onto new motifs and domains. A paradigmatic early example is Marcus Byrne's series of kitchen appliances in the style of Antoni Gaudí.[97] Nonetheless, all these notions stem from two interrelated premises:

(5) that AI (and, by extension, GenAI) is about making machines intelligent, and

(6) that GenAI understands the information it processes.

As noted in the introduction, the current boom in AI is driven by a paradigm shift in the design of AI systems, which consists of combining Self-Supervised Machine Learning (ML) methods with gargantuan datasets (mostly scraped from the internet). Similar ML methods have existed for some time. They are behind the complex optimization algorithms powering most smart features now considered standard in consumer technology, such as recommender systems, facial recognition, spam filters, speech generation, and image optimization. Thus, anyone who unlocks a smartphone using their biometrics to take a selfie while listening to Spotify is using a variety of AI-powered features.

Trained on datasets comprising billions of parameters, ML algorithms can construct massive statistical models of human-generated information, whether in the form of text, images, audio, or video. To simplify, information in these models is usually stored as tokens (e.g., pairs of words or phrases, in the case of language models). When a user inputs a prompt, the model tokenizes the text, weighs it against its own parameters, and then calculates the probabilities that a given token might logically follow another in a stochastic manner, ultimately outputting what it deems an appropriate response. In other words, the model does not *read* or write—it guesses based on statistics.

In text-to-image models, the process is similar, but instead of outputting text, the model starts with a canvas of visual noise (i.e., random pixels) and reorganizes it into a visual pattern that, to a human, resembles what the prompt described. Again, the model does not *see* or draw; it simply calculates the likelihood that a given set of pixels should be positioned alongside another.[98] GenAI models have no concept of what the image represents, that is why they are notoriously inept at representing certain parts of the human body, such as hands.

Contrary to what is often implied by proponents of the technology, GenAI systems do not understand what they are doing, nor do they comprehend the context in which they operate. GenAI models do not reason; they do not experience anything whatsoever. They are, to put it bluntly, stupid.[99] This limitation was recently highlighted by a research team from Apple, who argued that "current LLMs are not capable of genuine logical reasoning; instead, they attempt to replicate the reasoning steps observed in their training data."[100] Another study[101] found that LLMs are "very poor at verifying solutions" and even worse at critiquing their own responses. This is relevant because they also perform poorly at iterative prompting, meaning they are unreliable for tasks involving multiple steps. This lack of consistency is evident to anyone who has used GenAI and tried to generate the same image

96 Boden, "Creativity," 437.

97 Christina Vergopoulou, ed., "AI-Generated Series Redesigns Vibrant Household Appliances in Gaudí's Aesthetic," *Designboom Architecture & Design Magazine*, December 11, 2022, https://www.designboom.com/design/artificial-intelligence-vibrant-household-appliances-gaudi-marcus-byrne-12-11-2022/.

98 It is important to note that the above description is that of a "diffusion model," and that there are other methods currently being developed to achieve more or less the same results. It is, however, out of the scope of this article to give a proper account of the matter.

99 Bishop, "Artificial Intelligence Is Stupid."

100 Mirzadeh et al., "GSM-Symbolic."

101 Kaya Stechly, Matthew Marquez, and Subbarao Kambhampati, "GPT-4 Doesn't Know It's Wrong: An Analysis of Iterative Prompting for Reasoning Problems," arXiv, submitted on October 19, 2023, p. 8, https://doi.org/10.48550/arXiv.2310.12397.

more than once using the same prompt. Given the above, premise (6) cannot be upheld.

Regarding premise (5), as Luciano Floridi[102] notes, the field of artificial intelligence has not yet been successful in making genuinely intelligent machines by any standard. Instead, it has been successful in *divorcing* the capacity to carry out tasks that we associate with intelligence from the need to possess intelligence. It follows that GenAI is not focused on producing creativity but rather mimicking the results of creative cognition. In other words, GenAI is a pantomime of intelligence best characterized as "a reservoir of smart agency on tap."[103] Therefore, premise (6) must be rebuked.

GenAI models operate by weighing and averaging numerical values, not by judging semantics, appropriateness, and coherence. While GenAI is very effective at remixing visual styles, its approach is based on stereotypes rather than archetypical features. For training foundation models, datasets must be curated and tagged by humans, and it is during this process that biases of all kinds, including aesthetic ones, are introduced. Data curation and content moderation are extremely exploitative jobs that are often outsourced to countries in the global south. Given the nature of their work—repeatedly viewing images and clicking classifications—these workers have little incentive to carry out culturally sensitive and aesthetically complex data curation. In other words, what GenAI models ultimately combine is the collective aggregate of commonplaces, stereotypes, and biases that dominate much of the internet.

GenAI itself is not creative. Since it does not think and therefore lacks intentionality, it cannot generate many and varied original ideas through imagination, nor can carry them to completion. Furthermore, as it merely remixes styles based not on the careful logic of a genuine aesthetic judgment but on a mindless combination of stereotypes and formulaic tropes, that is why it is unlikely to serve as an effective source of inspiration for designers.

It could be argued, however, that a skilled designer with considerable training in prompting might be able to guide a GenAI system to produce satisfactory outcomes effectively. Yet the time spent not only steering the machine but also policing it to avoid blatant errors would be best spent carrying out the task themselves. In its current state, GenAI may allow people without skill to produce average-looking, human-like content, giving them a sense of enhanced creativity. However, GenAI does not provide significant creative enhancement for a seasoned professional. This conclusion is corroborated by a recent study showing that when creative workers are involved, the use of GenAI diminishes collective novelty.[104] In other words, laypeople who use GenAI might feel more creative, but the outputs are so derivative that they have little impact on the creativity of creative professionals. Furthermore, since GenAI has a strong tendency to hallucinate, constant oversight is required. In this regard, it is no different from other forms of automation, since even the most advanced automated systems require constant human involvement to work properly—an irony that is well documented by Human Factors literature.[105]

At this point, it is worth remembering that GenAI is far from sustainable due to the vast amounts of energy and water it consumes. Given that climate

102 Luciano Floridi, *The Ethics of Artificial Intelligence: Principles, Challenges, and Opportunities* (Oxford: Oxford University Press, 2023), https://doi.org/10.1093/oso/9780198883098.001.0001.

103 Ibid., 18.

104 Anil R. Doshi and Oliver P. Hauser, "Generative AI Enhances Individual Creativity but Reduces the Collective Diversity of Novel Content," *Science Advances* 10, no. 28 (2024): eadn5290, https://doi.org/10.1126/sciadv.adn5290.

105 Lisanne Bainbridge, "Ironies of Automation," *Automatica* 19, no. 6 (1983): 775–79, https://doi.org/10.1016/0005-1098(83)90046-8; Barry Strauch, "Ironies of Automation: Still Unresolved After All These Years," *IEEE Transactions on Human-Machine Systems* 48, no. 5 (2018): 419–33, https://doi.org/10.1109/thms.2017.2732506; Mark S. Young and Neville A. Stanton, "To Automate or Not to Automate: Advocating the 'Cliff-Edge' Principle," *Ergonomics* 66, no. 11 (2023): 1695–1701, https://doi.org/10.1080/00140139.2023.2270786.

change is an undeniable emergency, we must ask whether GenAI adds anything essential to design practice. What does it take away? Is the technology truly necessary at all to achieve innovation? Is it genuinely useful? Is it genuinely efficient? Or are we simply buying into the hype? So far, GenAI has done little to convincingly prove that it is the transformative force its proponents claim it be.

GenAI reduces design tasks to functional outputs, turning them into mechanical calculations that bypass the expertise honed through years of iterative learning and judgment in practical design work. However, skills that appear repetitive or low in creative value serve as the foundation for the complex decision-making and the higher-level thinking associated with senior design work. The utilitarian impulse to automate design overlooks the fact that craft-based learning—whether gained during a design degree or within a professional studio—is an intrinsic part of the intellectual value of design.

One could argue that two forces challenge a craft perspective of design work: (1) technological advancements, which are often linked to a declining number of junior roles in design and other fields as routine tasks become increasingly automated, and (2) recurrent economic recessions, which undermine society's ability to absorb higher education graduates.[106] In other words, the combination of technological progress and global economic instability reduces the demand for highly skilled professionals, creating concerns for those entering the job market.

We must, however, distinguish between political and academic concerns. Economic cycles fluctuate, and crises are becoming briefer due to global efforts, such as vaccination campaigns during the Covid-19 pandemic. Therefore, a university's mission cannot be dictated solely by economic conditions, which are volatile, brief, and difficult to predict. Instead, the primary focus of an academic field such as design should be on advancing its ontological and epistemological foundations. The core understanding of what constitutes design work must not shift with every technological novelty; designing has aspects that remain stable despite changes in the technologies it employs.

Furthermore, the decision to pursue a design education should rest with the individuals who choose to enroll in such programs, regardless of whether there is an immediate job market or a clear professional path awaiting them. Motivations to study design vary from person to person, and design is worth studying for its intrinsic value and contributions to human culture. The value of a design education extends beyond utilitarian job prospects—it lies in understanding design as an intellectually rich activity.

A utilitarian perspective sees the automation of routine design tasks with GenAI as inevitable and even desirable. However, GenAI proponents have yet to demonstrate its effectiveness within professional design project workflows. Moreover, a task-oriented, pro-automation perspective overlooks the essential role these tasks play in the development of junior designers. While such tasks may seem repetitive, they require judgment and the ability to adapt to sudden changes in requirements—qualities that require experience to cultivate. Automating these tasks strips junior designers of

106 Peter Turchin, "Political Instability May Be a Contributor in the Coming Decade," *Nature* 463 (February 2010): 608, https://doi.org/10.1038/463608a.

the opportunity to cultivate their skills through engagement with routine work. If automated, these skills will disappear, and the quality of design will diminish. Procedural tasks, while not necessarily high-level cognitive activities, are far from mindless. They serve as a training ground where junior designers learn and refine their craft, exposing them to real project workflows and helping them understand how a design project unfolds.

There is a continuum of skill development from junior to senior designers. Senior designers are responsible for art direction, complex decision-making, and strategic thinking. However, their expertise is not acquired in isolation; it builds upon years of hands-on experience with design work. Junior designers slowly understand what is involved in a complex design project by engaging in routine design tasks early in their careers. This experiential learning prepares them to gradually take on roles with greater responsibility, progressing from executing routine tasks to making design choices and eventually leading projects.

Reducing hands-on experience through automation disrupts this continuum. This situation can create a skill gap where future senior designers lack the foundational knowledge gained from firsthand engagement with routine tasks. The learning curve in design is steep, and the absence of entry-level opportunities makes it hard for novice designers to reach competency, let alone mastery. It also weakens the apprenticeship-like structure within design studios, where senior designers guide junior team members towards professional growth. While this way of conveying knowledge does not sit well within a managerialist enframing, we can reinforce our point by looking at other professions — such as medicine, architecture, and law — where practical skills acquired through apprenticeship remain the norm.

Viewing design as a craft implies seeing designers as individuals responsible for making decisions about their work and comfortable following an unpredictable process. Yet, both assumptions are at odds with the notion of work as a measurable and task-oriented activity. Unfortunately, the latter view pervades contemporary work and academic managerialist environments.

Conclusions

As we look toward the future of design work, it is hard to ignore GenAI's possible impact on automating tasks that were once the domain of designers. Proponents argue that these tools increase efficiency and unlock new possibilities, but so far, the evidence points to error-prone models delivering subpar results at a considerable environmental cost. While the models may improve, the current evidence shows otherwise. The tendency of GenAI models to hallucinate and generate misleading outputs will not be resolved by simply adding more information to their training data more frequently. This approach will only increase energy and water consumption and produce more toxic e-waste. GenAI models have already processed most of the information available online. If that was not enough, then what will be?

In this position paper, we reviewed the current state of GenAI technology, the discourse around it, and the concept of design work. Our argument

marks a particular moment in time and proposes caution and a critical approach to the embrace of GenAI within creative work.

GenAI devalues design, turning it from a craft-based, human-centered creative practice into a set of procedural tasks. This commodification could devalue design education as well, reducing it to a narrow set of skills focused on operating AI tools rather than a deep understanding of design that takes years to develop. We have seen this happen before; when desktop publishing first came into force many people believed that designers could simply be turned into technicians and that design required little more than learning the appropriate software. The more tasks we attempt to delegate to GenAI, the more the future of design work aligns with managerialist ambitions, leading designers to lose the critical thinking, judgment, and creativity necessary to tackle complex problems.

Clarifying our conception of design work has implications for design methodology (the study of design methods), design epistemology (what designers know, do not know, and should know), and design ontology (what design is). This could lead to a design theory that centers designers, which builds from what they do rather than prescribing what they *should* do and how they should do it. Also, a more robust understanding of design work could insulate the field from the negative impacts of managerialism and the growing anxiety regarding technological developments, including GenAI. While fears of AI replacing designers are largely misplaced, the discipline's vulnerability has become evident since GenAI became publicly available, with reactions swinging between panic and coping. Both attitudes reflect a technological deterministic perspective—AI is inevitable and unstoppable—and an insecurity about the value of design work.

We agree design education should adapt and evolve alongside society and technology. However, this change should not come at the expense of the primary goal: nurturing designers, not creative cognitive scientists or engineers. Design students should learn just enough about other disciplines like business, science, engineering, or psychology to work without being micromanaged. Designers should be prepared to argue for the value of making as the defining characteristic of material culture and confidently claim the role and responsibility of design in that realm.

To that end, in this article, we argued that design is not a generic process that can be reduced to a procedure or an algorithmic function. Design is a craft, in the broadest sense: the enduring human impulse to do a job well for its own sake. It requires deliberate practice, learning by doing, and years of experience in a specific domain to achieve expertise and, eventually, mastery. Design is also not magic; it is not a trick that can be summoned by clicking a button or writing a clever prompt. Design is hard work. It takes time, effort, knowledge, and skill. Design work underlines the human impulse to transform the world—not simply reproduce it in a different package, as GenAI does. A fundamental assumption of design is that the world is not as it should be. While the hard sciences aim to describe how things are and how the natural world is organized, and the arts and humanities explore what things mean and what symbolic, cultural, and spiritual forces animate our world, design is concerned with how things *could* be. Design work is the daily

pursuit of changing current situations into preferred ones—because that particular change is necessary.

Declaration of Interest

There are no conflicts of interest involved in this article.

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