she ji
[ʃə: ʤi:]

DARN (Part 1): What Is Strategic Design? Social Theory and Intangible Design in Perspective

Koray Caliskan
Matt Wade

Keywords
Strategic design
Methodology
Actor-Network Theory
Prototyping
Research

Received
May 21, 2022
Accepted
October 28, 2022

KORAY CALISKAN
Parsons School of Design, The New School, USA (corresponding author)
caliskak@newschool.edu

MATT WADE
The Wrong Department, London and New York
matt@thewrongdepartment.com

Abstract
This article presents the first part of a study that proposes an evidence-based research and prototyping method for strategic design. Analyzing the emergence of strategic design, we argue that a historically unprecedented rapprochement between intangible design and social research opens a spectrum of possibility for conducting design and science in a new way. First, we examine the emergence of strategic design and discuss its institutionalization in academic and professional contexts. Second, we summarize the three ways of approaching strategic design: (1) discipline, (2) practice, and (3) attitude. Third, drawing on the social sciences as inspired by Actor-Network Theory (ANT), we define strategic design as an evidence-based creative practice informed by the social sciences. We propose a new way to arrange or remake the interaction between devices (D), actors (A), representations (R), and networks (N) in any given organization or problem universe. Preparing a groundwork to develop a research and prototyping method for strategic design, this article ends with a methodological discussion as a segue to Part 2 (available in this issue of *She Ji*) that presents DARN as a theoretical toolkit for strategic designers.

© 2022 Koray Caliskan and Matt Wade.
Published by Elsevier B.V. on behalf of Tongji University. This is an open access article published under the CC BY-NC-ND license (https://creativecommons.org/licenses/by/4.0).
Peer review under responsibility of Tongji University.

http://www.journals.elsevier.com/she-ji-the-journal-of-design-economics-and-innovation
https://doi.org/10.1016/j.sheji.2022.10.001

Introduction and Summary

The beginning of the twenty-first century has marked a rapprochement between social sciences and design. Collaborating with historians and moving beyond the limited toolkit of methodological individualism and structuralism, social scientists have begun to theorize and measure the impact of intangible and tangible things on humans. In illustrating agency, researchers have shown that material things have an identifiable effect on how organizations and humans behave. At the same time, design scholars and practitioners have started to study more thoroughly the actors who use the things that they make, incorporating the social sciences in their prototyping practice.

With the emergence of strategic design at the end of the twentieth century, we have witnessed an emergent agreement. Strategic designers have begun to use prototyping strategies for organizations to reach their goals and objectives through simultaneous design and social research. Pioneer academic programs are now teaching social research as part of their curriculum delivery. As well, a growing number of designers and scientists are working together to merge their competences in unprecedented ways. We have figured out the importance of *the social life of the thing* and *the actor-things in the social* almost simultaneously.

This double movement has had allies. Social scientists from organization studies, sociology, anthropology, management studies, science and technology studies (STS), and their sister disciplines have supported the rapprochement of designers and scientists. First, approaches inspired by the Actor-Network Theory (ANT) have shown the empirical accuracy of designerly approaches (*things make us do things*). Their theoretical groundwork was based on a radically new point of entry to make sense of our worlds, proposing a diverse ontology of human and non-human actors. Second, an increasing number of social scientists has carried out research on sociology, anthropology, politics, and philosophy of design. Some have claimed the scientificity of design itself, by proposing it to be a liberal arts discipline.[1]

It is during such a partnership that strategic design emerged with competing yet ancillary definitions and practice priorities. We observe three ways in which strategic design is approached in the literature. The first approach entails seeing strategic design as a new discipline that aims to address limited (organizational) or larger (social) problems. Informed by Herbert Simon's goal of bringing research and design together to make a new "science of the artificial," this approach has worked on making visible the disciplinary uniqueness and emergent integrity of strategic design.[2]

The second cluster in the literature has approached strategic design from the vantage point of its practitioners' characteristics. This approach to strategic design emerged at a time when disciplinary uniqueness and integrity have begun to be seen as a liability with the proliferation of transdisciplinary approaches that critique disciplinary silos. Openness to change, tolerance of ambiguity, empathy, willingness to cooperate, and many other designerly qualities were discussed as a way to locate what strategic design is and does.[3]

1 Richard Buchanan, "Wicked Problems in Design Thinking," *Design Issues* 8, no. 2 (1992): 5, https://doi.org/10.2307/1511637.

2 Herbert A. Simon, *The Sciences of the Artificial*, 3rd ed. (Cambridge, MA: MIT Press, 1996); Richard Buchanan, "Wicked Problems in Design Thinking"; Tim Brown, "Design Thinking," *Harvard Business Review* 86, no. 6 (2008): 84, https://hbr.org/2008/06/design-thinking.

3 Brown, "Design Thinking"; Mariana V. Amatullo, *Design Attitude and Social Innovation: Empirical Studies of the Return on Design* (PhD dissertation, Case Western Reserve University, 2015), https://etd.ohiolink.edu/apexprod/rws_olink/r/1501/10?p10_etd_subid=102719&clear=10; Nigel Cross, *Design Thinking: Understanding How Designers Think and Work* (New York: Berg, 2011); Bryan Lawson, *What Designers Know* (Oxford: Architectural Press, 2004); Richard J. Boland Jr. and Fred Collopy, eds., *Managing as Designing* (Redwood, CA: Stanford University Press, 2004).

Finally, the third approach has chosen to locate strategic design not as an independent discipline, with its own ontological or epistemological foundation, but as a novel creative *process* that has brought together elements of science and design in order to pragmatically solve or set problems in organizational settings.[4] Calling it at times design process or design thinking, these approaches locate a specific approach in research and making, and then stress this particular process as the defining characteristics of strategic design. By and large, they made visible how four main practice sets of strategic design — that is, research, ideation, prototyping, and testing — are and can be deployed within a unitary practice area of strategic design.

We think that these simultaneously contending and intersecting visions have worked as a performative intervention to strategic design and thus contributed to the making and institutionalization of it as a designerly-scientific space of practice. We observe that the literature has proposed many prototypes of strategic design as a way of realizing it; thus, we treat them not as mutually exclusive or even competing approaches, but as parts of a larger strategic design "prototyping" process with a diversity of stress and focus. For example, ThinkPlace Global founders, in collaboration with their colleagues, proposed a rich and usable guide for other professional actors to steer and apply to strategic design in complex systems.[5] Similarly, government funded agencies like the now closed Helsinki Design Lab, pioneered the use of easy to adopt structures, processes and language to describe how strategic design can be put to action on the ground.[6]

However, despite this richness, we agree with scholars and practitioners of strategic design that there is a methodological gap in the literature regarding the social theoretical framework that could be used by strategic designers in research and prototyping.[7] The first approach locates strategic design as a discipline or practice area, yet without elaborating on the theoretical bedrock of such a disciplinary formation. The second approach locates the characteristics of the designer without discussing how such qualities must be deployed on the ground and following what kind of methodological concerns. The third approach locates what is to be done during the strategic design process, without explicating how to carry out these steps in each module of designing strategy, and at times confusing practical techniques with social theory grounded method. Yes, we should do research, but how? Where and how to look, and with what kind of theoretically grounded lens? For example, how are we to map an organizational universe that produces distributed action? How should we use our findings in design research to prototype intangible tools, network architectures, new representations, or even forms of agency? How are we to apply general models to specific contexts? How should we create structure without limiting the flow of ideas and creativity? Strategic designers seem to pursue a well-developed process of research and design, built on an under-developed and vague set of methodological rules of thumb.

An excellent recent study on the emergence and institutionalization of strategic design has shown that such a gap is experienced in the everyday

4 For a fine review of this literature see Carmenza Gallego, G. Mauricio Mejía, and Gregorio Calderón, "Strategic Design: Origins and Contributions to Intellectual Capital in Organizations," *Journal of Intellectual Capital* 21, no. 6 (2020): 873–91, https://doi.org/10.1108/JIC-10-2019-0234.

5 John Body and Nina Terrey, *Design for a Better Future: A Guide to Designing in Complex Systems* (London: Routledge, 2019).

6 "Helsinki Design Lab," accessed September 15, 2022, http://helsinkidesignlab.org/.

7 Camilla Buchanan, *What Is Strategic Design? An Examination of New Design Activity in the Public and Civic Sectors* (PhD dissertation, Lancaster University, 2020), https://doi.org/10.17635/lancaster/thesis/1127.

practice of strategic designers, who reported "a lack of shared vocabulary and methods" as a common weakness of strategic design.[8] Defining this gap in the literature, a variety of approaches have shown the ways in which strategic design has been institutionalized by the combined efforts of these three approaches and presented ANT as the most viable and practical meta-theoretical approach to be used in Design.[9] Contributing to this literature and incorporating recent advances in and around ANT approaches, we propose an updating of ANT to DARN, more specifically to the DARN approach for strategic design.

Below, we first discuss how the social scientific and designerly literature, as well as new design firms and organizations have contributed to the institutionalization of strategic design as an established practice and organizational change perspective. Second, we discuss how DARN as a new iteration of ANT can address the methodological gap in design research and practice.

From ANT to DARN: An Updated Theoretical Model

When Michel Callon named the focus of his new approach "Actor-Network" in 1986, he proposed it to research how actors and networks share a responsibility together, perhaps like conjoined twins, in giving birth to distributed action.[10] "Theory" did not mean a unique ontological or epistemological foundation for him. It was a call to resist the temptation of locating an "in the final analysis" as *a priori* dynamic either in explaining "X"—something—in terms of the unintentional consequence of intentional individual actors' choices (methodological individualism), or analyzing X as an outcome of the network structures that configure a spectrum of action and set of preferences for actors to follow (structuralism). Receiving their doctorates during the Cold War era with academic politics of right-wing individualism vs. left-wing structuralism, ANT scholars such as Bruno Latour, John Law, and Callon did not propose a middle ground. They chose to build an entirely new approach that had revolutionary consequences for the sciences and design.

As ANT developed in a variety of disciplines—such as sociology, anthropology, organization studies, and science and technology studies (STS)[11]—scholars have developed a tendency to drop the T, following critiques of using ANT as a theory.[12] Instead, they began to approach complex problems by locating how actors and networks are embroidered in specific *agencements*, assemblages, or actor-network contexts. As empirical studies began to analyze social and distributed action more closely, ANT scholars demonstrated how, in addition to Actor-Networks, things and devices have been playing a formative role in the assemblage of action. From refrigerators to computers, from smart-phones to guns, it has been empirically established that the presence and absence of devices in socio-technical networks configure a spectrum of action for agents.[13]

In design more than any other practice, things assume an important, even central role: the reason is that designers make things. Most of the time, the thing itself carries an agency potential that affects actors' choices, such as a speed bump near a school.[14] It is the bump, a speed control device produced and placed on the network of roads, that makes it possible to address the

8 Ibid., 215.

9 Cristiano Storni, "Unpacking Design Practices: The Notion of Thing in the Making of Artifacts," *Science, Technology, & Human Values* 37, no. 1 (2012): 88–123, https://www.jstor.org/stable/41511157; Cristiano Storni et al., "Designing Things Together: Intersections of Co-design and Actor-Network Theory," *CoDesign* 11, no. 3-4 (2015): 149–51, https://doi.org/10.1080/15710882.2015.1081442.

10 Michel Callon, "Pour une sociologie des controverses techniques," *Fundamentia Scientiae* 2, no. 3 (2006): 381–99, https://doi.org/10.4000/books.pressesmines.1196. Also see Michel Callon, "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of Saint Brieuc Bay," *Sociological Review* 32, no. S1 (1984): 196–233, https://doi.org/10.1111/j.1467-954X.1984.tb00113.x; Michel Callon, "The Sociology of an Actor-Network: The Case of the Electric Vehicle," in *Mapping the Dynamics of Science and Technology*, ed. Michel Callon, John Law, and Arie Rip (London: Palgrave Macmillan, 1986), 19–34, https://doi.org/10.1007/978-1-349-07408-2_2.

11 Bruno Latour, "On Recalling ANT," *Sociological Review* 47, no. 1 (1999): 15–25, https://doi.org/10.1111/j.1467-954X.1999.tb03480.x; Annemarie Mol, "Actor-Network Theory: Sensitive Terms and Enduring Tensions," *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 50, no. 1 (2010): 253–69, https://hdl.handle.net/11245/1.330874; John Law, "Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity," *Systems Practice* 5 (August1992): 379–93, https://doi.org/10.1007/BF01059830; Callon, "The Sociology of an Actor-Network"; Koray Caliskan, "Polanyi, Callon, and Amazon: Institutionalist, ANT, and DRAN Approaches to Platform Economies," *Sociologica* 14, no. 3 (2020): 195–204, https://doi.org/10.6092/issn.1971-8853/11748.

12 Latour, "On Recalling ANT."

13 Sandrine Barrey, Franck Cochoy, and Sophie Dubuisson-Quellier, "Designer, packager et merchandiser: Trois professionnels pour une même scène marchande," *Sociologie du Travail* 42, no. 3 (2000): 457–82, https://doi.org/10.4000/sdt.36965; Fabian Muniesa, Yuval Millo, and Michel Callon, "An Introduction to Market Devices," *Sociological Review* 55, no. 2 (2007): 1–12, https://doi.org/10.1111/j.1467-954X.2007.00727.x; Gay Hawkins, "The Performativity of Food Packaging: Market Devices, Waste Crisis and Recycling," *Sociological Review* 60, no. 2 (2012): 66–83, https://doi.org/10.1111/1467-954X.12038; Katy Mason, Hans Kjellberg, and Johan Hagberg, "Exploring the

problem of actors speeding around a school. Yet, things are not always tangible. Imagine new algorithms that optimize fuel consumption in cars used by car manufacturers. They also change car speeds, again by an embedded device used by actors, cars, and networks; still, they display intangible material qualities. However, the intangible things are much harder to locate. This is what strategic designer Dan Hill calls "dark matter," channeling physicist Fritz Zwicky, who in the early twentieth century identified the importance of the material that affects how the universe behaves but that we cannot see.[15] Importantly, because of the critical role that intangible things play in agency potential on the ground, most of the things that strategic design practitioners deal with are intangible. We argue that the proliferation of intangible things, in parallel with the expansion of economic digitalization, marks an increasing need to incorporate things, especially intangible ones, in our methodological approach to prototyping and research in strategic design.

The Emergence and Institutionalization of Strategic Design

Design is an evolution of what craftsmen have been doing for millennia. For Richard Sennett, we have been "striving to do things well" since we emerged as a species.[16] Contrary to expectations, craftsmen survived and proliferated even as capitalist economization relations came to dominate the world of production and exchange.[17] With the emergence of modern consumerism and in response to the proliferation of labor division in capitalist economization processes, a more professionalized and incorporated version of making emerged in the West: design.

First, the Arts and Crafts movement of the late nineteenth century questioned the role of the craftsman in the cycle of ideas, quality, and production as a reaction to the rising division of labor that began to separate design and production. Then, groundbreaking design schools such as the Bauhaus emerged in Germany and America. So did streamlining modernists such as Raymond Loewy. Altogether, they cemented the formative role of design in the production of goods. In this first wave of design, all these new things were tangible.

Following the period above, a new wave of design practice emerged that centered around the intangible design of visual things. These designs entailed a story embedded in the brand awareness of an organization and the representations of its products and services. Building on the earlier power of Russian Constructivism and success of wartime propaganda, this shift began in post-war America when advertisers started to incorporate psychological studies to determine consumers' hopes and fears about everyday life. They realized that they could use the power of persuasion to turn desires into needs. As Vance Packard noted, soap detergents were no longer marketed to homemakers based on their cleaning performance but rather as a product defining self-worth. Air conditioners were marketed to those who fear crime as an opportunity to keep windows closed rather than a way to keep homes cool.

Building on these shifts in advertising, companies realized that their corporate image had more power over the mind of the consumer than the reality

Performativity of Marketing: Theories, Practices and Devices," *Journal of Marketing Management* 31, no. 1-2 (2015): 1–15, https://doi.org/10.1080/0267257X.2014.982932; Liz McFall, "Devices and Desires: How Useful Is the 'New' New Economic Sociology for Understanding Market Attachment?," *Sociology Compass* 3, no. 2 (2009): 267–82, https://doi.org/10.1111/j.1751-9020.2009.00195.x; Philip Roscoe, "'Elephants Can't Gallop': Performativity, Knowledge and Power in the Market for Lay-Investing," *Journal of Marketing Management* 31, no. 1-2 (2015): 193–218, https://doi.org/10.1080/0267257X.2014.976584.

14 For a discussion of speed bumps in ANT see Bruno Latour, *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, MA: Harvard University Press, 1999), 189.

15 Dan Hill, *Dark Matter and Trojan Horses: A Strategic Design Vocabulary* (Moscow: Strelka, 2012).

16 Richard Sennett, *The Craftsman* (New Haven, NJ: Yale University Press, 2008).

17 Julia Elyachar, *Markets of Dispossession: NGOs, Economic Development, and the State in Cairo* (Durham, NC: Duke University Press, 2005); Raphaële Chappe and Cynthia Lawson Jaramillo, "Artisans and Designers: Seeking Fairness within Capitalism and the Gig Economy," *Dearq* 26 (2020): 80–87, https://doi.org/10.18389/dearq26.2020.09.

of the goods that they made. This led to a large-scale adoption of brand design to focus corporate direction and the use of myths and symbols as intangible devices in order to influence the interpretation of tangible goods.[18]

The rise of large-scale computer systems in the 1980s, increasing access to the internet in the 1990s, and the "handheldization" of mass consumer digital technology in the 2000s removed the final steps of comprehension. They hid the way things work under multiple layers of complexity while mixing physical and virtual experience. At the same time, opening up big data allowed corporations to look for patterns determining behavioral trends in consumer habits. This initiated a cycle of consumption and control where the only effective difference between two competing products is now understood through intangible brand propositions.[19]

This led to the third wave of design. Emerging at the end of the twentieth century, this third wave moved abstraction to an entirely new and revolutionary plane.[20] Designers began to figure out ways to bring together science and design processes to propose strategies and new organizational devices, agencies, representations, and networks. From design thinking to systems thinking, from social, speculative design to service, transdisciplinary, and strategic design, a new generation of designers began to address the problems facing organizations.[21] This turn in design required a more frequent engagement of designers with social scientists in management studies, sociology, anthropology, economics, and political science, as well as social and behavioral psychology.[22]

At this point in history, Simon's *Sciences of the Artificial* emerged as a common reference point, a quarter century after it was first published. Implicitly drawing on the American pragmatist philosopher Albert Spencer and the mathematician Seymour Papert, designers figured out, or perhaps remembered, the value of what craftsmen had been practicing for millennia: making as thinking. They began using this concept to find a common ground for bringing science and design together. The power of abduction, deployed together with the powers of the social sciences, produced an entirely novel way of relating things to each other,[23] leading to a new understanding of intangible things and proposing a new way of knowing—the designerly way, as Nigel Cross called it.[24] Instead of thinking about a methodology of new design, Bruce Archer even proposed design itself as a new methodology.[25]

This emergent intangible and relational design practice gave birth to and was born in new design programs in universities, such as Parsons' Strategic Design and Management or Transdisciplinary Design at The New School in the United States, Politechnic di Milano's Design Strategy in Italy, and Goldsmith College's Design in the United Kingdom. It was also visible at such design firms as IDEO, and at public agencies such as DesignLab in Helsinki, in scientific-designerly peer-reviewed journals such as *Design Studies and Design Issues*. Academics, practitioners, and organizational actors began to design new interventions as they also worked on figuring out what they were doing. This gave birth to three distinct ways of defining and describing strategic design.

Strategic Design as Discipline

Early theorists and practitioners of strategic design developed an approach to strategic design as a bounded and independent discipline or a liberal arts

18 Vance Packard, The Hidden Persuaders (New York: Pocket Books, 1958).

19 Such a move perhaps entailed realizing Baudrillard's concept of "marginal difference" from many years before its original formulation. See Jean Baudrillard, *The System of Objects* (London: Verso, 2005).

20 Hazel Clark and David Brody, "The Current State of Design History," *Journal of Design History* 22, no. 4 (2009): 303–8, https://doi.org/10.1093/jdh/epp042.

21 Valtonen's recent works present perhaps the most comprehensive summary of the literature, with a convincing discussion of the emergence and development of these branches of intangible design. See Anna Valtonen, "Approaching Change with and in Design," *She Ji: The Journal of Design, Economics, and Innovation* 6, no. 4 (2020): 505–29, https://doi.org/10.1016/j.sheji.2020.08.004. Also see Anna Valtonen and Petra Nikkinen, eds., *Designing Change: New Opportunities for Organisations* (Aalto: Aalto University, 2022), https://shop.aalto.fi/p/1699-designing-change/.

22 For a general discussion, see Ray Holland and Busayawan Lam, *Managing Strategic Design* (London: Palgrave. 2014).

23 Hugh Dubberly, "Connecting Things: Broadening Design to Include Systems, Platforms, and Products-Service Ecologies," in *Encountering Things: Design and Theories of Things*, ed. Leslie Atzmon and Prasad Boradkar (London: Bloomsbury, 2017), 153–66, http://www.dubberly.com/articles/connecting-things.html.

24 Cross, *Design Thinking*.

25 Bruce Archer, "Design as a Discipline," *Design Studies* 1, no. 1 (1979): 17–20, https://doi.org/10.1016/0142-694X(79)90023-1.

specialization. Drawing on Simon's concept of design as a *science* of the artificial, they located scientific processes as the defining characteristics of a new designerly-scientific endeavor. A definite parting shot came from the newly established *Design Studies* in 1979, which published a series of commissioned essays that treated Design (with a capital d) "as a coherent discipline of study in its own right."[26]

Inspired by a series of essays that contributed to the prototyping of design as a systematic discipline, management scholars continued to develop an approach that treated strategic design as a liberal art discipline itself associated with a business school focus. By and large proposed by professional scientists with a PhD, this perspective tended to systematize the contribution of the rapprochement between design and science via management sciences in organizational settings. A locomotive of this perspective, Richard Buchanan, described design as "a liberal art of a technological culture."[27] Being careful not to over-systematize an essentially anti-systemic creative practice such as design, Buchanan drew openly on John Dewey and implicitly on Charles Sanders Peirce, proposing a collaboration between design and the sciences in fixing organizational problems. Buchanan creatively substantiated his position, not as a theoretical choice but a requirement of the "nature" of the problems that human actors faced. Buchanan drew on Horst Rittel and Melvin Webber's theory of "wicked problems." Rittel and Webber, in turn, had borrowed the term from Karl Popper. Popper had seen wicked problems such as clouds vis-à-vis "other" problems that are "easy" to locate, much like a problem in a clock. Cloud-like problems, however, are strange, moving, shapeless, and often wicked.[28]

Inspired by Popper, Rittel and Webber introduced a distinction between "tame" and "wicked problems," locating the latter as the main motivation behind *planning* that required a collaboration between sciences and design. It would not be erroneous to claim that strategic design as a discipline can be seen as an inversion of planning and design as discipline. Following Rittel and Webber, Buchanan proposed a similar move from planning to strategic design via management sciences. IDEO's success in popularizing the term "design thinking" and Buchanan's straightforward adoption of the term to describe this new disciplinary formation were also supported by David Dunne and Roger Martin who elaborated the deployment of Design Thinking in the management sciences. Martin took a step further and reformed the Rotman Business School of the University of Toronto as one of the institutional bedrocks of strategic design as a discipline.

The disciplinary approach to strategic design has proposed an integrated area of strategic design practice and scholarship as a response to the nature of problems surrounding our times. They were "wicked," not "clock-like," without definite formulations and borders, much like "clouds," and exactly like a traditional design problem. It is ironic that this early formulation of *strategic* design drew on a rhetorical *tactic*. The specific nature of the problem was defined so that the response to that problem was legitimized and normalized. It worked, for a while.

The terms design thinking (as a frequently cited method-like, yet vague formulation) and strategic design began to assume popularity in

26 Ibid., 17.
27 Richard Buchanan, "Wicked Problems in Design Thinking," 5.
28 Karl R. Popper, *Of Clouds and Clocks: An Approach to the Problem of Rationality and the Freedom of Man* (St. Louis, MO: Washington University, 1966).

Figure 1
The word "Design" and "Thinking" on Clouds. Source: Tim Brown, "Design Thinking," *Harvard Business Review* 86, no. 6 (2008): 84, https://hbr.org/2008/06/design-thinking.

management and designerly circles. Design as discipline began to be seen as a major factor of success behind new-generation mega-companies such as Apple. Pioneer companies such as IBM began to train its employees and even started offering classes in design thinking. With its 1,600 formal "design thinkers" in 44 design studios across 20 countries, more than a quarter million IBM employees were trained in design thinking in less than a decade.[29] IDEO that also claims to have a university-like organization, began to offer classes on design thinking as well. Its executive chair, Tim Brown, wrote a popular piece on the concept in the *Harvard Business Review* and used the same rhetorical tactic, even directly printing the words "design" and "thinking" on a cloud visual, perhaps alluding to Popper's cloud analogy of wicked problems, as seen in Figure 1.

This new "discipline" used "the designer's sensibility and methods" to match people's needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity [*sic*]."[30] Wrapping the marketing of his company with the presentation of a mature disciplinary formation, this article also connected the perspective of strategic design as discipline with the second iteration of strategic design as practitioners' attitude.

Strategic Design as Attitude

The disciplinary formation approach to strategic design was maturing when disciplinary boundaries were questioned in the social sciences and other liberal arts disciplines. At a time when even interdisciplinarity was critiqued for its recognition of disciplines as legitimate silos of thinking, the strategic design as discipline approach hit a limit. Imagining strategic design as discipline was instrumental in building a coherent practice area. Nevertheless, it turned out to be a liability in imagining an open space of encounter that hybridizes scientific, designerly, artistic, and technical competences. Shifting the focus from the disciplinarity of strategic design to the personality of its practitioners began to support the development of strategic design at the right time.

For Brown, practitioners of design in strategic contexts should have five qualities: (1) *empathy* to imagine the world from multiple perspectives, (2) *integrative thinking* to bring together a variety of competences to address complex problems, (3) *optimism* to believe in positive change, (4) *experimentalism* to implore novelty, and finally (5) *collaboration* to leave behind the lonely genius designer who does everything alone. Such an exercise made it possible to change the focus of the question from "What is strategic design?" to "Who is its ideal practitioner?"[31]

Whether locating what practitioners do, such as "order-producing" designers,[32] or incorporating the competences of non-designers into the design process,[33] this approach to strategic design stresses the agency of the designer instead of the process or the qualities of the discipline itself. Approaching design practice from the perspective of the specificity of design knowledge, Bryan Lawson also supports approaches that underline the importance of designerly qualities, either by looking at how designers think,[34] or how they know.[35] Focusing on the ability to recognize, Lawson

29 Srikant M. Datar, Amram Migdal, and Paul Hamilton, "IBM: Design Thinking," *Harvard Business School Case* 121-007, April 2021, revised June 2021, https://hbsp.harvard.edu/product/121007-PDF-ENG.
30 Brown, "Design Thinking," 84, 86.
31 Ibid., 87. For a critique of Design Thinking, see Christian Madsbjerg, *Sensemaking: The Power of the Humanities in the Age of the Algorithm* (New York: Hachette, 2017).
32 Norman Potter, *What Is a Designer: Things, Places, Messages* (London: Hyphen, 2002).
33 Ezio Manzini, *Design, When Everybody Designs: An Introduction to Design for Social Innovation* (Cambridge, MA: MIT Press, 2015).
34 Bryan Lawson, *How Designers Think* (London: Routledge, 1997).
35 Lawson, *What Designers Know*.

underlined an ability to know and to do research in a particular way as one central tenet of design practitioners.

A thread of research on the nature of design attitude plays an important role in approaches that stress the importance of the designer's characteristics. First articulated by Richard Boland and Fred Collopy, attitude refers to the capacity of the designer that helps her bring a new orientation to the designing practice.[36] Drawing on this opening, Kamil Michlewski proposed an evidence-based approach to the nature of design attitude, by studying designers themselves in a variety of design companies, with a focus on strategic design practitioners.[37] Freedom to explore, ability to encounter the unexpected, subversion of predetermined rules, thinking out of the box, and synthesizing emotional, rational, and aesthetic levels of engagements emerged as constituents of this design attitude.[38] Later, he summarized his findings as capacity for synthesis, listening, and integrating various forms of knowledge.[39]

Research concerning design attitude took another turn following Mariana Amatullo's ground-breaking study on the articulation of designerly qualities in everyday professional life.[40] Defining design attitude as "a composite of distinct abilities (skills, capabilities, aptitudes) that designers apply during the process of designing," she empirically located six of such characteristics: "1) ambiguity tolerance; 2) engagement with aesthetics; 3) systems thinking; 4) connecting multiple perspectives; 5) creativity; and 6) empathy."[41]

Without critiquing strategic design as discipline, strategic design as attitude contributed to the "prototyping" of strategic design, not only by locating designerly attitudes, but also by deploying the professional sciences as a tool of making strategic design possible. This move further braided strategic design and science, even when critiquing management scholars' overly systemized tendencies of approaching strategic design. The last thread of strategic design approaches complemented these two approaches, by focusing on the process of strategic design itself.

Strategic Design as Process

Strategic design as process is informed by the general acceptance of the socially embedded nature of design practice[42] and its established relevance in organizational improvement and management.[43] Strategic design as a practice of adding information to organizations entails a design process that brings together scientific research and intangible device-making and network-making.[44]

Moving beyond the disciplinary qualities of strategic design and the qualities of its practitioners, strategic design as process focuses on the steps that designers take in their practice as they reform or change a sector-agnostic organizational universe. Being among the most popular ways in which designers describe what they do in professional life, strategic design as process is described by them in reference to four practice clusters: research, the synthesis of ideas, testing, and prototyping.[45] In academic settings, one may see other modules in the process of strategic design, such as concept testing, ideation, landscape analysis, and implementation.[46]

Strategic design research entails bringing together quantitative and qualitative research methods, almost all of which are borrowed from the social

36 Boland and Collopy, *Managing as Designing*.

37 Kamil Michlewski, "Uncovering Design Attitude: Inside the Culture of Designers," *Organization Studies* 29, no. 3 (2008): 386–87, https://doi.org/10.1177/0170840607088019; Kamil Michlewski, *Design Attitude* (London: Routledge, 2015), https://doi.org/10.4324/9781315576589.

38 Michlewski, "Uncovering Design Attitude."

39 Michlewski, *Design Attitude*.

40 Amatullo, *Design Attitude and Social Innovation*.

41 Ibid., 38–39.

42 Susan Yelavich, *Thinking Design Through Literature* (London: Routledge, 2019).

43 David Dunne and Roger Martin, "Design Thinking and How It Will Change Management Education: An Interview and Discussion," *Academy of Management Learning & Education* 5, no. 4 (2006): 512–23, https://doi.org/10.5465/amle.2006.23473212.

44 Dubberly, "Connecting Things."

45 Camilla Buchanan, *What Is Strategic Design*, 138, 145.

46 For example, Parsons' Strategic Design and Management Program starts with research and moves to concept testing, ideation, landscape analysis, prototyping, and finally ends with storytelling.

sciences. Strategic design research also entails enriching and supporting these research methods in design contexts and research methods with a pragmatic approach that also entails abduction or thinking by making.[47] For Christian Schneider, design research starts with the formulation of a rationale, carrying out quantitative explorations and literature review, empirical observations and touching base with reality on the ground, which altogether would inform the conceptualization of a design intervention.[48]

Following conceptualization and the research that tests its accuracy, strategic design practitioners move on to ideation and prototyping as the next steps of their design process,[49] operating as the core of strategic design practice. This entails the "production" of as many ideas as possible to address a design problem and then testing to choose the best one to inform the prototyping of the solution itself. The prototype is then tested to improve it. Finally, the beta version—the most developed prototype—is put forward for testing on the ground during the implementation phase of the strategic design process.

Strategic design as process supports the emergence of strategic design as a coherent practice with two important interventions. Critical of treating problems as almost natural things, designers have shown that "problems" should also be problematized and studied before accepting them at face-value. Scholars and practitioners have shown that problematization as a process itself should be incorporated into the design process that previously had been seen as response to an external and independent problem.[50]

Finally, the concept of strategic design as process involved bringing the politics of strategic design into the framework. It did so by arguing and demonstrating the necessity of the process itself to include those who will use and be influenced by specific design processes.[51] This echoes Ezio Manzini's emphasis on design activity as a process that is not developed *for* actors, but *with* actors in collaborative and co-design contexts.[52] Contemporary practitioners of strategic design also locate participatory engagements in strategic design as one of the most popular and effective modules of the design process.[53]

Social Science Methods and Strategic Design

Despite the substantive contribution of these three approaches to the institutionalization of strategic design, there remains a gap in the literature when it comes to addressing the methodological questions concerning designing strategy. The literature is scant in terms of showing what social theoretical framework could be used as strategic design practitioners carry out research, ideation, prototyping, and testing. Describing what is to be done (such as carrying out research or ideation), locating a designerly spectrum for a practitioner's attitude (such as being tolerant of ambiguity), enacting a strategic design process (such as prototyping), and carrying these out in participatory contexts (such as in co-design) do not necessarily entail explicating *how* to perform these on the ground. Carrying out research is a necessity. Nevertheless, this necessity doesn't tell us how strategic design can exhaustively scan for a universe of distributed action in an organizational setting. How should

47 Archer, "Design as a Discipline"; Bryan Boyer, Justin W. Cook, and Marco Steinberg, *Legible Practises: Six Stories about the Craft of Stewardship* (Helsinki: Sitra, 2013), http://helsinkidesignlab.rip/pages/legible-practises.html; Anna Meroni, "Strategic Design: Where Are We Now? Reflection around the Foundations of a Recent Discipline," *Strategic Design Research Journal* 1, no. 1 (2008): 31–38, https://doi.org/10.4013/sdrj.20081.05; Busayawan Lam, "Applying Strategic Design as a Holistic Approach to Investigate and Address Real World Challenges," *Strategic Design Research Journal* 10, no. 2 (2017): 164–71, https://doi.org/10.4013/sdrj.2017.102.09; Kees Dorst, "The Core of 'Design Thinking' and its Application," *Design Studies* 32, no. 6 (2011): 521–32, https://doi.org/10.1016/j.destud.2011.07.006.

48 Christian Schneider, "Design Research Guidelines: How to Unveil Opportunities," *Medium*, June 17, 2020, https://co-design.medium.com/design-research-guidelines-f11397402657.

49 Rhea Alexander and Aaron Fry, "Strategic Design and the Future of Work-and-Wellness," *Design for Health* 3, no. 1 (2019): 135–54, https://doi.org/10.1080/24735132.2019.1584024; Camilla Buchanan, *What Is Strategic Design*, 138, 145.

50 Daniel J. Huppatz, "Revisiting Herbert Simon's 'Science of Design,'" *Design Issues* 31, no. 2 (2015): 29–40, https://doi.org/10.1162/DESI_a_00320.

51 Eduardo Staszowski, "Inclusive Iteration: Participation as Method in Design Theory and Practice," in *Public Interest Design Education Guidebook*, ed. Lisa M. Abendroth and Bryan Bell (London: Routledge, 2018), chapter 21.

52 Manzini, *Design, When Everybody Designs*.

53 Chris Harkins and Oliver Escobar, *Participatory Budgeting in Scotland: An Overview of Strategic Design Choices and Principles for Effective Delivery* (Glasgow: Glasgow Center for Population Health, 2015).

researchers group or categorize such a dynamic organizational universe? Where should they look first? How should they generate ideas and prototype solutions, products, services, intangible devices, and forms of agency in an institutional context? And finally, how should we measure the impact of strategic design after its interventions become operational?

We believe that the social sciences have developed an answer that can be articulated in a design context. Independent of their epistemological, ontological, and methodological concerns, social scientists prioritize three approaches when they examine something (X). (1) They study the history of the emergence and the social, political, or cultural conditions of the possibility of X, such as studying the emergence of financial markets or focusing on what makes them possible. (2) They analyze and study the consequences of X on other things, agencies or relationships, such as studying the effect of markets on income distribution. Finally, (3) they explain how X works.

The first two approaches share a potential weakness as they build the strength of their analysis. They assume how X works, then move on to studying where it comes from or the condition of its maintenance. Karl Polanyi's path-breaking analysis of where markets come from in *The Great Transformation* explains the development of markets without explaining how markets work on the ground.[54] Polanyi describes the historical emergence of markets and the social universe in which they are embedded, but it stops there. The X remains an X, embedded now in Y.

The third approach is the most relevant for designerly contexts. This approach understands the present by focusing on the explanation of the X itself. It does so by using a combination of two general strategies. The first is methodological individualism. Methodological individualism informs microeconomics, analytical sociology, and management studies, as well as rational choice approaches in political science and neighboring disciplines. These focus on how the intentional choices of individuals produce unintentional and macro-social structures and consequences. The classical example of this approach is Adam Smith's understanding of economic relations as an unintended consequence of economic actors' actions and Alfred Marshall's proposition to represent it with a supply and demand curve. Surprisingly, this approach also informed the emergence of what may be the most popular design intervention in world history, the supply and demand graph.[55]

According to this methodologically individualist approach, one must approach how X works, by looking at the motivations of individuals who are supposed to make X possible in the first place. Those who assert methodological individualism believe that agency is solely embedded in the individual. It is possible to investigate such individual motivations as a propensity to trade to make sense of how X works. This approach draws on an almost intuitive reflex that studies the whole by focusing on its individual parts. This approach tends to universalize individual behavior and motivations in the name of accounting for particulars. Ironically, this approach replaces research with assumptions and it then treats fieldwork as an exercise that observes and records its own assumptions in the form of the empirical realities that it supposedly allows us to understand in the first place.

54 Karl Polanyi, *The Great Transformation: The Political and Economic Origins of Our Time* (Boston: Beacon, 1944), available at https://inctpped.ie.ufrj.br/spiderweb/pdf_4/Great_Transformation.pdf.

55 The original idea dates back to Adam Smith, *The Wealth of Nations* (1776; New York: Random House International, 2000); however, the first drawing emerged more than a century later in Alfred Marshall, *Principles of Economics: Unabridged*, 8th ed. (1890; New York: Cosimo, 2009).

The second approach, structuralism, located the dynamics that "produce" the individual. Karl Marx's revolutionary approach to X drew on the idea of showing that individuals are born into the societies that make them, not the other way around. This initially counter-intuitive approach—that society comes before the individual—has proven to be hegemonic in shaping the modern social sciences. These range from macroeconomics to sociology, from anthropology to institutionalist political science and organization studies. Scholars have looked at classes, genders, ethnicities, racialized relations—in a nutshell, the universes where the individual and her relations emerged and are constructed—to understand the working of X.

Needless to say, such an idealized and simplified way of looking at the history of the social sciences does injustice to a spectrum of approaches that construct their analysis. These always lie somewhere between the individual and the structure. Adam Smith himself argued that without a mobilization of moral sentiments, it was impossible to pursue individual interests.[56] It was the larger universe of morality that moved individuals by shaping their articulation of self-interest, not the other way around.

For Marx, structural explanations are not enough to explain change. Without the organized political initiatives of collective or individual actors, structures do not change by themselves. While societies produce individuals, each individual has the potential to change the conditions that created her. Actors can change their worldview thanks to a new communist politics of representation. This induces the transformation of agency itself. It moves from being a class-in-itself to becoming a class-for-itself. After this transformation, new actors assert their agency to claim the devices and networks of production (Marx called them "tools of production") to change the capitalist mode of production in any given society.

Explorations of a third way emerged in the context of finding the right balance between the individual and the structure. A variety of approaches began to describe a dynamic process of *becoming* rather than analytically distinct agencies and structures. Norbert Elias's theory of figuration was an early example of approaches that drew on the performative interplay between human actors and the structures around them.[57] This informed a variety of other approaches developed in the 1970s and 1980s.[58]

In conversation with Elias's ideas, Anthony Giddens's theory of structuration analyzed the space between actors and their larger networks. Giddens found a way to incorporate values, politics, and representations in a more nuanced explanatory framework.[59] Since then, others have developed and reformed this approach in a variety of disciplinary contexts.[60]

Similarly, Pierre Bourdieu proposed the concept of habitus to refer to a subjective system experienced by actors as an external structure when they internalize structures around them.[61] In the context of analyzing modern politics in colonial contexts, Timothy Mitchell's concept of enframing as a technology of power showed that power relations become internal to actors while these structures appear to be external.[62]

Marxist theorists continued to enrich the explanatory universe between the actor and the structure. They demonstrated how representations—organized narratives about actors—constitute and create power relations to show that

56 Adam Smith, *The Theory of Moral Sentiments*, ed. Knud Haakonssen (1759; Cambridge: Cambridge University Press, 2004).

57 Norbert Elias, *The Civilizing Process: Sociogenetic and Psychogenetic Investigations* (New York: Pantheon Books, 1982), especially see Part One.

58 Tânia Quintaneiro, "The Concept of Figuration or Configuration in Norbert Elias' Sociological Theory," *Teoria & Sociedade* 2, no. SE (2006): 1–13, http://socialsciences.scielo.org/pdf/s_tsoc/v2nse/scs_a02.pdf.

59 Anthony Giddens, *The Constitution of Society: Outline of the Theory of Structuration* (Cambridge: Polity Press, 1984).

60 Christopher Bryant and David Jary, eds., *Giddens' Theory of Structuration: A Critical Appreciation* (London: Routledge, 2014), https://doi.org/10.4324/9781315822556; Rob Stones, *Structuration Theory*: *Traditions in Social Theory* (New York: Palgrave Macmillan, 2005); John Parker, *Concepts in the Social Sciences: Structuration* (Philadelphia: Open University, 2000).

61 Pierre Bourdieu, *Outline of a Theory of Practice*, trans. Richard Nice (Cambridge: Cambridge University Press, 1977).

62 Timothy Mitchell, *Colonising Egypt* (Berkeley: University of California Press, 1988).

the everyday experience of ideology is endogenous to power relations. Scholars such as Louis Althusser explained how superstructural formations, such as the sciences or the organizational logics of a state, formed the worlds that individuals and structures make in capitalist relations.[63] His two students revolutionized this new thread. Nicos Poulantzas demonstrated how representational politics such as nationalist ideologies and discourses were constitutive of power relations articulated in political and economic hegemonic systems.[64] These were not devices of concealment. Rather, they revealed the relations that make structures and networks.

Leaving Marxism behind, Foucault revolutionized social theory by historically analyzing how agencies are produced within networks of power.[65] Foucauldian historical sociology and its analytical framework pushed the social sciences to a new level of abstraction and development. This prepared the ground for new approaches that better show how actors, networks, structures, representations, and tangible or intangible things make us — and how we make them.

In critical conversation with these developments, the emergence and institutionalization of science and technology studies contributed to the enrichment of perspectives that showed how scientific representations shape and are shaped by political and economic universes. As a radical self-reflective move, scientists began to study science itself in a scientific way using a variety of lenses.[66]

Actor-Network Theory (ANT) emerged in this dynamic context. This theory proposed a concise and effective framework to study, observe, and change the ways in which actors and structures interact. Marking a sea change in how social scientists carry out research and the ways in which to imagine new collaborative spaces between scientists and designers, this was a historical moment in preparing the groundwork for the rapprochement between the sciences and design.

Callon first proposed the Actor-Network concept referring to a space of *agencement* where actors' and structures' agential qualities were embraided[67] hence actor-network.[68] Callon, Latour, Law, Annemarie Mol, Madeleine Akrich, Geoffrey Bowker, Susan Leigh Star, Alberto Cambrosio, Antoine Hennion, Wiebe Bijker, Cecile Meadel, Arie Rip, and James Griesemer, among others developed the building blocks of the approach in concrete research contexts.[69]

The widespread institutional acceptance of ANT led designers to see it as an effective method. This is due to a theoretical orientation that locates the agency of things and non-humans in an inclusive and diverse sociological imagination.[70] The flat ontology of ANT allowed scientists and designers to define a more accurate space of intervention, increasing the scope of designable spaces and events. Inspired by Foucault — and in collaboration with researchers in Science and Technology Studies — ANT researchers also managed to incorporate the sciences, discourses, and representations as objects of study, thus making intangible conceptual frameworks' impact on human societies visible and empirically measurable.

For Albena Yeneva, ANT made it possible for designers to imagine and improve the performative power of their interventions in intervening in social and organizational contexts.[71] ANT opened a new sociology of non-humans and their effect on humans. This introduced a new possibility of grasping

63 Louis Althusser, "Ideology and Ideological State Apparatuses: Notes toward an Investigation," in *The Anthropology of the State: A Reader*, ed. Aradhana Sharma and Akhil Gupta (Hoboken: Wiley-Blackwell, 2006), 86–98.

64 Nicos Poulantzas, *State, Power, Socialism*, trans. Patrick Camiller (London: Verso, 1978).

65 Michel Foucault, *The Archaeology of Knowledge: And the Discourse on Language*, trans. A. M. Sheridan Smith (New York: Pantheon Books, 1972); Michel Foucault, *The Order of Things: An Archaeology of Human Sciences* (1966; London: Routledge, 2005).

66 Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Los Angeles: Sage Publications, 1979); Wiebe E. Bijker, Thomas P. Hughes, and Trevor Pinch, eds., *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge, MA: MIT Press, 1987); Steve Woolgar, *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge* (London: Sage, 1988); John Law and Annemarie Mol, eds., *Complexities: Social Studies of Knowledge Practices* (Durham, NC: Duke University Press, 2002).

67 Callon, "The Sociology of an Actor-Network."

68 The approach was not proposed as a "theory," and many of this approach's early developers resisted the temptation to call it as such.

69 Callon, "The Sociology of an Actor-Network"; Latour, "On Recalling ANT"; Law, "Notes on the Theory of the Actor-Network"; Mol, "Actor-Network Theory"; Geoffrey C. Bowker and Susan Leigh Star, "How Things (Actor-Net) Work: Classification, Magic and the Ubiquity of Standards," *Philosophia* 25, no. 3-4 (1996): 195–220, available at https://social.cs.uiuc.edu/class/cas587/readings2/How_things_(actor-net)work_excerpt.pdf; Michel Callon, *Sociologie des agencements marchands: Textes choisis* (Paris: Presses des Mines via Open Edition, 2017); Wiebe E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge, MA: MIT Press, 1997).

70 Erling Björgvinsson, Pelle Ehn, and Per-Anders Hillgren, "Design Things and Design Thinking: Contemporary Participatory Design Challenges," *Design Issues* 28, no. 3 (2012): 101–16, https://doi.org/10.1162/DESI_a_00165; Carl DiSalvo, "Design and the Construction of Publics," *Design Issues* 25, no. 1 (2009): 48–63, https://doi.org/10.1162/desi.2009.25.1.48.

71 Albena Yaneva, *The Making of a Building: A Pragmatist Approach to Architecture* (Bristol: Peter Lang, 2009).

and locating different types of matter in design processes.[72] Cristiano Storni argues that this new approach provides designers with the opportunity and the toolkit to imagine the entire design activity as actor-networking by presenting an alternative and more developed perspective for designers to use for new ways of making things.[73]

Initiatives to analyze how ANT could be used in design settings have begun to attract growing interest from a variety of disciplines. When the journal *CoDesign* called for papers focusing on thinking ANT in design context, the editors received sixty-eight paper proposals in a short period of time. These came from a variety of practice clusters, including "design schools, fine arts, architecture and urban studies, communication and media, computer science, public policy, pedagogy, philosophy, medicine and health, information and business schools."[74]

As one of the editors of this influential issue of *CoDesign*, Storni proposed the most developed ANT framework to be used in design, by not only using ANT in design, but by moving one step further to imagine *design as actor-networking*. For Storni, ANT cannot be used as a mere social scientific help to make design better. Rather, it should be fully incorporated in the design process itself, epistemologically, methodologically, and substantively.[75] How is this possible? How can the contribution of ANT be incorporated into the design process? How are we to imagine an ANT-inspired method for research and prototyping in strategic design? More important, how can we incorporate advances in ANT-inspired research to develop a more effective approach to strategic design practice?

Conclusion or Towards DARN as an Integrated Strategic Design Method

This article presents the first installment of our study by developing a social theoretical groundwork for strategic design research and practice. This article locates the emergence of strategic design amid a productive rapprochement between two seemingly unrelated phenomena. The first is designers' emergent practice of reconfiguring agency in tangible and intangible things in social organizations. The second is the increasing acceptance and expanding knowledge of things' agential status by social scientists. Analyzing this historically unprecedented rapprochement between intangible design and social research, we present how it opened a spectrum of possibility for conducting design and science in a new way in three steps.

First, we examine the historical emergence of strategic design and its institutionalization in academic and professional contexts. Following Sennett, we locate the rise of design as the result of an evolution of craft practices in rapport with the hegemonic expansion of capitalist economic relations over the organizational framework of production and exchange around the world. Coupled with the rise of modern consumerism, designers found ways to bring emotion to tangible things. Designers came to believe that people bought more chairs because they loved some chairs more. Then came the intangible design of representations through visual design. This added a story to how chairs and their potential buyers approach each other.

72 Ibid., 284.
73 Storni, "Unpacking Design Practices."
74 Storni et al., "Designing Things Together."
75 Cristiano Storni, "Notes on ANT for Designers: Ontological, Methodological and Epistemological Turn in Collaborative Design," *CoDesign* 11, no. 3-4 (2015): 166, https://doi.org/10.1080/15710882.2015.1081242.

Strategic design came last. Its goal was bringing social science and design together to realign, repair, or improve the organizations that produce goods, along with the emotions they create, together with their stories. Bringing making and managing together, strategic design practitioners began to blend social science, intangible design, and management in concrete organizational contexts in a universe of practice and research agnostic to sectors and domains. They began to design strategy, creating ways for organizations to reach their goals. Further, designers began to make organizational devices, plan transition design, imagine new services and novel agencies.

Three complementary definitions of this new practice emerged in this evolving context. The first entailed locating strategic design in the disciplinary context of the social sciences or the liberal arts. Aiming to address wicked problems, this new arts and sciences orientation—"a science of the artificial" as Simon put it—made it possible to imagine a unique disciplinary with unique integrity for strategic design.

The second approach associated strategic design with its practitioners' professional and personal characteristics. These included such attributes as tolerance for ambiguity or openness to change.

The third approach emphasized strategic design as a creative process that brings science and design together for solving a variety of problems in organizational settings. We don't see a necessary tension between these approaches. We treat them as innovative and ancillary processes of conceptual prototyping that contribute to our understanding of an emergent creative practice that draw on scientific research.

This article juxtaposes these three developments with social science theories inspired by Actor-Network Theory to search for a common theoretical framework that can inform strategic design research and practice.

Updating ANT to DARN, this article proposes strategic design as an evidence-based creative practice informed by social science. Our goal is proposing a new way to arrange or remake the interaction between devices (D), actors (A), representations (R), and networks (N) in any given organization or problem universe.

Analyzing the ANT literatures, this article showed how empirical studies make the components of social and distributed action visible with reference to actor-networks. This article demonstrates the formative role of DARN in the assemblage of organizational action as a contribution to the literature of studies on the agency of representations (R) and devices (D).

In conclusion, we posit that DARN provides strategic design practitioners with a theoretical toolkit to study and scan the way in which agency is distributed in complex organizational spaces. This makes visible the ways in which to deploy the four main practice sets of strategic design—Research, Ideation, Prototyping, and Testing—within the unitary practice domain of strategic design. The next installment of this article, DARN (Part 2),[76] we explain DARN and demonstrate how to use it in concrete cases on the ground.

Acknowledgments

We would like to thank Sıla Eser and İstem D. Akalp for editing and research support, and acknowledge the following colleagues for their contributions to

76 Koray Caliskan and Matt Wade, "DARN (Part 2): An Evidence-Based Research and Prototyping Method for Strategic Design," *She Ji: The Journal of Design, Economics, and Innovation* 8, no. 3 (2022): 319–37, https://doi.org/10.1016/j.sheji.2022.11.002.

our paper: Rhea Alexander, Marianna Amatullo, Alexandra Bekker, John Bruce, Camilla Buchanan, Leandro Butteri, Erin Cho, Fernanda Flores, Ken Friedman, Aaron Fry, Nariman Gathers, Raz Godelnik, Adam Hayes, Michele Kahane, Elif Kocabıyık, Peter Levin, Donald MacKenzie, Sam Mejias, Elliott Montgomery, Christian Madsjberg, Andrew Moon, Clair Neal, Hector Oulhet, Matthew Robb, Christian Schneider, Nina Terrey, Evren Uzer, Sevde Nur Ünal, Anna Valtonen and Jen van der Meer. Also, thanks to two anonymous reviewers for helping us improve this paper.

Declaration of Interests

There are no conflicts of interest involved in this article.

References

Alexander, Rhea, and Aaron Fry. "Strategic Design and the Future of Work-and-Wellness." *Design for Health* 3, no. 1 (2019): 135–54. https://doi.org/10.1080/24735132.2019.1584024.

Althusser, Louis. "Ideology and Ideological State Apparatuses: Notes toward an Investigation." In *The Anthropology of the State: A Reader*, edited by Aradhana Sharma and Akhil Gupta, 86–98. Hoboken: Wiley-Blackwell, 2006.

Amatullo, Mariana V. *Design Attitude and Social Innovation: Empirical Studies of the Return on Design*. PhD dissertation, Case Western Reserve University, 2015. https://etd.ohiolink.edu/apexprod/rws_olink/r/1501/10?p10_etd_subid=102719&clear=10.

Archer, Bruce. "Design as a Discipline." *Design Studies* 1, no. 1 (1979): 17–20. https://doi.org/10.1016/0142-694X(79)90023-1.

Barrey, Sandrine, Franck Cochoy, and Sophie Dubuisson-Quellier. "Designer, packager et merchandiser: Trois professionnels pour une même scène marchande." *Sociologie du Travail* 42, no. 3 (2000): 457–82. https://doi.org/10.4000/sdt.36965.

Baudrillard, Jean. *The System of Objects*. London: Verso, 2005.

Bijker, Wiebe E., Thomas P. Hughes, and Trevor Pinch, eds. *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology.* Cambridge, MA: MIT Press, 1987.

Bijker, Wiebe E. *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. Cambridge, MA: MIT Press, 1997.

Björgvinsson, Erling, Pelle Ehn, and Per-Anders Hillgren. "Design Things and Design Thinking: Contemporary Participatory Design Challenges." *Design Issues* 28, no. 3 (2012): 101–16. https://doi.org/10.1162/DESI_a_00165.

Body, John, and Nina Terrey. *Design for a Better Future: A Guide to Designing in Complex Systems.* London: Routledge, 2019.

Boland, Richard J., Jr., and Fred Collopy, eds. *Managing as Designing*. Redwood, CA: Stanford University Press, 2004.

Bourdieu, Pierre. *Outline of a Theory of Practice*. Translated by Richard Nice. Cambridge: Cambridge University Press, 1977.

Bowker, Geoffrey C., and Susan Leigh Star. "How Things (Actor-Net) Work: Classification, Magic and the Ubiquity of Standards." *Philosophia* 25, no. 3-4 (1996): 195–220. Available at https://social.cs.uiuc.edu/class/cas587/readings2/How_things_(actor-net)work_excerpt.pdf.

Boyer, Bryan, Justin W. Cook, and Marco Steinberg. *Legible Practises: Six Stories about the Craft of Stewardship*. Helsinki: Sitra, 2013. http://helsinkidesignlab.rip/pages/legible-practises.html.

Brown, Tim. "Design Thinking." *Harvard Business Review* 86, no. 6 (2008): 84–92. https://hbr.org/2008/06/design-thinking.

Bryant, Christopher, and David Jary, eds. *Giddens' Theory of Structuration: A Critical Appreciation*. London: Routledge, 2014. https://doi.org/10.4324/9781315822556.

Buchanan, Camilla. *What Is Strategic Design? An Examination of New Design Activity in the Public and Civic Sectors.* PhD dissertation, Lancaster University, 2020. https://doi.org/10.17635/lancaster/thesis/1127.

Buchanan, Richard. "Wicked Problems in Design Thinking." *Design Issues* 8, no. 2 (1992): 5–21. https://doi.org/10.2307/1511637.

Caliskan, Koray. "Polanyi, Callon, and Amazon: Institutionalist, ANT, and DRAN Approaches to Platform Economies." *Sociologica* 14, no. 3 (2020): 195–204. https://doi.org/10.6092/issn.1971-8853/11748.

Caliskan, Koray, and Matt Wade. "DARN (Part 2): An Evidence-Based Research and Prototyping Method for Strategic Design." *She Ji: The Journal of Design, Economics, and Innovation* 8, no. 3 (2022): 319–37, https://doi.org/10.1016/j.sheji.2022.11.002.

Callon, Michel. "Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of Saint Brieuc Bay." *Sociological Review* 32, no. S1 (1984): 196–233. https://doi.org/10.1111/j.1467-954X.1984.tb00113.x.

Callon, Michel. "The Sociology of an Actor-Network: The Case of the Electric Vehicle." In *Mapping the Dynamics of Science and Technology*, edited by Michel Callon, John Law, and Arie Rip, 19–34. London: Palgrave Macmillan, 1986. https://doi.org/10.1007/978-1-349-07408-2_2.

Callon, Michel. "Pour une sociologie des controverses techniques." *Fundamentia Scientiae* 2, no. 3 (2006): 381–99. https://doi.org/10.4000/books.pressesmines.1196.

Callon, Michel. *Sociologie des agencements marchands: Textes choisis*. Paris: Presses des Mines via Open Edition, 2017.

Chappe, Raphaële, and Cynthia Lawson Jaramillo. "Artisans and Designers: Seeking Fairness within Capitalism and the Gig Economy." *Dearq* 26 (2020): 80–87. https://doi.org/10.18389/dearq26.2020.09.

Clark, Hazel, and David Brody. "The Current State of Design History." *Journal of Design History* 22, no. 4 (2009): 303–8. https://doi.org/10.1093/jdh/epp042.

Cross, Nigel. *Design Thinking: Understanding How Designers Think and Work*. New York: Berg, 2011.

Datar, Srikant M., Amram Migdal, and Paul Hamilton. "IBM: Design Thinking." *Harvard Business School* Case 121-007, April 2021. Revised June 2021. https://hbsp.harvard.edu/product/121007-PDF-ENG.

DiSalvo, Carl. "Design and the Construction of Publics." *Design Issues* 25, no. 1 (2009): 48–63, https://doi.org/10.1162/desi.2009.25.1.48.

Dorst, Kees. "The Core of 'Design Thinking' and its Application." *Design Studies* 32, no. 6 (2011): 521–32. https://doi.org/10.1016/j.destud.2011.07.006.

Dubberly, Hugh. "Connecting Things: Broadening Design to Include Systems, Platforms, and Products-Service Ecologies." In *Encountering Things: Design and Theories of Things*, edited by Leslie Atzmon and Prasad Boradkar, 153–66. London: Bloomsbury, 2017. http://www.dubberly.com/articles/connecting-things.html.

Dunne, David, and Roger Martin. "Design Thinking and How It Will Change Management Education: An Interview and Discussion." *Academy of Management Learning & Education* 5, no. 4 (2006): 512–23. https://doi.org/10.5465/amle.2006.23473212.

Elias, Norbert. *The Civilizing Process: Sociogenetic and Psychogenetic Investigations*. New York: Pantheon Books, 1982.

Elyachar, Julia. *Markets of Dispossession: NGOs, Economic Development, and the State in Cairo*. Durham, NC: Duke University Press, 2005.

Foucault, Michel. *The Archaeology of Knowledge: And the Discourse on Language*. Translated by A. M. Sheridan Smith. New York: Pantheon Books, 1972.

Foucault, Michel. *The Order of Things: An Archaeology of Human Sciences*. London: Routledge, 2005. First published 1966.

Gallego, Carmenza, G. Mauricio Mejía, and Gregorio Calderón. "Strategic Design: Origins and Contributions to Intellectual Capital in Organizations." *Journal of Intellectual Capital* 21, no. 6 (2020): 873–91. https://doi.org/10.1108/JIC-10-2019-0234.

Giddens, Anthony. *The Constitution of Society: Outline of the Theory of Structuration*. Cambridge: Polity Press, 1984.

Harkins, Chris, and Oliver Escobar. *Participatory Budgeting in Scotland: An Overview of Strategic Design Choices and Principles for Effective Delivery.* Glasgow: Glasgow Center for Population Health, 2015.

Hawkins, Gay. "The Performativity of Food Packaging: Market Devices, Waste Crisis and Recycling." *Sociological Review* 60, no. 2 (2012): 66–83. https://doi.org/10.1111/1467-954X.12038.

Hill, Dan. *Dark Matter and Trojan Horses: A Strategic Design Vocabulary*. Moscow: Strelka, 2012.

Holland, Ray, and Busayawan Lam. *Managing Strategic Design*. London: Palgrave. 2014.

Huppatz, Daniel J. "Revisiting Herbert Simon's 'Science of Design.'" *Design Issues* 31, no. 2 (2015): 29–40. https://doi.org/10.1162/DESI_a_00320.

Lam, Busayawan. "Applying Strategic Design as a Holistic Approach to Investigate and Address Real World Challenges." *Strategic Design Research Journal* 10, no. 2 (2017): 164–71, https://doi.org/10.4013/sdrj.2017.102.09.

Latour, Bruno, and Steve Woolgar. *Laboratory Life: The Construction of Scientific Facts*. Los Angeles: Sage Publications, 1979.

Latour, Bruno. *Pandora's Hope: Essays on the Reality of Science Studies*. Cambridge, MA: Harvard University Press, 1999.

Latour, Bruno. "On Recalling ANT." *Sociological Review* 47, no. 1 (1999): 15–25. https://doi.org/10.1111/j.1467-954X.1999.tb03480.x.

Law, John. "Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity." *Systems Practice* 5 (August1992): 379–93. https://doi.org/10.1007/BF01059830.

Law, John, and Annemarie Mol, eds. *Complexities: Social Studies of Knowledge Practices*. Durham, NC: Duke University Press, 2002.

Lawson, Bryan. *How Designers Think*. London: Routledge, 1997.

Lawson, Bryan. *What Designers Know*. Oxford: Architectural Press, 2004.

Madsbjerg, Christian. *Sensemaking: The Power of the Humanities in the Age of the Algorithm.* New York: Hachette, 2017.

Manzini, Ezio. *Design, When Everybody Designs: An Introduction to Design for Social Innovation*. Cambridge, MA: MIT Press, 2015.

Marshall, Alfred. *Principles of Economics: Unabridged*, 8th ed. New York: Cosimo, 2009. First published 1890.

Mason, Katy, Hans Kjellberg, and Johan Hagberg. "Exploring the Performativity of Marketing: Theories, Practices and Devices." *Journal of Marketing Management* 31, no. 1-2 (2015): 1–15, https://doi.org/10.1080/0267257X.2014.982932.

McFall, Liz. "Devices and Desires: How Useful Is the 'New' New Economic Sociology for Understanding Market Attachment?" *Sociology Compass* 3, no. 2 (2009): 267–82. https://doi.org/10.1111/j.1751-9020.2009.00195.x.

Meroni, Anna. "Strategic Design: Where Are We Now? Reflection around the Foundations of a Recent Discipline." *Strategic Design Research Journal* 1, no. 1 (2008): 31–38. https://doi.org/10.4013/sdrj.20081.05.

Michlewski, Kamil. "Uncovering Design Attitude: Inside the Culture of Designers." *Organization Studies* 29, no. 3 (2008): 373–92. https://doi.org/10.1177/0170840607088019.

Michlewski, Kamil. *Design Attitude*. London: Routledge, 2015. https://doi.org/10.4324/9781315576589.

Mitchell, Timothy. *Colonising Egypt*. Berkeley: University of California Press, 1988.

Mol, Annemarie. "Actor-Network Theory: Sensitive Terms and Enduring Tensions." *Kölner Zeitschrift für Soziologie und Sozialpsychologie* 50, no. 1 (2010): 253–69. https://hdl.handle.net/11245/1.330874.

Muniesa, Fabian, Yuval Millo, and Michel Callon. "An Introduction to Market Devices." *Sociological Review* 55, no. 2 (2007): 1–12. https://doi.org/10.1111/j.1467-954X.2007.00727.x.

Packard, Vance. *The Hidden Persuaders*. New York: Pocket Books, 1958.

Parker, John. *Concepts in the Social Sciences: Structuration*. Philadelphia: Open University, 2000.

Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Time*. Boston: Beacon, 1944. Available at https://inctpped.ie.ufrj.br/spiderweb/pdf_4/Great_Transformation.pdf.

Popper, Karl R. *Of Clouds and Clocks: An Approach to the Problem of Rationality and the Freedom of Man*. St. Louis, MO: Washington University, 1966.

Potter, Norman. *What Is a Designer: Things, Places, Messages*. London: Hyphen, 2002.

Poulantzas, Nicos. *State, Power, Socialism*. Translated by Patrick Camiller. London: Verso, 1978.

Quintaneiro, Tânia. "The Concept of Figuration or Configuration in Norbert Elias' Sociological Theory." *Teoria & Sociedade* 2, no. SE (2006): 1–13. http://social-sciences.scielo.org/pdf/s_tsoc/v2nse/scs_a02.pdf.

Roscoe, Philip. "'Elephants Can't Gallop': Performativity, Knowledge and Power in the Market for Lay-Investing." *Journal of Marketing Management* 31, no. 1-2 (2015): 193–218. https://doi.org/10.1080/0267257X.2014.976584.

Schneider, Christian. "Design Research Guidelines: How to Unveil Opportunities." *Medium*, June 17, 2020. https://co-design.medium.com/design-research-guidelines-f11397402657.

Sennett, Richard. *The Craftsman*. New Haven, NJ: Yale University Press, 2008.

Simon, Herbert A. *The Sciences of the Artificial*, 3rd ed. Cambridge, MA: MIT Press, 1996.

Smith, Adam. *The Wealth of Nations*. New York: Random House International, 2000. First published 1776.

Smith, Adam. *The Theory of Moral Sentiments.* Edited by Knud Haakonssen. Cambridge: Cambridge University Press, 2004. First published 1759.

Staszowski, Eduardo. "Inclusive Iteration: Participation as Method in Design Theory and Practice." In *Public Interest Design Education Guidebook*, edited by Lisa M. Abendroth and Bryan Bell, chapter 21. London: Routledge, 2018.

Stones, Rob. *Structuration Theory*: *Traditions in Social Theory*. New York: Palgrave Macmillan, 2005.

Storni, Cristiano. "Unpacking Design Practices: The Notion of Thing in the Making of Artifacts." *Science, Technology, & Human Values* 37, no. 1 (2012): 88–123. https://www.jstor.org/stable/41511157.

Storni, Cristiano, Thomas Binder, Per Linde, and Dagny Stuedahl. "Designing Things Together: Intersections of Co-design and Actor-Network Theory." *CoDesign* 11, no. 3-4 (2015): 149–51. https://doi.org/10.1080/15710882.2015.1081442.

Storni, Cristiano. "Notes on ANT for Designers: Ontological, Methodological and Epistemological Turn in Collaborative Design." *CoDesign* 11, no. 3-4 (2015): 166–78. https://doi.org/10.1080/15710882.2015.1081242.

Valtonen, Anna. "Approaching Change with and in Design." *She Ji: The Journal of Design, Economics, and Innovation* 6, no. 4 (2020): 505–29. https://doi.org/10.1016/j.sheji.2020.08.004.

Valtonen, Anna, and Petra Nikkinen, eds. *Designing Change: New Opportunities for Organisations*. Aalto: Aalto University, 2022. https://shop.aalto.fi/p/1699-designing-change/.

Woolgar, Steve. *Knowledge and Reflexivity: New Frontiers in the Sociology of Knowledge*. London: Sage, 1988.

Yaneva, Albena. *The Making of a Building: A Pragmatist Approach to Architecture*. Bristol: Peter Lang, 2009.
Yelavich, Susan. *Thinking Design Through Literature*. London: Routledge, 2019.