
DARN (Part 2): An Evidence-Based Research and Prototyping Method for Strategic Design

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Abstract

Published in two parts, this article presents an evidence-based research and prototyping method for strategic design. In Part 1, we introduce the concept of DARN as an updated version of Actor-Network Theory (ANT). DARN is a theoretical framework used to study, rearrange, or remake the constituents of an organization or problem universe. In Part 2, we propose that DARN can be used to for several purposes. (1) It can help organizations reach their stated objectives. (2) It can define, *darn*, or solve organizational problems with evidence-based and collaborative design interventions. (3) It allows us to imagine new organizational models with complex and distributed agency considerations. (4) It can improve and measure the impact of design interventions within organizational strategy. The DARN approach is critical of social engineering and design solutionism. This approach proposes using collaborative strategic design in sector-agnostic organizational contexts to support designers in problematization, research, conceptualization, prototyping, testing, and impact measurement. Further, DARN presents a single frame that designers and scientists can use simultaneously without imposing an *a priori* language on each other. It can also serve other actors with whom they work and study. The article concludes with a practical discussion of how to apply DARN on the ground while considering its limits.

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- 1 Koray Caliskan and Matt Wade, "DARN (Part 1): What Is Strategic Design? Social Theory and Intangible Design in Perspective," *She Ji: The Journal of Design, Economics, and Innovation* 8, no. 3 (2022): 299–318, <https://doi.org/10.1016/j.sheji.2022.10.001>.
- 2 An early iteration of DARN appeared as DRAN in a previous publication of one of the authors in his analysis of economic platforms, see Koray Caliskan, "Polanyi, Callon, and Amazon: Institutional, ANT, and DRAN Approaches to Platform Economies," *Sociologica* 14, no. 3 (2020): 195–204, <https://doi.org/10.6092/issn.1971-8853/11748>.
- 3 This is also why we do not find the circular and contradictory term "design thinking" useful. In addition to many other things, Design is already a form of thinking. Design Thinking thus sounds like "Omelette with Eggs."
- 4 This statement does not claim an objective exterior to theory, for even our refusal to call it a theory has a theoretical ground.
- 5 Of course, this is a categorical imperative in an ideal world. We observe that many social scientists choose to ask questions that are suitable to be answered with the methods they know, especially in rational choice and positivist social, political, and economic sciences.

Introduction and Summary

In the first part of this article,¹ we constructed a foundation for imagining an integrated theoretical framework to be used by strategic designers and social researchers. Michel Callon named this framework "Actor-Network" in 1986, proposing it to describe how actors and networks share responsibility together in giving birth to distributed action, somewhat like conjoined twins. Moving beyond individualism and structuralism, a group of founding social scientists developed this approach. They included such as Bruno Latour, John Law, Annemarie Mol, Madeleine Akrich, Geoffrey Bowker, Alberto Cambrosio, Antoine Hennion, Wiebe Bijker, Cecile Meadel, Arie Rip, Susan Leigh Star, and James Griesemer, among others. As they located the agency of things in addition to actors and networks, a new series of research findings supported their work. These findings showed how representations contribute to the making and maintenance of the relations that they are supposed to represent in the first place. In addition to actors and networks while recognizing the formative agency of devices and representations in organizational universes, we proposed that a new iteration of ANT as DARN can serve as an effective approach in strategic design research and practice.²

We let T of ANT go. We do not propose a grand theory for two reasons. First, DARN cannot serve as an autonomous theory of action or design. Design is a research tool itself. It is wrong to imagine an *a priori* theory of design when design itself is an act of thinking. Strategic design brings together "making to think" and "thinking to make."³ To deploy a grounded theoretical *a priori* would make strategic design resemble a plane trying to fly with one wing.⁴ Second, methods should be strategic choices structured by research objectives, not *vice versa*. We do not choose our questions according to the methods we have at hand.⁵ The problem areas of strategic design are determined by the organizational universes on which it focuses. This prevents the practitioners of strategic design from imagining an independent theory. Nevertheless, strategic design is a designerly scientific endeavor. It carries out sociologically oriented research to learn about actors and their lives to design strategies for organizations. Thus, strategic design cannot figure out the aims of an organization. Rather, it works to help the organizations in re-aligning their actor, network, device, and representational configurations in order to reach their self-defined objectives. But how?

Here, we explain what DARN is and we explain how to deploy DARN as a research tool supporting designers, social scientists, and professional actors for comprehensively locating the distribution of responsibility among the constituents of an organizational problem. After this, researchers can use DARN in ideation, prototyping, and testing strategies. They can also use DARN to measure the impact of strategic design interventions.

In ground-breaking research that draws on strategic design literature to carry out empirical research among contemporary design professionals, Camilla Buchanan empirically demonstrates that strategic design now represents "a coherent body of directed practice with sufficient recognition and application that can be considered to be an emerging sub-discipline of design

- 6 Camilla Buchanan, *What Is Strategic Design? An Examination of New Design Activity in the Public and Civic Sectors* (PhD dissertation, Lancaster University, 2020), 215, <https://doi.org/10.17635/lancaster/thesis/1127>.
- 7 Ibid.
- 8 Ibid., 216.
- 9 Geoff Mulgan, "Design in Public and Social Innovation: What Works and What Could Work Better," *Nesta*, January 2014, https://media.nesta.org.uk/documents/design_in_public_and_social_innovation.pdf; Daniela Sangiorgi and Alison Prendiville, eds., *Designing for Service: Key Issues and New Directions* (London: Bloomsbury Publishing, 2017); Lucy Kimbell, "Rethinking Design Thinking: Part I," *Design and Culture* 3, no. 3 (2011): 285–306, <https://doi.org/10.2752/175470811X13071166525216>; Sabine Junginger, "Parts and Wholes: Places of Design Thinking in Organizational Life," *Strategic Design Research Journal* 2, no. 09 (2009): 23–29, available at <https://www.researchgate.net/publication/266281802>.
- 10 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
- 11 Camilla Buchanan, *What Is Strategic Design*.

in its own right.”⁶ Yet, her research made three problems visible in the space of strategic design by drawing on her interviews and fieldwork. First, strategic designers lack a general framework explaining what they do and how they do it. Their occupational comfort with forms of ambiguity proves to be a liability when it comes to clearly explaining their approach and practice to the public and other actors. For Buchanan, this is more than a problem. It is an urgent problem. She writes, “The research participants [...] underline the urgency for proponents of design activity in strategic contexts to find language which makes their work accessible to a wider audience.”⁷

Second, strategic designers think that the fusion of their activity with social and technical sciences is now an established requirement. However, they lack a single framework that can incorporate design, science, and technology simultaneously in addressing the possible silo effect of each expert using her own vocabulary.⁸ Third, designers complain about the lack of a general framework to measure the impact of strategic design in organizational contexts. Also recognized in the literature, this weakness is one of the reasons slowing the expansion, acceptance, and adoption of strategic design. This prevents it from expanding into wider application universes while slowing its scalability.⁹ The exception to this is the work of Mariana Amatullo, who notes this gap in the literature, devising a framework to measure the impact of strategic design in organizational contexts.¹⁰

We propose the DARN approach as a method that supports strategic designers in addressing these three challenges. Operating like an X-ray of an organizational distributed action universe, DARN helps designers and social researchers understand how the interaction of devices (D), actors (A), representations (R), and networks (N) produce distributed action in organizational contexts. Such an approach also helps designers develop collaborative interventions to address organizational challenges. Deliberately under-theorized and open, DARN can establish the disciplinary competence of strategic designers. At the same time, it provides them with a unitary and dynamic language framework, making their work accessible to a wider audience. This can also help them address the next most frequently cited challenge they face in their practice. This is the absence of a framework that integrates design and socio-technical sciences.¹¹

ANT was born in dialogue with science and technology studies (STS). In this proposed framework, the DARN Approach acts as a theoretically optimal interface between designers and scientists, allowing their findings to be recognized and deployed. Finally, the evidence-based scaffold of DARN is grounded in the social sciences. It can therefore be used to locate empirical evidence for the impact of the changes that strategic design practitioners deploy in concrete organizational settings.

Finally, we present a series of empirical cases exemplifying the usefulness and deployment of DARN in concrete organizational contexts. We conclude by discussing the politics of deploying DARN in terms of justice and planetary concerns. We also consider emergent areas of application may develop in the future to expand the practice universe of strategic design. The article ends with a brief discussion of limits to the DARN approach.

- 12 Bruno Latour and Peter Weibel, eds., *Making Things Public: Atmospheres of Democracy* (Cambridge, MA: MIT Press, 2005).
- 13 Michel Callon, *The Laws of the Markets* (Oxford: Blackwell Publishers, 1998).
- 14 Koray Caliskan and Michel Callon, "Economization, Part 2: A Research Programme for the Study of Markets," *Economy and Society* 39, no. 1 (2010): 1–32, <https://doi.org/10.1080/03085140903424519>; Koray Caliskan and Michel Callon, "Economization, Part 1: Shifting Attention from the Economy towards Processes of Economization," *Economy and Society* 38, no. 3 (2009): 369–98, <https://doi.org/10.1080/03085140903020580>.
- 15 Adam Smith, *The Wealth of Nations* (1776; New York: Random House International, 2000).
- 16 Bruno Latour, "On Recalling ANT," *Sociological Review* 47, no. 1 (1999): 20, <https://doi.org/10.1111/j.1467-954X.1999.tb03480.x>.
- 17 Blok et al. is a groundbreaking companion to the past and future of ANT scholarship and its larger consequences in the social sciences, humanities, and design. See Anders Blok, Ignacio Fariás, and Celia Roberts, eds., *The Routledge Companion to Actor-Network Theory* (London: Routledge, 2020).

Four Elements of DARN

Almost as soon as it emerged, ANT attracted the attention of designers. ANT scholars such as Latour were deliberately open to collaborations, working with designers and artists to build bridges between the spaces of arts, design, and the sciences.¹² The concept of Actor-Network had been born in the context of economic devices and organizational design. Callon studied how devices and representations contributed to the emergence of new design strategies in making electric car markets using a novel approach to analyze the interaction of tangible things and intangible representations along with their impact on actor-network configurations. From the perspective of a strategic designer, this is actually what they do.

Economic sociology has lent itself to an analysis of Actor-Network considerations with an increasing pace. *The Laws of the Markets* was the parting shot. It showed the historical relevance of Karl Polanyi's work, moving beyond it to explore the empirical specificity of economization processes.¹³ Koray Caliskan and Michel Callon¹⁴ collaborated to show how to study the process of market-making and market-designing to understand the *making* of marketization on the ground. For them marketizations referred to the assembly and qualification of actions, devices, analytical descriptions, and practical descriptions. They analyzed how markets were designed, instead of assuming how they just emerged automatically from actors' unintentional actions, as Adam Smith had thought.¹⁵

Since then, ANT scholars have developed the perspective in a variety of ways. At times, the development took place through a process of elimination. Theory—the T—was the first to go. Latour criticized the Actor-Network approach as a meta-theory of human action. For him, Actor-Network approaches had emerged as "a very crude method to learn from the actors without imposing on them an *a priori* definition of their world-building capacities."¹⁶ Instead of a theoretical imposition on how actors behave in a network, Latour and other Actor-Network scholars began to approach different objects of inquiry by keeping a few rules of thumb in mind. Each of these rules has specific consequences in imagining a method for strategic design practice.¹⁷

A: Actors

The contribution that ANT makes to the universe of actors opens social theory to a multiplicity of agencies. We wrote this article during the Covid-19 pandemic: it is a telling irony that we can no longer discuss economies without considering non-humans such as viruses. Be they collective or individual, human or non-human, such a proliferation of actor types has contributed to the emergence of a more nuanced study of economies and organizations.

Human actors include individuals such as a specific trader in a market or administrators in an organization. Human actors can also include groups such as a working class in an urban design context, women in a feminist political economic design brief, or black American youth in an inclusion, diversity, and social justice context.

However, non-human living beings are also actors. Regardless of the capacity to plan (many non-humans plan), these actors have significant consequences on other actors and networks of relations. Covid-19 is a pandemic for humans, but a

proliferation of life for a virus. The agency of the virus is so potent that it led to a temporary total disruption of economies around the world, something we have not seen much even during major depressions. Broadway theater productions came to a halt. Even during both world wars, curtains went up, but a coalition of viruses closed Broadway for more than a year.

For strategic design, the theoretical *Glasnost* that opens the definition of agency has vast consequences. First, the study of novel organizational spaces prepares designers to better articulate the various human and non-human agencies at stake in their work. For example, in the case of an organizational problem concerning human health, the study of problems and the prototyping of desirable solutions should incorporate the agency of non-humans. These include such actors as mosquitos, trees, and viruses, both in terms of the emerging problem, and in terms of the effects of any solution on humans and non-humans.

When we recognize the capacity of agency in non-human actors, we can see anything—that is, *any thing*—as an agent of distributed action spaces such as networks, devices, and representations. Action itself is an effect of such networked distributions. This radical openness and a willingness to imagine the agency of non-humans entail a risk of confusing ethics with empirical analysis. (We do not assume that empirical analyses can be independent of ethical or moral qualifications.) ANT does not assume that this openness entails a symmetry of rights in the realm of politics. For example, a hammer does not have the same rights as a human actor. Neither does it assume a symmetry in jurisprudence. For example, when someone kills a person with a gun, the gun itself is not legally responsible. Rather, this suggests an openness in the analysis of *constituents* of action, not an openness to see all actors or actants as equal. With a contemporary lens on institutional and organizational bias towards one group of individuals or another, these theoretical tools permit us to look beyond the ethics and politics of complex human issues. They allow us to interrogate non-human actors with the same rigor with which we approach human actors in problematic contexts and scenarios. Without considering non-human actors, we risk a form of conceptual “business as usual” that hides crucial and powerful elements behind “bad actors” while over-simplifying complexity.

N: Networks

Actor-Network approaches assume that the responsibility of action is distributed among a variety of constituents. One of the most important aspects of such a universe involve the ways in which preceding and existing formations or relations affect how action is distributed. However, it would be misleading to analytically imagine actors and networks as being separate and then bring them together for the purposes of analysis or explanation. Even so, we can approach the distributed universe of an actor-network from the vantage point of a network, an actor, a device, or a representation.

Analyses of networks are hardly new in social research. They precede ANT by many decades. However, the explanatory power of network-focused approaches was often inflated by such strands of research as structuralism, or it was diminished by such methodological individualist accounts as

- 18 John Bellamy Foster and Robert W. McChesney, "Surveillance Capitalism: Monopoly-Finance Capital, the Military-Industrial Complex, and the Digital Age," *Monthly Review* 66, no. 3 (2014): 1, <https://doi.org/10.14452/MR-066-03-2014-071>.
- 19 Shoshana Zuboff, "Big Other: Surveillance Capitalism and the Prospects of an Information Civilization," *Journal of Information Technology* 30, no. 1 (2015): 75–89, <https://doi.org/10.1057/jit.2015.5>; also see Shoshana Zuboff, *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power* (London: Profile Books, 2019).
- 20 Yuval Noah Harari, *Sapiens: A Brief History of Humankind* (New York: Random House, 2014).
- 21 John Finch, Conor Horan, and Emma Reid, "The Performativity of Sustainability: Making a Conduit a Marketing Device," *Journal of Marketing Management* 31, no. 1-2 (2015): 167–92, <https://doi.org/10.1080/0267257X.2014.980752>; Michael R. Glass and Reuben Rose-Redwood, eds., *Performativity, Politics, and the Production of Social Space* (New York: Routledge, 2014); Gernot Grabher and Jonas König, "Performing Network Theory? Reflexive Relationship Management on Social Network Sites," in *Networked Governance*, ed. Betina Hollstein, Wenzel Matiaske, and Kai-Uwe Schnapp (Cham: Springer, 2017), 121–40, https://doi.org/10.1007/978-3-319-50386-8_8; Vincent-Antonin Lépinay, "Decoding Finance: Articulation and Liquidity around a Trading Room," in *Do Economists Make Markets? On the Performativity of Economics*, ed. Donald MacKenzie, Fabian Muniesa, and Lucia Siu (Princeton, NJ: Princeton University Press, 2007), 87–127, available at <https://www.researchgate.net/publication/285267080>; Donald MacKenzie, "The Big, Bad Wolf and the Rational Market: Portfolio Insurance, the 1987 Crash and the Performativity of Economics," *Economy and Society* 33, no. 3 (2004): 303–34, <https://doi.org/10.1080/0308514042000225680>; Anna Olofsson and Jens O. Zinn, eds., *Researching Risk and Uncertainty: Methodologies, Methods and Research Strategies* (London: Palgrave Macmillan, 2019), <https://doi.org/10.1007/978-3-319-95852-1>.
- 22 Martha S. Feldman, "Organizational Routines as a Source of Continuous Change," *Organization Science* 11, no. 6 (2000): 611–29, <https://doi.org/10.1287/orsc.11.6.611.12529>; Martha S. Feldman and Brian T. Pentland, "Reconceptualizing Organizational Routines as a Source of Flexibility and Change," *Administrative*

micro-economics. Interpreting action in reference to distributed agency, ANT helped researchers imagine a more nuanced approach to networks.

The exponentially growing platformization of contemporary economic and social relations has been challenging ANT-inspired scholars and designers. The effects of the challenge have increased with the growth of platformization. According to many, such platforms have created network effects that tilt the power of agency from human actors towards networks with unprecedented power. This leads to a new structural formation that some call surveillance capitalism, a term originally proposed by John Bellamy Foster and Robert McChesney in 2014,¹⁸ then used by Shoshana Zuboff in 2015.¹⁹

The exponential growth of the types and influence of new networks and their embroidered maintenance in relation to data materialities poses a new challenge for strategic designers. They now encounter design briefs that entail forms of digitalization of organizational settings. To be able to incorporate these considerations in methodological concerns regarding strategy design, we must review the importance of devices and representations in organizational universes.

R: Representations

The way in which we represent life is a part of the way we live life. Yuval Noah Harari historically documents the importance of representations in human evolution from stories to religions, from ideologies to discourses, and from technical propositions to the sciences.²⁰ Individuals only managed to survive when they formed organizations and when narratives served as the amalgam of these organizations. In human evolution, such representations were not a consequence of spare time activities. They served as a building block of being for human actors working in organizations.

A burgeoning literature shows the effect of representations (R) on action in terms of their performativity. Returning to Foucault's historical exposition of how the modern sciences contributed to the making of modern subjectivities and power, scholars loosely or tightly associated with ANT have presented empirically robust and analytically strong demonstrations of how certain representations represent the making of realities on the ground. Via their performativity, they also contribute to making the realities they represent.²¹

In organizational contexts, representations entail how actors see themselves and their roles in their everyday practice, how companies develop organizational cultures and ways of doing things on the ground, as well as the algorithms that standardize operational tasks such as setting pay scales. These representations inform everyday action and they have an empirically evident effect on organizational performance.²² Further, new computer-based industries have been creating representational orders that structure types and spectra of action via algorithms or data structures. The ways in which an organizational space is governed, described, and structured in terms of data representations have become more and more central to how organizations work and fail on the ground. This creates an urgent requirement for caution by strategic design practitioners in terms of new forms of agency representations performed in socio-economic life.²³

- Science Quarterly* 48, no. 1 (2003): 94–118, <https://doi.org/10.2307/3556620>; Michel Callon and Fabian Muniesa, "Economic Markets as Calculative Collective Devices," *Organization Studies* 26, no. 8 (2005): 1229–50, <https://doi.org/10.1177/0170840605056393>; Mark Learmonth, "Doing Things with Words: The Case of 'Management' and 'Administration,'" *Public Administration* 83, no. 3 (2005): 617–37, <https://doi.org/10.1111/j.0033-3298.2005.00465.x>; Stéphane Guérard, Ann Langley, and David Seidl, "Rethinking the Concept of Performance in Strategy Research: Towards a Performativity Perspective," *M@n@gement* 16, no. 5 (2013): 566–78, <https://doi.org/10.3917/mana.165.0566>.
- 23 MacKenzie, "The Big, Bad Wolf"; Paul Dourish, *The Stuff of Bits: An Essay on the Materialities of Information* (Cambridge, MA: MIT Press, 2017).
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- 24 Edward W. Said, *Orientalism* (New York: Vintage, 1979); Karl Marx, *Capital: A Critique of Political Economy*, 3 vols. (London: Penguin Classics, 1992–93); Michel Foucault, *Power/Knowledge: Selected Interviews and Other Writings, 1972–1977* (New York: Vintage, 1980).
- 25 Finch et al., "The Performativity of Sustainability"; Glass and Rose-Redwood, *Performativity*; Grabher and König, "Performing Network Theory"; Lépinay, "Decoding Finance"; MacKenzie, "The Big, Bad Wolf"; Olofsson and Zinn, *Researching Risk and Uncertainty*.
- 26 Judith Butler, *Gender Trouble: Feminism and the Subversion of Identity* (New York: Routledge, 1990); Judith Butler, "Performative Agency," *Journal of Cultural Economy* 3, no. 2 (2010): 147–61, <https://doi.org/10.1080/17530350.2010.494117>; John L. Austin, *How to Do Things with Words* (Cambridge, MA: Harvard University Press, 1962); Jean-François Lyotard, *The Postmodern Condition: A Report on Knowledge*, trans. Geoffrey Bennington and Brian Massumi (Minneapolis: University of Minnesota Press, 1984).
- 27 Austin, *How to Do Things with Words*; Judith Butler, *Excitable Speech: A Politics of the Performative* (New York: Routledge, 1997); Jacques Derrida, "Signature Event Context," *Glyph* 1 (1979): 172–97, available at <https://videomole.tv/wp-content/uploads/2018/04/JD1972.pdf>; Lyotard, *Postmodern Condition*.
- 28 Gary J. Adler Jr., Daniel DellaPosta, and Jane Lankes, "Aesthetic Style: How Material Objects Structure an Institutional Field," *Sociological Theory* 40, no. 1 (2022): 51–81, <https://doi.org/10.1177/07352751221076864>.

But this is not enough. Studies of representations have always been a central focus in those forms of social research that study the formative power of discourses and ideologies in human relations.²⁴ Studies of performativity have provided scholars with an opportunity to empirically locate the power of representations in distributed action and to begin to measure their impact. It has been shown that representations — such as those created by economists — do more than *re-present*. They also contribute to the *making* of realities on the ground, via the power of performativity.²⁵ Other studies of performativity have examined the impact of representations on the making of (1) actor's identities in terms of phenomena from patriarchy to nationalism,²⁶ (2) micro cultures in organizational contexts that change actor preferences, and (3) meaning and frameworks attached to forms of organizational division of labor in a variety of governance modes and types.²⁷ Representations change actor, network and device configurations in organizations. Strategy designers must therefore take them seriously.²⁸

D: Devices

Things have agency in the ways that humans and non-humans display themselves. The agential characteristics of things have been much contested in the impossibility of thinking. Grossly exaggerating the thinking capacity of humans — we rarely think, even when we drive — this critique misses the whole point of ANT. Things have agency, not because they think or plan, but because their presence, absence, and distribution contribute to the making of action on the ground.

From the supermarket cart to the computer, from the mouse to the gun, researchers have empirically demonstrated that the presence and absence of devices configure the spectrum of action for agents.²⁹ Data shows that when guns are not regulated and can easily be found, homicide rates increase universally.³⁰ Guns and actors together kill.

One may argue that a device is a mere actor. It is not. Devices are the necessary bridges between actors and networks. Without them, we cannot understand the socio-technical universes of distributed action. To give an example, imagine that a city government wants to slow the speed of automobiles as they drive past schools. Not slowing down, or worse still, speeding near a school may have many reasons ranging from a lack of proper training to macho culture and patriarchy (these drivers are predominantly male). One may scan for the constituents of this distributed action by using DARN.

Road networks and infrastructure play a role. It is not ideal to have a school and a busy road next to each other; however, it is practically impossible to separate them if they are already built. Changing representational orders by increasing the punishment for speeding to disincentivize drivers is also a possibility. Similarly, representational devices such as stop signs, billboards aimed at educating drivers, or advertising campaigns to change the driver mindset are possible solutions that attempt to make a change in the driver's mind. However, a tangible device attached to the road network seems to work best: the speed bump. Actors slow down to protect their cars. As a result, fewer children are harmed around schools. In this example, the real difference is not convincing the actor to slow down. It is not a difference

- 29 Sandrine Barrey, Franck Cochoy, and Sophie Dubuisson-Quellier, "Designer, packager et marchandiser: Trois professionnels pour une même scène marchande," *Sociologie du Travail* 42, no. 3 (2000): 457–82, [https://doi.org/10.1016/S0038-0296\(00\)01089-X](https://doi.org/10.1016/S0038-0296(00)01089-X); 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," *The 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 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>.
- 30 For a review of the literature and a study of meta data regarding gun availability and homicide, see "Homicide," Harvard Injury Control Research Center, accessed November 19, 2022, <https://www.hsph.harvard.edu/hicrc/firearms-research/guns-and-death/>.
- 31 John Law, "Notes on the Theory of the Actor-Network: Ordering, Strategy, and Heterogeneity," *Systems Practice* 5 (August 1992): 384, <https://doi.org/10.1007/BF01059830>.
- 32 Advanced strategic design even designs an entire organization as a device itself.
- 33 For the place of scale in SD, see Jamer Hunt, *Not to Scale: How the Small Becomes Large, the Large Becomes Unthinkable, and the Unthinkable Becomes Possible* (New York: Grand Central Publishing, 2020).
- 34 "Homicide Rate by Mechanisms," UNODC, accessed May 3, 2022, <https://dataunodc.un.org/data/homicide/Homicide%20rate%20by%20mechanisms>.

in the network made by changing the roads. Neither is it a matter of representation made by changing laws or road signs. What makes a real difference is adding one more device to the DARN universe of speeding.

The Application of DARN in Strategic Design

We define strategic design as an evidence-based practice aimed at proposing new ways to arrange the interaction of devices, actors, representations, and networks in any given organization or problem universe. As John Law eloquently put it, when organizations work seamlessly, they create the effect of a unitary actor.³¹ When an organization fails, however, its agency must be improved and repaired. The main objective of strategic design is *re-pairing* the constituents of an organization to enable it to reach its objectives. The DARN approach has the potential to equip designers with a scanning device for studying an organizational problem and imagining a way to repair, darn, or improve it. It does this by rearranging and revising the interaction of devices, actors, representations, and networks that serve as elements of the process that creates distributed action. Such strategic design interventions can also take the shape of designing an entirely new device, agency, representation, or network in or of an organization.³²

By delineating DARN, we do not propose D, A, R, N to be fixed categories that represent the components of an organization. Instead, each building block of an organization can be framed as a device or an actor in different contexts. They are vantage points to make sense of distributed action, not mutually exclusive components of a larger whole.

Consider examples in the context of transition design to transform a gender-specific organization towards a gender-neutral one. Interventions could address several aspects. (1) They can use representations such as changing the ways in which to conduct intra-organizational training. (2) They can address architectural network effects that determine how gendered actors in the organization relate to each other, from bathrooms to meeting rooms. (3) They can address agencies themselves by freezing male hiring to hire women only as a way to increase the population of female actors. (4) They can also use devices such as redistributing resources monopolized by men and distributing them to women. These interventions can also take the shape of an entirely new organizational interaction of devices, actors, representations, and networks.

The DARN approach to strategic design can also be scaled to analyze (again, not solve) more general societal problems, as long as it addresses them via organizational competences.³³ A method or methodology is not a bundle of design techniques. A method *theoretically* specifies how one uses techniques of strategic design in design. It is helpful to illustrate the application of DARN as a method used in an actual social problem cluster.

The unusually high rate of mass shootings and homicide rates in the United States can serve as an example of a design research and prototyping method in strategic design. According to the United Nations Office on Drugs and Crime (UNODC), the United States has the highest firearm-related homicide rate in the democratic and developed world.³⁴ Conservative approaches

- 35 Larry Buchanan et al., "What is a Bump Stock and How Does It Work?" *New York Times*, updated March 28, 2019, <https://www.nytimes.com/interactive/2017/10/04/us/bump-stock-las-vegas-gun.html>.

address homicide from a perspective underlining the sole responsibility of the delinquent individual. Organizations such as the National Rifle Association (NRA) argue that actors bear the sole responsibility for homicide. Recognizing the high homicide rates in the United States as a problem, these individualist approaches propose more effective prosecution of bad actors to decrease high homicide rates and mass shootings.

A DARN Approach would first scan the environment to examine the production of homicide as a distributed action. This frames the problem as a socio-technical organizational problem rather than a simple crime committed by delinquent actors. This perspective accepts the responsibility of actors, but it does so in reference to the larger universe that equips actors with competences, devices, networks, and representations that make the distributed action of homicide possible in the first place. Actors can be individuals, but most of the time they represent class, gender, identity or belief based collective characteristics. It is the impact of this collective agency of humans that should also be factored in to make sense of homicide.

Second, a DARN approach would look for devices and things such as guns, bullets, and magazines that make gun violence possible or increase the scale of gun violence. For example, a bump stock is harmless as a single device. When used with a weapon, it turns a simple gun into a machine gun. Actors remove the regular rifle stock, the part of the rifle that keeps the rifle on the shooter's shoulder, substituting a bump stock mechanism that causes the weapon to increase its shooting capacity. With a bump stock, the shooter can pull the trigger once so that the rifle shoots all the bullets in the magazine. In the Las Vegas mass shooting of 2017, the gunman shot more than 1,000 bullets, killing sixty people. Half of his twenty-four guns were equipped with bump stocks.³⁵

Following this mass shooting, the National Rifle Association stopped lobbying against legislation that would make bump stocks illegal. From that time on, the National Rifle Association supported the ban of bump stocks. The legislation passed in 2019, making bump stocks illegal in the United States.

Although less lethal than bump stocks, there exist many trigger-enhancing instruments that turn pistols into semi-automatic weapons (Figure 1). How are these mechanisms used and found? The ease of finding and deploying these devices configures agencies in unexpected ways. Actors can assemble devices that are represented in a variety of settings in differing ways. They can purchase a hand pistol in one state while updating the pistol with a trigger-enhancing instrument purchased in another state. The free marketization of these devices creates a new spectrum of agency that changes homicide rates in countries. Thus, the DARN approach can help us locate the agency of devices in a distributed action universe. We can then use this information to ideate to neutralize the effect of this device on action in a novel way.

Further, having a gun changes the agential capacity of actors independent of their original motives and the technical composition of the device. Much like the idea that when one holds a hammer, one looks for nails, when one carries a gun, one may look for reasons to use it. The easier it is to carry a gun, the higher the homicide rates will be, independent of the demographic characteristics of the actor who carries the gun.



Figure 1
Action enhancement trigger device. Source: "Action Enhancement Trigger for Hellcat," APEX, accessed May 3, 2022, <https://www.apextactical.com/apex-hellcat-action-enhancement-trigger-black-4>.

36 Glenn Thrush and Katie Benner, "6 Gun Shops, 11,000 'Crime Guns': A Rare Peek at the Pipeline," *New York Times*, updated April 30, 2022, <https://www.nytimes.com/2022/04/28/us/politics/gun-shops-weapons-resell.html>.

Much like actors, devices cannot do things alone. They configure agency, always in reference to legal networks that control the production, exchange, and circulation of devices. In Florida, a twenty-year old man cannot buy light beer, but he can shop for a semi-automatic gun. This happened in the case of nineteen-year-old Nikolas Cruz, who murdered seventeen people in Parkland in 2018. In this case, devices and legal rules and regulations together contributed to the production of homicide as a distributed action. This is also the case for a network of gun-selling agencies that makes it easy to buy these devices of homicide.

Finally, a DARN approach would scan the environment for representational formations that contribute to increasing homicide rates. From an expanding gun culture to an aesthetics of violence, from patriarchal discourses to ideologies of gun use as individual freedom, DARN would work on locating representations that serve as performative of homicide in a cultural context. More important, a DARN perspective would look at which representations are blocked or prevented in the homicide universe. For example, the National Rifle Association has successfully lobbied to block the Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) from collecting and distributing trace data of guns beyond law enforcement agencies. Thus, it becomes very difficult, if not impossible, to locate meta-data concerning the gun sellers who are primarily responsible for the marketing of guns that were more frequently used in homicide.

A recent report shows that 1.2 percent of Pennsylvania's licensed gun dealers account for 57 percent of the guns used in gun-related violence.³⁶ Such a new representation changed the DARN universe of homicide in two ways. First, it makes it easy to see that only six shops sell 11,000 crime-related guns. This makes it possible to imagine a new legal representational order that would block certain actors from using certain parts of the network. Second, the new design intervention is made possible only after an intervention into the representational sector of the DARN universe.

In prototyping possible solutions to address increasing homicide rates, strategic design practitioners can work with urban or state policy makers and other concerned actors on the ground. They might, for example, co-design interventions that curb the proliferation of homicide *devices*, such as trigger enhancers. They might change legal *representations* of gun ownership rights, or *networks* of sales agents. In this way, DARN could be used for more than studying a universe of distributed agency that gives birth to increasing homicide. It could be used to find ways of ideating with actors in prototyping possible ways of addressing homicide. However, and to repeat ourselves, DARN cannot be regarded as a way to offer a *solution* to a social problem such as homicide. It is a method that actors can use with designers and social scientists to imagine, make and implement solutions.

Once such research is carried out in re-imagining and studying the problem, DARN can help designers to ideate and prototype an intervention proposal that can be deployed in an organizational setting, by theoretically locating possible change scenarios. For example, Actor A is responsible for homicide from a legal point of view. Yet, sociologically, homicide is created and maintained by Homicide DARN. Hence, pursuing ideation in the realms

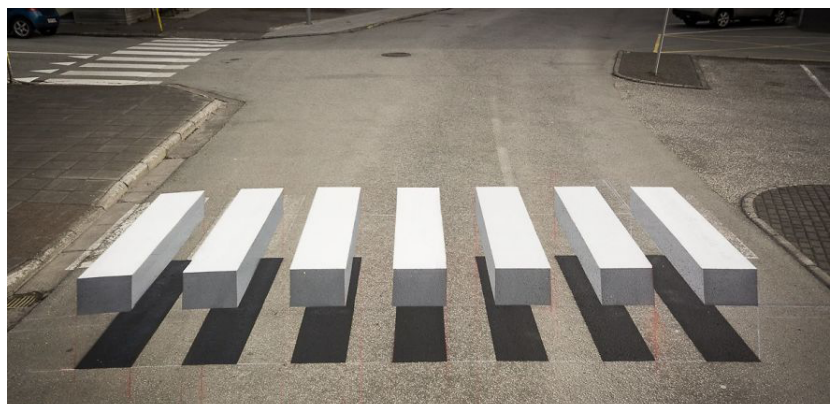
of devices, representations, networks, as well as other actors, designers can find a way to alter the nature of the production of homicide.

The problem can be about an actor (a speeding driver), but the solution may be found in devices (speed bumps). In another context, the problem can be about representation (such as a company's patriarchal organizational culture), and the solution could be found in a network (changing how actors see and relate to each other in the office space). The problem can be about a network (such as a wi-fi network that does not work in a certain community), and solution can be about an actor (such as the absence of a security worker around a router). It is possible to imagine addressing an actor problem with a device-and-representation solution, as in [Figure 2](#), using combinations of DARN to address a single distributed action problem.

The analytical approach of DARN serves to understand and intervene in a problem universe. It also equips strategic design practitioners with a framework to measure the effect of their interventions by observing how a certain change introduced into a DARN universe can lead to a change in the distributed nature of a certain action. In the previous example, an applied prototype entailed curbing a trigger device or prohibiting bump stock production or circulation (a change in the device). We can measure impact in terms of how artifact actions are visible in meta-data concerning gun violence in a certain state before and after the change. Similarly, we can measure the impact of a new device in cars (such as an automatic slow-down feature that kicks in around schools) and compare it to the performance of a speed bump, or a representation-and-device combination such as painting crosswalks to look like a material impediment, as the image of tangible block applied in Ísafjörður, Iceland, illustrates ([Figure 2](#)).

It is important to note that DARN does not present an *a priori* explanation of the nature of distributed action, nor does it aim to replace explanation itself. Furthermore, it is vital to imagine DARN as a dynamic approach that can change configurations and even change the definitions of its components. DARN should be used to analytically approach the complex

Figure 2
Representation-and-device combination example. Source: "Town in Iceland Paints 3D Zebra Crosswalk to Slow Down Speeding Cars," BoredPanda, accessed May 3, 2022, <https://www.boredpanda.com/3d-pedestrian-crossing-island>. Image credits: Gústi Productions.



and integrated universe of a problem from the vantage point of device, actor, representation, and network. In the actual world of problems, one cannot locate what is really a device that is not an actor, for every device has an agential capacity. Action is always distributed among actors, devices, networks, and representations to varying degrees. We approach the problem's dynamic universe from the theoretical vantage point of each device, actor, representation, and network.

In the example of a speed bump, we see that it is a part of the road network for a driver, yet it is a device for a school master. A policeman is an actor who earns his living by policing, but a device for a dictator who wants to curb dissent. A train is a network for a planner, a device for a traveler, an infrastructural network for the restaurant-owner on the restaurant train car, and a representation of industrialization for a historian. Therefore, DARN can only be used as an approach to examine a problem or a distributed action universe and to imagine and co-design possible interventions in them. It does not replace analysis and design. It supports the deployment of design techniques with an evidence-based framework grounded in the social sciences. DARN is not a theory per se, but an effective methodological framework in strategic design informed by social theory.

Conclusions

This article proposes a new method for research and prototyping in strategic design. We draw on advances in socio-technical research informed by Actor-Network Theory and social studies of science and technology. We also review the literatures of strategic design and its sister practices in social and transdisciplinary design. In this article, we define strategic design as an evidence-based practice that offers a new way to arrange the interaction of devices, actors, representations, and networks in any given organization or problem universe.

Nevertheless, DARN should not be confused with a solution. Methods do not solve problems. They help actors design solutions, and solutions are always informed by the political and moral philosophies of those who design them.

Neither should DARN be equated with techniques of strategic design. Many designers propose techniques as methods. For instance, they call for starting design process with problematization and research. This is not a methodological choice, but a technical call. A method *theoretically* specifies *how* one carries out techniques of strategic design such as research. Furthermore, a method summarizes how to carry out research, but carrying out research is not a method of design. Research is what designers do regardless of the methods they use.

The DARN approach is an analytical tool to understand and intervene in the distributed nature of action in an organizational problem universe. Operating as an intangible toolkit, DARN provides designers, social scientists, and professional actors with a working framework to locate the distribution of responsibility among the parts of an organizational problem, DARN informs strategic design processes in a variety of its application modules.

37 Camilla Buchanan, *What Is Strategic Design*.

38 *Ibid.*, 215.

39 Buchanan, *What Is Strategic Design*; Amatullo, *Design Attitude and Social Innovation*.

In terms of problematization, DARN warns us that problems may be more complex than their actors immediately see or represent. Not assuming the *a priori* legitimacy of any problem, DARN invites practitioners to first problematize the problem in order to check for whether the very representation of the problem is performative of the problem itself. After all, DARN is a representation in the first place.

Second, DARN can be deployed to study the distributed universe of a problem by approaching it from the vantage point of its constituents—devices, actors, representations, and networks. Once the legitimacy of the problem is established, it becomes less challenging to define what kinds of actors, with which devices, on what type of network considerations, and in reference to what performative forms of representation behave to make and maintain a problem.

Third, DARN can be deployed in ideation exercises to imagine actual or speculative ways to address a problem on the ground, either among designers or with the actors implied by or in the problem universe. It is the multi-dimensional nature of DARN that affords non-linear thinking and lateral idea generation. It creates multiple directions for the designers' thinking to travel. This practice can entail prototyping by using many of methods and processes, as well as drawing on many designerly characteristics or attitudes. Finally, DARN can be used to measure the impact of design intervention in the organizational universe by comparing and contrasting the DARN analysis before and after deploying the design intervention.

DARN supports and draws on three intersecting approaches to strategic design in the literature—strategic design as discipline, as process, and as attitude. In this way, DARN addresses an important gap that design practitioners articulate in a recent study.³⁷ Despite their well-developed process of research and design, strategic design practitioners operate on an underdeveloped and vague set of methodological rules of thumb and a socio-technical theoretical framework. At times, vagueness is desirable, and designers are trained to tolerate ambiguity. But when it comes to communicating what they do and how they do it in making things on the ground, such vagueness leads to “a lack of shared vocabulary and methods.” This turns out to be a common weakness of strategic design.³⁸ We believe that DARN can address this gap, while operating as a single framework of practice and research.

This framework can be used in several ways. (1) It can help organizations to reach their stated objectives. (2) It can define, *darn* or solve organizational problems with evidence-based and collaborative design interventions, presenting a simple framework for use by implied actors, professional designers, and researchers. (3) It can imagine new organizational models with complex and distributed agency considerations such as economic platforms. Finally, (4) it can improve and measure the impact of design interventions in organizational strategy, addressing another gap that design practitioners and researchers have identified.³⁹

DARN has limits. First, if DARN is confused with a “theory of human action,” it can be incorrectly used to describe everything and anything pertaining to human behavior. DARN is not a theory. It is an approach used to

- 40 See, for example, Stig Ole Johannessen and Lesley Kuhn, eds., *Complexity in Organization Studies: Implications and Applications of Complexity Thinking in Organization Studies: Strategy, Organizational Dynamics and Innovation* (Thousand Oaks, CA: Sage, 2012); Robert Macintosh et al., eds., *Complexity and Organization: Readings and Conversations* (London: Routledge, 2006), <https://doi.org/10.4324/9781315887784>; Gregory Bateson, *Mind and Nature: A Necessary Unity* (1979; Cresskill: Hampton Press, 2002), 1–18; Joel A. C. Baum and Jitendra V. Singh, eds., *Evolutionary Dynamics of Organizations* (Oxford: Oxford University Press, 1994).

analyze the constituents of distributed action. Analysis starts with DARN, but it does not end with it. DARN is a tool that can be used for research and design informed by the social sciences in organizational settings.

Second, DARN is not a summary of how an organization works. Organizations are complex institutions, and the organizational studies literature—some of it informed by Actor-Network approaches—is a testament to the complexity of organizational universes and how they work.⁴⁰

Third, and last, DARN does not pass judgement on matters of moral philosophy. DARN demonstrates empirically that things have agency, or that networks have power, or that representations are performative of action. This does not mean that all agencements, apparatuses, actor-network configurations, or DARN universes are right, democratic, or legitimate. Do stones have rights? Should trees vote? Is the designer of a bumper stock responsible for homicide? Are platforms (read as networks) responsible for rising authoritarianism? Yes, and no. Of course, and perhaps. We do not know, and DARN cannot help us address these vital questions. Politics and philosophy help us deal with these difficult questions.

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