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Integrating Design into Organizations: The Co-evolution of Design Capabilities

Summary

Organizational leaders are increasingly turning to design approaches as a panacea for uncertainty and disruption. However, frictions between design and typical engineering and management practices make integrating design into organizations difficult. To do this well, it is necessary to foster the co-evolution of two types of design capabilities: *deep expertise in design practices* and *wide understanding, application and scaffolds of design*. Underestimating the co-evolution leads to three typical “pitfalls” that can limit the effectiveness of investments in design. We discuss each of these tensions in the context of large technology companies, along with practical recommendations on how to avoid them.

Keywords: design, design thinking, innovation, strategy, organizational change, strategic management

Introduction: Design and design thinking in business

Scholars and managers alike understand that organizations must be able to exploit existing businesses in mature industries, while simultaneously exploring new technologies and competing in new markets where flexibility and experimentation are key success factors.¹ However, this is an enormous challenge organizationally.² In recent years, design approaches and practices (including design thinking) have emerged as a solution to this challenge,³ and one that can be a source of competitive advantage.⁴ *Design* aims to transform existing situations into preferred ones,⁵ “with the intention of improving human experience with respect to a specified problem.”⁶ While various designers (e.g., industrial, software, architects) have been studied since the 1960s,⁷ the field of design continues to elude a commonly accepted definition.⁸ There is agreement, however, on the idea that both the domain and the process of design distinguishes it from other fields.⁹ It is this process that has captured scholarly and

practitioner attention in the past decade, with design thinking becoming a buzzword for fostering innovation in organizations.

Design thinking refers to the approaches and methodologies developed in the field of design for abductively creating non-routine solutions to ill-defined problems,¹⁰ regardless of the domain of application. While design thinking is a contested construct academically, most scholars connect it to human or user-centered innovation, creative problem solving, experimentation, and iteration.¹¹ The literature varies on whether design thinking is seen as something that either non-designers need to learn or something specific to designers, or on the organizational level, as a cultural or processual approach.¹² It is clear, though, that with the spread of the notion of design thinking in organizations, the occupation of designers in many companies has broadened in scope beyond designing products and services.¹³ Organizational leaders now treat strategy-making as an exercise in design.¹⁴ They apply design to create new employee experiences¹⁵ and to build new business ecosystems.¹⁶ Design is now being used as a tool to facilitate the process for organizational change and to build a strong brand. As one of our informants told us (see Research Setting box below):

“Design, as a discipline, is pretty broad, and it has many things from research to visual design, brand, organizational change... And sort of the [client] expectations of what we [as a design consultancy] deliver have broadened and broadened constantly.” (Head of Design in an agency)

Design-driven organizations have integrated design and design thinking into most of their organizational practices,¹⁷ believing that design and design thinking is at the heart of value generation and sustainable competitive advantage.¹⁸ These companies are led by design (though not necessarily by designers) and insist that design and design thinking be embedded throughout the organization.¹⁹ They use design to redefine problems, to facilitate co-creation between different stakeholders, and to learn through experimentation. As a result, design can be seen as a cultural transformation process within a business,²⁰ playing a pivotal role in the way the organization manifests itself in the marketplace.²¹ As in any transformation effort, shifting power relations and scopes of roles need to be navigated carefully, or non-designers can see designers as infringing on their turf and designers can see design becoming diluted. Sometimes the excitement over design moves design towards management rather than the other way around.²²

Nevertheless, there is mounting evidence that firms that do succeed at becoming design-driven outperform their competitors, with the positive impact of design on business performance apparent in many measures (e.g., time-to-market, adoption rate, share of wallet, market share, revenue growth, profitability, and brand value).²³ For example, the Design Management Institute's 2015 Design Value Index, based on a portfolio of publicly traded stocks from companies considered to be design-driven, showed a 211% return over the S&P 500.²⁴ In a more recent comparison, companies in the top quartile of the McKinsey Design Index in terms of their design actions showed 167% higher growth in revenue over industry benchmarks.²⁵ However, the contesting views on design and design thinking in both the practitioner and scholarly communities²⁶ can be confusing to leaders attempting to reap these benefits. What types of capabilities and practices do you need and to whom on an organizational scale?

As companies attempt to integrate design, they often encounter frictions caused by differences between the practices and approaches of design and design thinking, and those of engineers and managers. Rather than dive into all of the rich and nuanced particularities, we aim to provide an overall view across design transformations in the context of large technology organizations and the broader themes related to these changes to illuminate opportunities and challenges that leaders of such organizations can expect to encounter. Based on our professional experience and a study of 110 designers, design managers and design business leaders working with or in large technology companies (see the Research Setting box below), we argue that there must be a co-evolution of two types of design capabilities – deep design expertise and organization-wide understanding and scaffolds of design – in order to manage the frictions between design, engineering and management. We identify three common pitfalls large technology companies face in becoming design-driven organizations, and we pin these pitfalls to the lack of successful co-evolution of the different facets of design capabilities. We conclude by practical recommendations on how leaders can avoid these pitfalls and a call to action and further inquiry.

Research setting

As a part of a larger research project,²⁷ we interviewed 110 designers, design managers, and design business leaders currently working either within large, globally operating technology companies

(ranging from software to hardware to industrial processes) or design consultants working with such companies. The majority of interviewees were North American or European, but interviews were conducted in nine countries (USA, Finland, Australia, Germany, India, Norway, Poland, Sweden, and Switzerland). The aim was to include diverse industries, cultures, positions and design specializations in order to identify commonalities in the dynamics of integrating design into large technology organizations.

The interviews were conducted in person or by videoconference. The interviews were built around core themes²⁸ using open-ended questions aimed at providing a deep and detailed understanding of our interviewees' professional roles and identities, their thoughts on the future of design, and their experiences and views on integrating design in their organizations or with their clients. In all interviews, we probed to get specific information on interviewees' memorable experiences (or "critical incidents").²⁹ The interviews typically lasted between 45 to 60 minutes and ranged from 30 to 120 minutes.

In addition to these 110 interviews, we also interviewed engineers, sales staff, and support personnel and examined internal and external organizational materials on design to gain further insights into advancing and structuring design in the organizations' contexts. We also examined the internal and external materials on design and design thinking of several additional technology companies, and had multiple informal discussions with design professionals working in and for other technology organizations.

The data allow us to better understand the changing role of design within large technology companies, and the challenges that ensue when such companies attempt to become design-driven. This paper draws on the qualitative data from the entire data set, as well as exploring specific issues with different subsets of the data.

Frictions between design, business and engineering

Design specializes in the "messy situations"³⁰ of ill-defined problems³¹ that are especially difficult because the problem and solution co-evolve.³² This means that how a problem is defined depends on

one's idea for solving it, as well as the other way around – neither is stable.³³ For example, an urban design challenge that is defined as a safety challenge points to a very different set of solutions than the same challenge defined as a distributed entertainment challenge.³⁴ Solving such open-ended, co-evolving problems through the scientific method³⁵ or analysis and synthesis³⁶ is not possible, but instead requires abduction and exploration.³⁷ While these problems are not unique to design, design has developed its distinct traditions and ways of addressing such issues. We can learn much from the decades of research conducted on how design experts tackle design problems.

One of the core constructs that stands out in design research is *framing* and *reframing*, essentially questioning the given problem and coming up with alternative perspectives. This is an essential feature of design expertise.³⁸ Good design is dependent on creating a mental standpoint (frame) from which a problem can be successfully tackled.³⁹ It is not surprising that design experts spend a significant portion of their time and effort framing and reframing the problem, as opposed to solving it.⁴⁰ Design experts approach more well-defined problems as if they were design problems, needing reframing.⁴¹ As Cross notes, “outstanding designers are found in various studies to be pro-active in problem framing, actively imposing their view of the problem and directing the search for solution conjectures.”⁴² We have found that practitioners also strongly associate reframing with the benefits of design expertise, as emphasized by, for example, two of our informants, who told us:

“The designerly way of thinking goes [with] iteration, and I think the key point is asking the question[s]. You don't think for yourself, ‘Here is a problem, what is my solution?’ That is the engineering way. [In the designerly way of thinking,] it's ‘Okay, what is the underlying cause of the problem? What is it that I wanna achieve, or what my user wants to achieve?’” (VP of Innovation in a large software Fortune 500 company)

“This is a tremendously good combination that we have, having designers and then having engineers within our ranks. And I've said many times, that designers are those who make problems for us, and engineers are good problem solvers, creating then a good combination.” (R&D Manager in a Fortune 500 industrial equipment company)

As a result of looking at different frames, the problem space is questioned and *more* uncertainty is initially introduced into the process. This is in stark contrast to the traditional management and engineering processes, creating frictions when introducing more design-driven ways of working into organizations. One of our informants told us:

“Execution is all about problem-solving. Here’s a problem, solve it. And that’s what our companies are good at. Creativity is all about problem-finding. So, what is the problem here that we’re solving? And when you look at every one of us in the company environment, do you prefer the employee that, when you say: ‘Here’s a problem’, who comes back and says: ‘Here’s a solution’, or do you prefer the employee who comes back and says: ‘And here are five more problems?’ So, all our incentive structures, how we’re reviewing people, [are] all built around execution and the markets. They wanna see efficiency, it’s all about execution.” (VP of Innovation in a software Fortune 500 company)

The way that designers approach the challenge of framing and creating successful solutions to problems sets them further apart from many business processes. Design experts pursue parallel lines of thought, whereas those new to design depend on a serial process.⁴³ Design experts transition between breadth-first and depth-first strategies to assess the feasibility of a high-level solution concept,⁴⁴ mixing solution and problem driven strategies,⁴⁵ and making extensive use of analogies to past projects and cases.⁴⁶ Such non-linear ways of working do not fit easily into the typical stage-gate development models used in many companies, which attempt to minimize risk by calculating projections and locking features before proceeding to subsequent steps.⁴⁷ One of our informants described the design process of “navigating ambiguity”:⁴⁸

“Transformation [to designerly ways of working] requires a leap of faith. You have to jump to the unknown, explore, tolerate risks. And intuition is important there, you have to trust your intuition. And that’s challenging, ‘cause traditionally there has been focus on numbers, not on intuition, those traditional processes don’t support intuition. And you can always argue that you can’t scale intuition. But you can build on experience, purpose, and strong values.”
(Partner in a design agency)

Throughout the iterative design process, visualizations and prototypes play important roles as cognitive and interpersonal *boundary objects*, that is, artifacts and epistemic objects facilitating shared understanding between people.⁴⁹ The act of creating these objects offers feedback to the designers on the feasibility and distinctiveness of the idea,⁵⁰ not only representing knowledge but transforming it.⁵¹ Furthermore, visualizations and prototypes offer a communicative connection required for coordinating efforts,⁵² raising “questions that turn into avenues for further exploration.”⁵³ While prototyping is also a central practice in engineering, the emphasis of prototyping in an engineering-driven organization tends to be on validating proposed solutions rather than exploring different possibilities in a visual manner. In other words, designers prototype to learn more about their users and the problems they are facing.

Designers tend to work from questions around particulars – deep understanding of specific user issues, specified prototypes and experiments – in order to create new insights that can then be applied to create solutions in a wider context. The process of prototyping, experimentation, testing, and iteration, and the contrast between how engineers typically work, is nicely described by two of our informants:

“This concretization of things, it has also had a really huge impact on all of our work [...] The mockups, the rapid prototyping methods, we didn’t do that before bringing the designers onboard. It’s been something new to us, which has really brought us quite a bit more speed and flexibility to our doings. The engineer’s mentality is always that we specify everything to the smallest detail, and then build the product, and then we see how it works.” (R&D Manager in a Fortune 500 industrial equipment company)

“In today’s world, you know everything is changing, so your possibilities for your inputs are also changing. So you wanna design a system that is easy to change. I argue, every version is a prototype of the next version. And you wanna be able to get to the next version as quickly as possible. And then it’s something in the mind-set. So, you pull your risk, try many things, small experiments so you can quickly learn and decide what to scrap or not. I think that is something that especially at a top leadership level where you’re thinking long term can be difficult. And it requires new instruments for managing a company.” (VP of Innovation in a Fortune 500 software company)

We summarize these frictions between the central features of design approaches and typical engineering and management practices in Table 1, below.

Insert Table 1 here

These different ways of working and cultural distance from engineering and management make it difficult to build design-driven organizations through investments in the design organization alone. We argue that exercising design capabilities on a comprehensive level requires organizations to attend to co-evolution of deep and wide design capabilities.

Building design-driven organizations: Co-evolving deep and wide design capabilities

The co-evolution of design problems and solutions⁵⁴ means that design cannot be separated into its own function with clear boundaries and be expected to influence strategic decisions, whether on an

organizational level or in individual products. Rather, design, engineering and business decisions must become intertwined. As a result, we argue that to move toward a design-driven organization, it is necessary for there to be co-evolution of:

- (1) deep expertise in design and its practices for human and question-centered abductive exploration, and
- (2) wide design capabilities including both wide-spread understanding and application of design approaches and the organizational scaffolds to support design efforts across the organization

Due to the centrality of reframing and abduction, which make it difficult to define the scope of design, and the human-centered, non-linear ways that designers work, design approaches are not especially compatible with most existing organizational routines, practices and processes. Thus, truly integrating design can be even more complex than other organizational transformation efforts. Simultaneously, most large technology organizations start with a very small or non-existent internal design workforce, necessitating scaling a new function within the organization - unlike in many other transformation efforts. Enabling good design on an organizational scale thus requires significant investments in both deep and wide capabilities. While it is possible to invest in these separately and focus on building a professional design organization, or training non-designers in design thinking, or incorporating design into organizational processes, the effect of these investments will be limited because shortcomings in one type of design capability will prevent taking full advantage of the others. Investments in the lagging capability will have a larger net effect in the organization than continuing to hone more developed capabilities (see Figure 1, below).

Figure 1. The effect of design investments at different levels of deep and wide design capabilities in the organization

Insert Figure 1 here

Design-driven organizations need sufficient numbers of design professionals to do design and to bring their deep, disciplinary expertise to the table. Without this expertise, design is reduced to a stepwise exercise rather than craft⁵⁵ – the same way cookbook recipes are useful for the home cook, but hardly

the way to create new Michelin-starred dishes. Expertise in the design discipline and related methods and tools, such as user research, visualizations and prototyping, is represented in the depth of design capabilities in the organization. While the true measure of this depth lies in the level of this expertise, typical indirect indicators of organizational investments in deep design capabilities include, for example, the number of in-house designers, the variety of design specializations, the budget for design, and design and customer satisfaction awards.

However, design expertise is not sufficient on its own. Organizations also need a broader group of design thinkers and a widespread understanding of design to allow designers to effectively practice their trade and to benefit from the full range of expertise inside the company – like communication skills, design approaches can help engineers, sales staff, internal services and management alike be more effective in their own work as well as enhance cross-functional collaboration. As one of our informants nicely summarized their perspective on design-driven organizations:

“Design-driven means that there is a shared design-mindset, on all levels, everywhere in organization. Not everybody needs to be a designer, but everybody can think like a designer, support those principles, give value to customer experience and so on. [...] And of course it’s not just about the mindset, you have to have skills and practices and structure in place to be design-driven. Great design artefacts won’t be created with mindset only.” (Partner in a design agency)

In addition to the skillsets and values of the people working in the organization, the width of design capabilities is also reflected in the organizational scaffolds for design, uniting and supporting design efforts across the organization. Organizations cannot become design-driven without a wide-scale transformation of their operations, as otherwise those practicing design approaches will run into constant friction and pushback from outdated collective legacy systems at place. As one of our informants highlighted, design-driven organizations do not just add a design component into existing practices, but rather redesign their business at large:

“I’d say you don’t wanna integrate [design] into ‘business as usual’. The notion of your goal is to change from ‘business as usual’ into a more user-centered and agile organization.” (VP of Innovation in a Fortune 500 software company)

The width of design capabilities is thus represented in both the appreciation, understanding and application of design approaches throughout the organization and the structures, processes and

scaffolds for supporting and coordinating design across the organization. While the true measure of this width lies in the level of understanding and effectiveness of design application throughout the organization, typical indicators of investments into wide capabilities include the scope and timing of involving designers in projects, portion of employees trained in design approaches, defined and shared tools and processes for design, and the consistency of design output across the organization.

The co-evolution of deep and wide design capabilities means that imbalances limit the operational effectiveness of one type of capability. It also makes it difficult to achieve truly deep expertise without wide design capabilities, and vice versa. Deep design capabilities in an organization depend not only on the expertise of individuals, but the quality of input they receive from the organization at large and how design efforts come together as a coherent whole. Similarly, achieving wide-spread understanding and supportive structures requires deep design capabilities to produce well-designed solutions fitting the organization. This can produce a chicken-and-egg problem: On the one hand, with designers needing input and output cutting across formal organizational and hierarchical structures, it is difficult to mandate the level of required collaboration for designers to be effective if others in the organization do not see the value of design or understand the ways of working. On the other hand, it can be hard to achieve the needed wide understanding and support structures without wide-spread personal experience of working with design and designers due to the frictions between typical design, engineering and management approaches. But while one way of looking at the co-evolution is that lagging capabilities can limit the application and effectiveness of the leading capability, it is equally true that capabilities of one type open up new opportunities in the other, creating fertile ground (or new “affordances”, to use a design term⁵⁶) for building further capabilities. With the combination of deep and wide capabilities, design can become a concerted, effective effort throughout the organization, seen in the desirability, feasibility and viability of the organization and its offering⁵⁷: customer satisfaction, new innovations, sustainable products and services, and revenue, profit and growth.

Common pitfalls in integrating design into large technology organizations

Based on an analysis of the designer and design manager interviews we conducted, we found three typical stumbling blocks faced by technology organizations transitioning from engineering-driven towards design-driven operations: boxed-in design, unactionable design thinking and fragmented efforts. Each of these pitfalls is connected to an imbalance between the level of deep and wide design

capabilities in the organization. We illustrate how they manifested in our data, and discuss how the co-evolution of deep and wide design capabilities helps to make sense of and anticipate these challenges in integrating design into large technology organizations. While these pitfalls represent complex issues with no universal solutions, understanding the co-dependencies of design capabilities can help to structure design transformations and recognize signs of imbalances – and direct investments accordingly.

Pitfall 1: Boxing in design with ineffective cross-functional collaboration

The work of designers crosses functional and organizational borders, making it difficult to mandate collaboration from above. While previous research has highlighted championing or selling issues to top management,⁵⁸ our data clearly show that the biggest headache for designers' may be "selling" design horizontally in the organization to create the space and collaboration needed for effective design. The interviewees repeatedly highlighted the importance of cross-functional collaboration. The majority of employees in large technology companies come from an engineering background, and without investments in increasing design capabilities across the organization, designers are easily excluded, invited far too late, or offered too narrow and rigid scopes. As a result, even highly capable designers end up having to compromise too much in their designs and to waste their time persuading reluctant potential collaborators. Sometimes designers themselves can end up adopting rather siloed ways of working with like-minded colleagues. Although top management and frontline employee enthusiasm were seen as necessary, we found that often middle managers, such as product owners or R&D managers, were in a tactical position to either usher in or block design efforts in their respective siloes. For designers to practice their trade effectively, they needed buy-in from at least a handful of such managers across the organization. Boxing in design with ineffective cross-functional collaboration demonstrates how highly skilled design experts will struggle to produce high quality designs without sufficient buy-in and understanding of design from the part of non-designers in the organizations. Organizational processes with design steps integrated into them can be circumvented, by-passed or met on a superficial level when the hearts of staff have not been won over. While these challenges are faced in any wide-scale effort to change ways of working (such as introducing more inclusive practices to hiring, evaluating and promoting employees), rather than introducing a new dedicated team to the organization, design outside of the realm of engineering design can represent an entire new function in

many technology organizations and one working very differently from traditional engineering and management, leading to frictions. The more time designers spend on educating and persuading others for new ways of working, the less time they have available for using their expertise to do the actual design work. Boxed-in design suggest that investments have been made into deep design capabilities, but the width of design capabilities is lagging behind. The organization lacks of a wide-spread understanding and willingness to use design approaches. Table 2, below, summarizes signs of this pitfall and shows representative quotations from our data related to these issues.

Insert Table 2 here

Pitfall 2: De-contextualized information resulting in unactionable design thinking

Change efforts tend to overestimate the effect of increasing knowledge on subsequent behavior,⁵⁹ assuming that a lack of information is the main culprit holding back progress. This over-reliance on information sharing often happens at the expense of targeting conflicting values, motivations, fears and frictions with existing organizational processes and structures. In the context of bringing in more design-driven ways of working in technology organizations, this pitfall frequently manifested itself as a disconnect between training and action. At its best, training results in increased awareness, inspiration to learn more and a lowered threshold for trying out new ways of working. At its worst, however, it can inadvertently result in a devaluation of design expertise, promoting design as something anyone can do in just a few easy steps.⁶⁰ This can decrease the perceived need to invest in hiring professional designers at a team-level and openness to collaborating with designers on the frontline. Second, training alone is insufficient to integrate design thinking into organizations' engineering- or finance-driven day-to-day practices and decision-making, not to mention changing organizational culture. All too often participants are first excited, but end up lacking peer support and running into resistant structures, slipping back to business-as-usual after completing the training – or even leaving in frustration. This is not to say training should not be organized, but that the experiential and contextual elements tied to it need to be carefully designed to overcome these challenges.

There is a clear movement underway to use design thinking to democratize innovation activities and create organizational environments where everyone has the opportunity to innovate⁶¹. Unactionable

design thinking in organizations demonstrates how investments in wide-spread understanding of design lacks compatible scaffolds to secure wide-spread acceptance. It also shows how depth is needed to complement wide capabilities – not only is design expertise required for producing superior design outcomes, but to facilitate the application of wide capabilities and offering first-hand experience of the design approach and its benefits, as it differs fundamentally from the engineering and management-driven processes at place. In fact, some of the criticism of design thinking has been that it does not go far enough to necessitate co-design,⁶² although users and communities brought into the design process are central to design approaches such as social design⁶³. Unactionable design thinking suggest that investments into the wide design capabilities of the organization have been too narrow, and that the depth of design capabilities is lagging behind in the organization. Table 3, below, summarizes signs of this pitfall and shows representative quotations from our data related to these issues.

Insert Table 3 here

Pitfall 3: Fragmented design efforts lacking a shared framework

In traditional engineering-driven technology organizations, design work, if existent beyond engineering design, is done by a small minority of people. This highlights the importance of pooling scarce resources to make an impact. The alternative is often disorganized or random efforts, with designers here and there in the organization. Shortcomings in design leadership, common goals and a strategic approach to design work leaves design issues and practice at an operative level. At its worst, dispersed efforts without sufficient coordination can result in lower quality, inconsistent design outcomes and a fragmented customer experience. On the other hand, if the priorities and interests of top management lay elsewhere, designers may suffer from a lack of mandate to operate and insufficient resources, while the rest of the organization draws conclusions on whether or not design is important. With incompatible processes and structures, designers may need to take detours and shortcuts to do their work. Sometimes it is even unclear who has the final say in decision making across siloes, leading to standstills. The lack of managerial and peer support, along with a restricted impact, dampens designers' commitment to the organization and retaining talent becomes difficult. From an organizational perspective, it is important

to recognize that designers do not represent a unified group, rather different specializations and skills are needed for different design tasks – yet peer support and collaboration across specializations is important. Tools and processes are needed to extend the reach of design from professional designers to others in the organization, with both informal collaboration and alignment being beneficial for developing creative communities.⁶⁴ Product and service design, facilitating the design and development efforts of others, designing organizational processes and leading design all need to be addressed and aligned to effect change on traditional linear, technology-driven ways of operating throughout the organization. Finally, open discussion needs to be scaffolded to enable redesigning roles and power structures, as well as debate the ethical judgement calls inherent in design work.

Fragmented design efforts, like boxing in design with ineffective cross-functional collaboration, demonstrate how investments in design expertise will have a limited impact without sufficiently wide capabilities. Here, however, the shortcoming of width is seen as the lack of scaffolds rather than organizational understanding of the value and methods of design. This can be compared to many other change efforts that focus on introducing a new way of working without examining potentially conflicting organizational scaffolds, such as reward or reporting systems. What makes design tricky is the wide variety of approaches, methods, specializations and actors bundled together under one umbrella, combined with the uncertainty and ambiguity inherent in creative work. Both designers and non-designers need a shared framework for aligning design efforts across the organization. Fragmented efforts suggest that investments into the wide design capabilities of the organization have been too narrow, holding back the effectiveness of the deep design capabilities in the organization. Table 4, below, summarizes signs of this pitfall and shows representative quotations from our data related to these issues.

Insert Table 4 here

Practical tips for avoiding common pitfalls in transforming technology organizations

As the root causes of the most common pitfalls intertwine in co-evolving design capabilities, so do their solutions. Drawing from our data and our experience in managing and educating organizations, we offer three interrelated practical recommendations for leaders building design-driven technology

organizations on how to begin to address all three pitfalls. We emphasize that these are not steps that should be taken in isolation, rather, simultaneous investments are needed into deep design expertise and wide-spread understanding, application and scaffolds for design across the organization (see Figure 2, below). Nevertheless, we recognize that ideal conditions for design transformations will not arise without action, and encourage leaders and designers to pursue any of the recommendations possible in their existing conditions, and use the impact these create to usher a more fertile ground for further investments. We illustrate each of the recommendations with examples from our research data.

Figure 2. Investing in co-evolving design capabilities to avoid common pitfalls in integrating design into organizations

Insert Figure 2 here

Building wide-spread appreciation for design: Connecting design to the bigger picture

As design decisions are intertwined with engineering and business decisions, effective cross-collaboration cannot rely on decrees alone. To help win over hearts across the organization, design needs to be connected to the bigger picture. While visible support from top management is beneficial, sometimes it can be wise to start small and build momentum by delivering results that are visible in the metrics the organization already believes in - such as revenue growth.⁶⁵ For example, one of the design managers we interviewed described how after a design solution managed to cut a third of needed engineering time for a project, word started to circulate in the efficiency-appreciating organization, and spark interest towards bringing designers onboard other projects. Major changes often start with small teams trying something new, and telling vivid stories about small wins.⁶⁶ These quick wins can then produce positive “spillover” effects in the longer run.⁶⁷ On the other hand, it can be wise to piggy-back and connect design to other timely agendas,⁶⁸ such as open innovation or digitalization efforts. As one of our interviewees said, sometimes the best way to advance transformation can be to refrain from using the term “design” – a “not-invented-here” attitude can be quick to take over if one function is associated too strongly with it. At the end of the day, it doesn’t matter what it is called in the wide

capabilities, but that everyone in the organization understands and adopts more explorative, need-focused ways of working. Find out what resonates in your organization and go with it.

Concrete steps to build appreciation for design across the organization

- share the wins, big and small, with everybody involved to showcase progress and create further demand for change
- connect design to other ongoing transformation efforts, such as digitalization and key performance indicators already in place
- have design objects and artefacts such as journey maps and physical prototypes visible in offices to bring everyone on the same page, encourage feedback and spark discussion

Example from the technology industry: Creating the Cisco Hyperinnovation Living Labs

In recent years, Cisco has put significant effort in design and design thinking. The company offers a good example of how not all investments related to design transformation need to be led by designers or done under the rubric of design. Based on a combination of design thinking, lean start-up and business model innovation methodologies, Cisco Hyperinnovation Living Labs (CHILL)⁶⁹ bring Cisco's teams together with partners, customers, and other companies working to find new business opportunities. The idea is to combine richly different skills, knowledge and viewpoints of senior managers and CEO's along with entrepreneurs, consumers and company employees at all levels, including designers. Through intense collaboration, the lab sessions aim to create breakthrough ideas that can be implemented or invested in by those that participate. Of course, not all projects survive, but something much more important happens: participants develop new innovation capabilities at the ecosystem level, across functional and organizational boundaries. Perhaps equally importantly, they offer compelling, tangible stories of the benefits of adopting such ways of working. These sessions and their results have served as showcases that have received significant amounts of both internal and external attention, building up an appetite and reputation for design approaches both amongst employees and external collaborators and clients, even if they do not always label or recognize these new ways of creating innovations as design approaches. The Hyperinnovation Living Labs and the numerous other design investments the company has been making, such as the Cisco design thinking framework, Cisco Design Thinking Labs, and learning framework around design thinking are paying

off: In 2017, the design group of Cisco received four Red Dot design awards. Instead of taking the honor for themselves, the design group emphasized the countless complex interactions that go into product development and an ecosystem built on teamwork.⁷⁰ Building great products takes a village, as they said. We might add that it takes a good story bigger than design, too.

Building interconnections between capabilities: Creating low-threshold opportunities for design collaboration

To take full advantage of deep and wide design capabilities in the organization, these need to be connected. To help build the requisite interconnections, low-threshold opportunities for design collaboration need to be fostered both between designers and non-designers, as well as within and between teams in the wider community. All of the companies we studied offered their employees design training or workshops facilitated by in-house or external designers. In addition, centralized design-as-a-service teams were used in many technology companies to help units newer to design approaches bring in the first designers into projects and pave the way for local within-unit design experts. On the other hand, in one of the companies we studied, one of the in-house design teams constructed a large block model of the complex, technical industrial process of the business line to help the engineering teams in different product lines see the interconnections of their work with the other teams in the unit. Once the spark for design has been ignited, it should be easy to find the people and resources to start applying design in practice.

Concrete steps to build and connect design capabilities across the organization

- train teams rather than individuals and connect training to outside-classroom development efforts
- facilitate design sprints, co-creation workshops or other low-threshold opportunities to try out design thinking in practice
- use internal and external designers to facilitate development and offer design-as-a-service for units that haven't yet their own design expertise
- contract external design experts to bootstrap developing internal design capabilities and allow internal designers to focus on their main work

Example from the technology industry: Clear steps to helping teams at Intuit

When Brad Smith became CEO of Intuit, design was not central to the company. However, the new CEO set a long-term goal: Intuit will be considered as one of the most design-driven companies in the world by 2020.⁷¹ The company increased the number of in-house designers by nearly 600 percent, representing a significant investment in deep design capabilities. In addition, low-threshold opportunities to learn of and apply design thinking were created throughout the organization on all levels. For example, one day of the company's leadership conference was used to get people thinking more broadly about design, and Intuit organized a series of Design for Delight forums. These were targeted at the entire staff, from finance to HR, rather than only leadership and those directly involved with development activities, and were typically attended by more than 1,000 employees each. The forums showcased successes and shared best practices. Significantly, people who worked together were encouraged to attend together and were asked as a team to identify the one thing they would do differently after the forum, lowering the threshold for subsequent action. A host of other low-threshold opportunities for design collaboration were also created in the company, including changing the layout of its office spaces to better enable collaboration. Two types of new teams advancing design were created: Design-thinking coaches – “innovation catalysts” – were established to help any work group create prototypes, run experiments, and learn from customers. Another group was formed to help middle management embrace both design thinking as a concept and the innovation catalysts as its enablers. Making it easy for teams to proceed from being inspired by design approaches to trying them out in practice with the help of design professionals, amongst other design investments, has resulted in dramatic increases in the amount of innovation activities in the company.

Building wide-spread scaffolds for design: Creating shared frameworks for harmonized design

Design efforts must have a shared direction and gravitas to have a strategic impact in companies. Especially in large organizations, there is a risk of reinventing the wheel. Shared frameworks and tools are needed to help designers and non-designers across the organization to work efficiently and align their efforts for a coherent, high-quality customer experience and strong brand. However, it is crucial that processes and guidelines support experimenting and reflecting. For example, one of the design teams we studied had created a PowerPoint template tool for analysts in the unit to easily create early

mock-ups of customized user interfaces compatible with the design guidelines of the company. We found designers to welcome tools, such as design guidelines or design language, to save their time for meaningful design decisions. Perhaps even more important than the practical tools helping designers, developers and other employees in the organization in their design work, however, is sharing the intentions behind guidelines and frameworks to guide design towards a common direction. There needs to be also space to debate and question the implications of design decisions.

Concrete steps to scaffold design efforts across the organization

- create shared purpose, framework, and processes for design work
- get both top management and middle management onboard to act as role models and sponsors
- create a network of design ambassadors that participates in formal and informal discussions on different organizational levels
- appoint a chief design officer or another person responsible for design and customer experience with a high enough level of design expertise and organizational standing to take part in strategic level discussions.

Example from the technology industry: Creating a shared design framework at IBM

When IBM set its ambitious goal to become design-driven, one of the key challenges was that the growing but fragmented design resources of the company did not support an organization-wide, aligned approach.⁷² It was soon decided that a holistic overview was needed to ease communication between different players, but most of all to create a coherent user experience. IBM built a global platform of 44 studios, enabling the company to amplify and accelerate innovation and human-centered product and service delivery across the organization. A centralized design organization allowed cultivating a shared understanding of design goals. The company constructed its own design framework, IBM Design Thinking, for teams to understand and deliver great user outcomes, while IBM Design Language is a shared vocabulary for doing great design and creating products that look, sound, think and perform like IBM, without resorting to patterns and templates right off the bat. Furthermore, IBM Design Research is a way for teams to build continuous knowledge, discovery, and empathy. It encourages teams to implement actionable user insights through deeper understanding gained from empirical observation, experience, and making. To build a strong design culture, the company also defined seven core habits that are emphasized across all of IBM's design

education programs. These efforts to build a shared framework, combined with recruiting hundreds of designers and offering in-person training for more than 10,000 employees and online training for more than 100,000 employees, translate design investments clearly to the language of business leaders: A commissioned report by Forrester, published in February 2018, shows that IBM has become two times faster in its time-to-market, reduced a third of development time, and had a 301% return on investment.

Conclusions: Beyond deep and wide design capabilities

In recent years, organizational leaders have become interested in design approaches as a way to open up innovation and secure a competitive advantage over competitors.⁷³ Bringing design into technology organizations requires co-developing deep and wide design capabilities to help navigate tensions between design, engineering and business approaches. Doing so successfully is ever more pressing with the rate of technological change and degree to which technology permeates our lives – the implications of design in an era of technology are far-reaching, and not always positive. Some designs represent conscious decisions with intended short-term and long-term consequences, while others do not. Failing to appreciate the co-evolution of and co-dependencies between deep and wide design capabilities in the organization will limit the ability of designers, engineers, and managers alike in making these judgement calls.

Indeed, there are considerable movements in both technology and design emphasizing the responsibility creators have over their creations. As Victor Papanek highlighted decades ago: “You are responsible for what you put into the world.”⁷⁴ Approaches such as social design and speculative design are bringing these questions to the forefront, asking who designers serve.⁷⁵ Mike Monteiro, promoting a professional code of ethics for designers, emphasizes that creativity in design should not be mistaken for personal expression, but rather balancing different needs and recognizing who design includes and excludes.⁷⁶ In some organizations, moving into more design-driven approaches can unearth dilemmas in these trade-offs, emphasizing the importance of shared purpose and values as well as bringing in design on a holistic level rather than product fine-tuning. These are not issues any single function or unit can resolve working alone. While one-size-fits-all type of answers on how to build a

design-driven organization are impossible, recognizing signs of imbalance between deep and wide design capabilities can help leaders direct resources towards where they are most acutely needed.

We believe design-driven organizations – that is, organizations with both deep and wide design capabilities enabling human-centered innovation comprehensively on all levels – are more likely than others to innovate and generate business growth in a responsible manner. With the help of cultivating the necessary skills and scaffolds for design capabilities hand in hand in the organization, leaders can lessen the friction between design, engineering and business approaches, increasing the impact of new capabilities and translating these benefits to both the users and the bottom line. However, we recognize the limits of focusing on evaluating and building design capabilities within the organization. While it serves as a starting point, technology organizations are not known for their diversity, even in terms of the design workforce,⁷⁷ and the issues we are trying to solve are complex phenomena in a continuously changing context. In addition to internal skills, organizations ultimately need to cultivate design capabilities and principles beyond their borders. Going forward, how to create such between and outside-organization capabilities in a way that is economically, socially and environmentally sustainable becomes a key question for organizations, as well as for the design community and design and management scholars.

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