Making Design Thinking Work

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Making Design Thinking Work

Adapting an Innovation Approach to Fit a Large Technology-Driven Firm

An adaptive, incremental approach helped a large company incorporate design thinking into its culture.

Sihem Ben Mahmoud-Jouini, Sebastian K. Fixson, and Didier Boulet

OVERVIEW: In their quest to become more innovative, many firms try out new innovation approaches that are brought in from the outside. Design thinking has been one of these sought-after innovation approaches in recent years. Design thinking has produced remarkable results in creative firms such as design consultancies, but its implementation in large, established firms has proven to be far more challenging, especially if a strong company culture contradicts the philosophies underlying design thinking. One possible answer to this challenge lies in adapting an innovation approach such as design thinking to its new environment so it can truly take hold. We describe how a large, technology-driven firm proceeded in morphing the design thinking approach to allow it to take root in different parts of the company and over time become an integral part of the firm's innovation activity.

KEYWORDS: Design thinking, Culture, Adaptation

Innovation continues to be top of mind for many company leaders (Ringel et al. 2018), yet few are satisfied with their organizations' innovation capabilities. Competitive environments characterized by increasing levels of volatility, uncertainty, complexity, and ambiguity (Bennett and Lemoine 2014) force companies to become more nimble in exploring new opportunities and addressing emerging challenges. Flexibility and speed are especially challenging for existing large organizations with legacy systems and organizational cultures imprinted by past successes.

As a result, many firms have been experimenting with importing innovation approaches from outside of their firms, and even from outside their industries—for instance, Agile,

especially the Scrum version (Sutherland 2014), or Lean Startup (Ries 2011). In small-scale pilots, these experiments often produce positive results, but the larger transformation often proves far more difficult.

Part of the challenge is acknowledging that building innovation capabilities often takes years and requires iterating with the innovation approach itself (Smith et al. 2017). These iterations allow the firm to adapt the approach to its own culture and needs at the same time that they allow learning to accrue and organizational change to gain momentum. Although such an iterative journey inevitably introduces a certain amount of firm-level idiosyncrasy into the transformation journey, successful cases can provide useful insights

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about tradeoffs, funding, strategy, and structure, for researchers and for other companies contemplating such a transformation. We report on one case in which a large, established technology company improved its innovation capability by adapting design thinking to its own circumstances.

Background

Top-performing companies pursue innovation activities based on direct insights from end users (Jaruzelski, Chwalik, and Goehle 2018). One innovation approach that places a strong emphasis on user insights is design thinking. Design thinking represents both a set of methods for innovating and a mindset—in this case, an open mindset characterized by a curious attitude that helps reframe problems (Beckman and Barry 2007; Carlgren, Rauth, and Elmquist 2016). While academic discussions of the true nature and origin of design thinking continue (Johansson-Sköldberg, Woodilla, and Cetinkaya 2013), most authors include at least three phases in the design thinking process (Brown 2008; Luchs 2015; Seidel and Fixson 2013):

1. **Inspiration**—An empathy phase that focuses on gaining deep insights about user needs.
2. **Ideation**—A creative phase that focuses on generating solution options.
3. **Implementation**—A prototyping phase that seeks to quickly weed out poor options and improve upon promising ones.

Because the design thinking process maps closely with experiential learning (Kolb 1984), the journey through the design thinking process also alternates between concrete experiences and abstract conceptualizations (Beckman and Barry 2007) (Figure 1).

Design thinking has received substantial attention across industries as a way to make organizations more innovative (Ben Mahmoud-Jouini, Midler, and Silberzahn 2016; Liedtka and King 2013; Martin 2009). Firms from various industrial sectors have implemented design thinking as an approach to problem solving, albeit with a variety of implementation paths. For example, some firms have trained a large number of employees in design thinking (for instance, Infosys); others have hired designers and had them collaborate with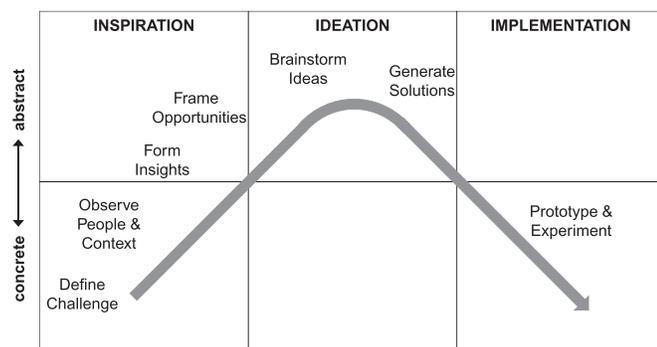 engineers (IBM); and yet others have created a category of employees whose role it is to spread design thinking throughout the organization (Intuit's "innovation catalysts"). Other firms have simply acquired design companies to bring design thinking skills in house; for instance, McKinsey acquired Luna, and Accenture acquired Fjord (Kolko 2015).

While some of these implementations have been promising, others have run into challenges (Carlgren, Elmquist, and Rauth 2016). Some of these challenges are associated with the normal cognitive limitations of humans (Butler and Roberto 2018). Others emanate from the inherent tensions between the organization's established approach and the new push to elevate design. Practices such as top management support, strong leadership in the design function, awareness of design's role and contribution, interfunctional coordination, evaluation of design, and formalization of product and service development processes are needed to reconcile these inherent tensions (Micheli, Perks, and Beverland 2018). But the challenges of implementing a new innovation approach, such as design thinking, in an existing organization are greatest when the underlying philosophy of the new approach stands in conflict with the existing culture of the organization. This is perhaps why, until recently, design thinking has been observed predominantly in organizations whose sole purpose is innovation, for example, in design consultancies.

Given these challenges, it is important to better understand the factors that can help an organization to successfully introduce design thinking, or any other alternate innovation approach. To contribute to this goal, we studied the effort to introduce design thinking in a large, established technology-driven firm, a context which is traditionally not particularly user-centric.

Implementing Design Thinking at Thales

Thales is a multidivisional organization with each decentralized division specializing in a given technology or market (aerospace, space, ground transportation, defense, and security). Headquartered in France, the firm operates globally, currently in 56 countries. It has approximately 65,000 employees, 25,000 of whom work in R&D; 70 percent of those are engineers.

Over a period of six years, beginning in 2012, the firm built a design thinking capability, by 2018, support through design centers located in some of its main business units. (There were eight centers in 2018; five additional centers are planned for 2019.) The design centers have trained thousands of managers and engineers, provided hundreds of workshops, and delivered more than 50 projects with business lines engaging users and customers. The projects have led to new solutions in police technology, radar technician training, inflight entertainment systems, security domains, and air traffic control technology. Design thinking is now integrated in every top management leadership program, and it has become instrumental in the digital transformation under way in the company.

Innovation is a key pillar in Thales's strategy and considered vital to its long-term growth. Like many large engineering firms, Thales spends considerable amounts on self-funded

FIGURE 1. Basic model of the design thinking process

> This first design center experiment was a low-cost, time-limited, low-risk prototype to test whether the center could gain acceptance and build traction for design thinking.

research and develops numerous research partnerships. The company runs five research centers around the world and 20 joint laboratories and maintains more than 50 partnerships with research institutes worldwide. Despite these substantial investments, the impetus for introducing design thinking as an innovation approach originated outside of the company.

The Trigger

In 2009, Thales ran a learning expedition to Silicon Valley for 30 high-potential employees involving various vice president–level executives along with other members of the executive committee. The trip included visits to the design consulting company IDEO and the d.school at Stanford University. This was the leadership team's first exposure to the design thinking approach.

Following this initial interaction, the company signed a three-year partnership with the d.school program; participating students worked on projects proposed by Thales. The student teams were given wide latitude in their approaches to the project. The results, which were presented to the business lines, were promising, but the company didn't choose to develop any of these opportunities. One reason for this disappointing outcome was that the opportunities were not embedded in the environment of the divisions that had the technological capabilities to develop them. As one of the managers involved said, "We learned two things from this phase. The first one was that design thinking really works, and this was good news. The second one was that it was difficult to bring the [project] outcomes back inside the company. However, it created the conditions that allowed a few individuals to push the idea that we needed to internalize design thinking inside the company and create something." During this early period, ad hoc attempts to inject more design thinking into the techno-dominated R&D context met little success.

The Experimentation Period

The partnership with the d.school provided insight, but it did not generate any business impact. However, some senior managers from the learning expedition became convinced of the potential of design thinking. In 2012, one of those managers, the General Manager of the Corporate University agreed to host an experiment. A relatively small open space (~2,000 square feet) within the Corporate University (an independent entity with its own P&L) was dedicated to a 12-month trial to demonstrate the viability of the approach and generate internal traction; the project also received a budget of €60,000 for refurbishments.

In that space, the head of the initiative developed a frugal design center with a small garage and a flexible area that could host workshops. He used the refurbishment funding to create a strong visual identity for the space that was visible from the exterior and contrasted with the rest of the building. He hired one design intern and after intense research into best-in-class design thinking practices and a lot of self-training, they created the design center space and branding, a one-day design thinking training, and support material for workshops. In parallel, he ran many internal meetings with early believers from the learning expedition to recruit his first customers.

This first design center experiment was a low-cost, time-limited, low-risk prototype to test whether the center could gain acceptance and build traction for design thinking. The main objective at this stage was to contact a maximum number of people through workshops and trainings, paid for by the internal stakeholders. In other words, the design center employed an internal consulting agency business model.

The results of this first year surpassed anyone's expectations. The training course was delivered to more than 200 people and was included in management leadership programs, which in turn led to post-training opportunities to pitch design thinking. More than 15 workshops and two six-month projects were completed. One of these projects, project W, won an internal innovation award, attracted good press from outside the firm, and played a significant role as a reference to illustrate the design thinking approach to other divisions (see "Project W—A Product and Services Project," p. 52). It also increased interest among innovation teams throughout the organization.

The design center team trained and supported two small teams to develop their own centers. In that process, the team more formally defined the center's identity, value proposition, methodology, and toolkits. That experience also helped the team realize that the design center could become something beyond a single agency based at the corporate university. Hence, one year after the launch of the first design center, two additional design centers were created, in Glasgow and Singapore, and two more—London and Bordeaux—were planned for 2014.

The Growth and Diffusion Period

In the following two years, design center activity continued to grow: 2,000 people were trained, 100 workshops were held, 10 projects were explored, and two events were organized. The design center launched a firm-wide newsletter presenting the principles of design thinking and featuring some applications. The design center team grew to four full time people plus two design interns. The team seized every opportunity to communicate about its projects and approach in the numerous internal conventions, conferences, and management meetings.
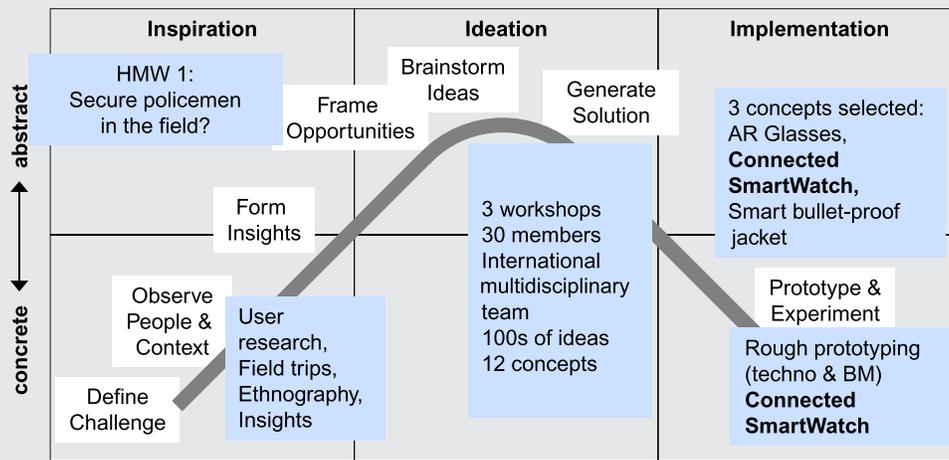
Project W—A Product and Services Project

Project W was launched for a business unit specializing in security and defense as an experiment involving a core team of eight people from the design center and the business unit. The division was looking to diversify its portfolio by adopting a proactive approach rather than only answering calls for proposals from government agencies, its typical customers. Instead, the business unit wanted to focus on end users—in this case, police officers.

The visit to IDEO during the learning expedition as well as the partnership with the d.school shaped the framework adopted by the design center in addressing projects. Activities in the project proceeded in three phases: inspiration, ideation, and implementation. The *inspiration* phase, which lasted three months, started with the question of securing the policemen on the field (HMW1). It involved in-depth research into police officers' activities in the field, including both primary and secondary data collection. Ethnographic research was performed, and technology trends and various cities' security models were studied and documented. The phase concluded with a one-day sensemaking workshop with a multidisciplinary team (business development, marketing, R&D) from several geographic subsidiaries of the firm for which the security market was important and where the firm had major police system customers. During the workshop, the data was presented on inspiration boards, shared, and discussed. Some insights emerged from this exercise; for example:

- Police officers rely on their intuition in analyzing situations; these intuitions are based on past experience and on patterns of behaviors.
- Sharing information when they are in the field without revealing their position is critical to police officers.
- When they can't share information, police officers rely on routines developed and based on pattern matching and, therefore, they sometimes neglect information which could be very important.
- "Routines can kill us" said police officers.

Based on these insights, the workshop participants defined a design challenge for ideation: How might we help police officers in the field rely on shared up-to-date information rather than routines?

Design thinking activities in Project W (product and service project)

In the *ideation* phase, more than 30 people participated in sessions that generated hundreds of ideas and developed 12 concepts. Finally, in the *implementation* phase, a rough prototyping cycle, to test both value and business models, led to the selection of three major new concepts (augmented reality glasses, a connected smartwatch, and a smart bulletproof jacket). The connected smartwatch was ultimately selected to move forward into a product design phase, which lasted another six months.

In parallel, design thinking gradually became more integrated into the Thales Leadership Programs; program participants were required to deliver a strategic innovation project over several months using design thinking as their approach and the design center as their base camp. More than 200 managers went through these leadership programs each year.

During this period, design center activities evolved in two ways. First, the center's emphasis shifted away from training and creativity workshops and toward projects. The projects grew in both size and number, occupying a larger share of the center's overall activity portfolio over time (Figure 2).

Second, project briefs increasingly did not follow the traditional product design format. Some projects now focused on business or strategy challenges, such as turning a product business into a service business, or exploring a new strategic positioning or business model, or finding a new application for a technology. These projects were proposed by marketing or business development teams who had been unable to solve these problems with their traditional tools and considered the design center a resource for innovating with alternative methods. Some of these projects involved Thales customers and end-users as well, creating
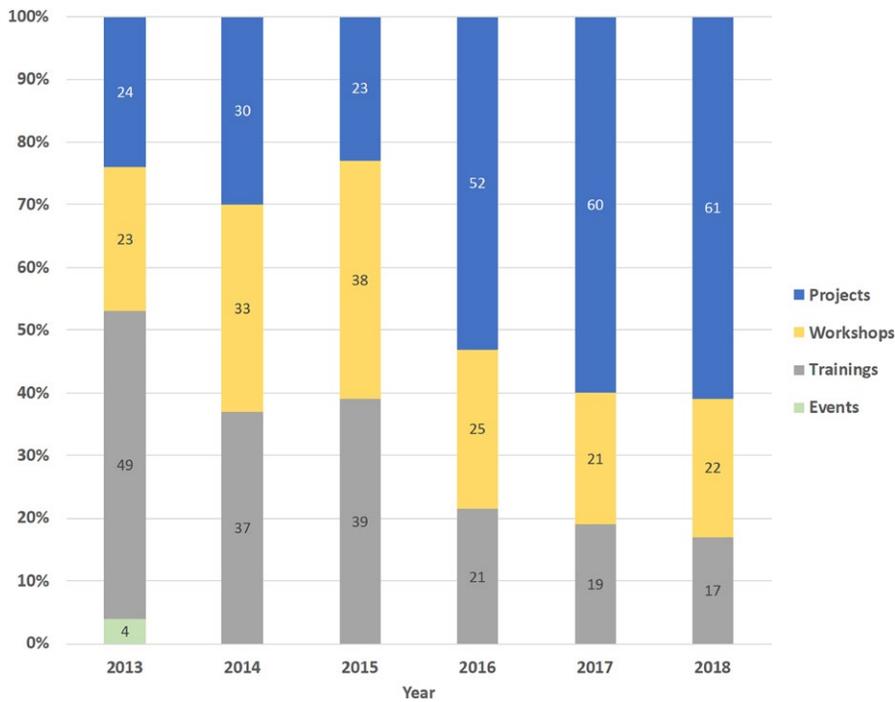
FIGURE 2. Design center activities, by year

fully codesigned solutions. This customer engagement was highly valued by the corporate marketing leadership team, which became a strong supporter of design thinking and the design center. As the audience for and scope of design thinking projects diversified, the design center team adapted its processes to these new needs. These adaptations shifted the emphasis to particular steps within the phases that were particularly well suited for the project type. The adaptations also acknowledged a stronger focus on business and technology aspects of the projects, relative to the strong end user focus of the first project (which is typical of design thinking generally). The first such adaptation was for business and strategy projects (see "Project C—A Business and Strategy Project," p. 54).

A second adaption of the "traditional" design thinking project evolved into a category that received the label "technology projects." Despite that label, these projects still used the design thinking approach, albeit in an adapted way. Project E is one example (see "Project E—A Technology Project," p. 55).

The international expansion continued, with each new design center operating independently from the original. The majority of the new centers were set up to provide design thinking capability internally to the business units; thus they became hierarchically and financially a part of the business units that hosted them.

The Consolidation Period

Over the first five years of its existence, the initial design center has developed an impressive portfolio of projects and broadened its design thinking process to support a growing range of value propositions, including product design,

service design, business model design, transformation projects, venture design, and UX projects. Design thinking support is now available for three main categories of projects: product and service projects make up about 30 percent of the center's work; business and strategy, about 50 percent; and disruptive technology, the remaining 20 percent. Projects represent about 60 percent of the design center's activities.

Along with activity growth, design center revenue has increased eightfold and the original team in Paris has grown to eight people plus interns. Overall, the design center network employs more than 30 professional design thinking professionals with a variety of backgrounds, including strategic design, industrial design, UX design, creative facilitation, and engineering. The total number of design centers now stands at eight.

The latest development is the involvement of the design center in the firm's digital transformation. A digital factory was launched in 2017 (an investment of more than €150 million over three years). Its objective is to accelerate the development of disruptive digital products throughout the businesses. The conditions of eligibility for a project to enter the factory include a strong value proposition, a viable business model, and demonstrated product desirability. Because developing these elements requires a design thinking approach, the design centers were identified as a critical component of Thales's digital transformation.

Lessons Learned

Because Thales' design thinking implementation followed an organic path, as opposed to a top-down implementation strategy, it demonstrates some mechanisms that can help make design thinking successful in a technology-driven firm. We identified five elements that contributed to the success of the design center:

1. The broad variety of design thinking activities, starting with training—including the incorporation of design thinking and the design thinking center into the company's leadership training program and workshops and moving to an expanding range of projects;
2. The adoption of an internal agency business model;
3. The adaptation of the design thinking method to a wide variety of project types;
4. The adoption of a catalyst approach focused on supporting internal clients rather than owning projects; and
5. Applying a franchise model to diffuse design thinking to the business units.

Each of these factors must be managed, as each one also comes with some downsides.

Project C—A Business and Strategy Project

Project C was developed for a division specializing in aerospace activities, which was involved in a European aerospace project that generated very large amounts of earth observation data. The division sought strategies and approaches for monetizing the data. While the division had its own innovation resources (R&D and strategic and marketing capacities), its traditional strategic analytical methods had not produced a solution for this problem. Therefore, the division asked the design center for help in exploring alternative business models.

A six-month project involving a cross-functional team with 9 members from the design center and various functions of the business unit was launched. The project's *inspiration* phase began with a workshop to discuss the first brief; this workshop led to an articulation of the challenge: How might we dispatch collected observation data toward end users? Could a Google-like map be created, and if so, under what conditions? Workshop participants also identified six themes to be explored by the design center team (the ecosystem and analogies and trends), jointly with the project owner team (competitive analysis and space and service applications), or by the owner team (platform architectures and technologies).
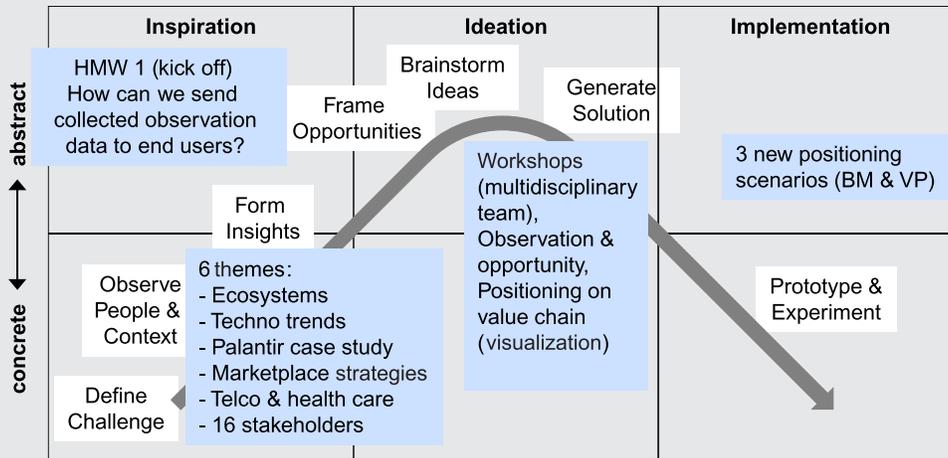
Design thinking activities in Project C (business and strategy project)

The inspiration phase lasted three months; outcomes included the identification of technological trends with regard to data access, a case study of a potential competitor, mapping of the main marketplace strategies, a study of analogous situations where data and regulation are as critical as in the aerospace industry (such as the digital transformation in the health sector), and the identification of 16 major stakeholders. This phase ended with a two-day sensemaking workshop to identify opportunities these data inspired and define actions to dig deeper into the opportunities. From these opportunities, three possible scenarios were selected for further exploration.

The *ideation* phase, stretched over two months, was intended to provide the division with a clear roadmap. The owner team developed several scenarios (business models, functional overviews, use cases, concrete applications of the services) but was supported and monitored by the design center through weekly videoconferences. Each scenario was sponsored by a project leader at the division. For the design center, the project ended with a final workshop with documentation delivered to the business unit's strategy and innovation team, which took on the *implementation* phase. Twelve months later, the business unit began developing a prototype for one of the scenarios.

Variety of Activities

While the broad range of design thinking activities in our case was not a result of upfront planning, but rather emerged over time, the unusual starting point of the design thinking activities turned out to be a blessing in disguise. Positioning the design center in the corporate university—a move meant to minimize risk and cost for the experiment—put it under the aegis of human resources rather than in the traditional innovation and R&D homes. That structural happenstance kept the design center below the radar of the main players in the firm's innovation space, giving it the time to grow and develop without triggering competition from the established innovation players.

In addition, including design thinking in the (human resources–organized) management leadership programs provided a fortuitous indirect channel to build support for the design center's work. It also meant managers had contact with the design center and created valuable post-training

> **Including design thinking in the management leadership programs provided a fortuitous indirect channel to build support for the design center's work.**

Project E—A Technology Project

Project E was launched for a division specializing in energy. The division had realized "by accident" that one of its core technologies could be turned into a groundbreaking recycling technology. The technology enabled improved material separation during the recycling process. The division had its own innovation resources (R&D, strategy and marketing, and innovation team) but those teams were focused on addressing existing markets. Having heard about the design center's user orientation, the division asked for help exploring how the technology could be applied to a new concept and identifying a business model to enable it.

A team of eight people was formed, composed of a mix of design center and business unit personnel, for the four-month project. During the *inspiration* phase, the design center analyzed the recycling industry and associated value chains and interviewed potential users and customers, including recycling champions, smartphone vendors, and smaller specialized players. The data were synthetized in inspiration boards that were used as an ideation canvas to position available options. The ideas ranged from a full-scale factory down to desk-sized reactors. Business model options were also generated for each concept.

In the *implementation* phase, a small number of concepts (prototypes and business models) were selected to be tested. The assumptions underlying the main concepts were identified and tested with potential customers and partners. The technical prototypes were developed by a team outside the design center because they required specialized facilities; the design center produced business models, value propositions, and test plans.
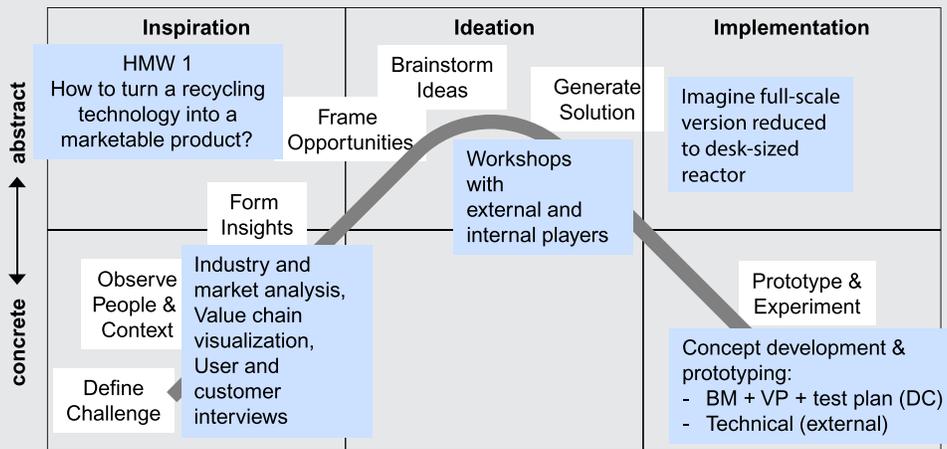
Design thinking activities in Project E (technology project)

opportunities for pitching design thinking activities and the design center value proposition.

The downside is that covering such a wide range of activities as a small organization with limited resources risks losing the focus needed to be effective. However, the design center team managed its activities portfolio carefully to ensure that activities complemented each other and to minimize the risk of getting stretched too thin.

Internal Agency Model
Initially, the main objective of the design center was to demonstrate as quickly as possible the business impact of design thinking by completing projects. Consequently, the diffusion of the design thinking in the larger organization was not accomplished by promoting a specific method or tool. Rather it was achieved through demonstrating design thinking in action. The internal agency model provided the appropriate incentives for the design center to generate traction by attracting customers and generating revenues. As a side benefit, it also meant the design center could remain independent, instead of being institutionalized too quickly into other business units or departments.

This approach also has its drawbacks. Limited resources constrained the number of projects the design center could work on at once and also limited capability development. This limitation became apparent when the design center's project portfolio shifted to more strategic design projects, in response to business unit requests. This challenge can be exacerbated when the pursuit of profitability leads the center to accept more projects that fall further outside of the traditional scope and potentially do not serve the center's primary mission—to diffuse design thinking throughout the firm. Balancing this tension between being flexible enough to offer what the customer wants and staying close to the center's capability and mission is a key management task in implementing a design center agency, or any agency model.

Diversified Project Portfolio
In order to sustain its agency business model, the design center adapted initially the traditional design thinking approach and then broadened its capabilities to support the

diversity of briefs it received. Over time, the center developed a genuinely unique value proposition and established itself as a center of competence for business model and value proposition design. The value of the capability was recognized by the corporate marketing leadership team.

Across all its projects, the design center deployed a three-phase design thinking approach (Table 1). In every project, teams engaged in needs finding (*inspiration*), brainstorming (*ideation*), and prototyping (*implementation*) activities. However, the nature of those phases differed; in some cases, for instance, the work was more value chain than end-user focused. Prototyping activities also varied in the timing and fidelity of prototypes, but in all projects, assumptions were tested quickly. In sum, although the same basic design thinking process was applied in all project types, the emphasis on certain activities changed, in response to the project briefs.

While the project diversity was beneficial to the design center's customers, the wide variety of projects was a challenge for designers, who had to develop lateral skills rapidly to respond to customer needs.

The Catalyst/Enabler Approach
Another critical decision in the evolution of the design center was the choice to adopt a catalyst approach rather than seeking to own design thinking projects. The design center codesigns with internal customers; the business unit owns the project. As a result, the business unit teams participate in all phases of the process and continue working on the project after the collaboration with the design center ends. It is the

> Over time, the center developed a genuinely unique value proposition and established itself as a center of competence for business model and value proposition design.

business unit teams who are ultimately responsible for project outcomes.

Not being the project owner does come with some downsides. The design center could not pursue on its own opportunities that are validated in a project, which can create frustration. Most importantly, it can also lead to missed opportunities to demonstrate the benefits design-thinking can bring to these projects. For this reason, it may be advisable to begin with an early project that has a high probability of success to ensure a visible success case.

Growth through Franchising
A complete program for introducing and accelerating design thinking in an organization needs to develop a clear understanding of its own growth paths. In our case company, the design center "franchise" model was instrumental for disseminating the model to other innovation teams, which

TABLE 1. Cross-case analysis of activities

Phase	Activity	Project W Product & Service	Project C Business & Strategy	Project E Technology
Inspiration	User research, primary data collection	Interviews and field work with police officers	None	Interviews with stakeholders and experts in recycling
	User research, secondary data collection	Security data, value chain analysis, etc.	Value chain analysis, player identity cards, analogies	Value chain analysis, identification of main players
	Synthesizing	Inspiration boards, storyboards, journey maps	Inspiration boards adapted to audience (scientific), value chain presentations	Inspiration boards, value chain presentations
Ideation	Individual ideation	Workshops	Workshops	Workshops
	Team-based ideation	Workshops with interdisciplinary and international employees	Workshop with members from different functions Use of cards when listening to ideas (further opportunities and actions to go deeper)	Workshop involving external players
	Shaping ideas	Journey maps, storyboards, etc.	Use of a Wardley map* to identify new value chain positions for the firm	Business models for solutions that will use the technology
Implementation	Early prototyping	Rough prototypes	Value chain positioning, further work on scenarios	Business models canvas to be tested on players
	Late prototyping	More detailed development	None	None

*In a Wardley map, each component is classified by the value it has to the customer or user and by the maturity of that component, ranging from custom-made to commodity. See https://en.wikipedia.org/wiki/Wardley_map.

allowed the design center team to leverage network effects and achieve critical mass for diffusion.

Some business units tried to develop design capabilities on their own, without the involvement of the design center. When those efforts were successful, they contributed to the diffusion and implementation of design thinking within the firm. When they did not deliver, however, they made the design center's diffusion work harder. Balancing the impulse to tightly control the process on the one hand with the benefits of the multiplier effect on the other is the central management challenge.

Conclusion

Science- and technology-driven firms tend to see themselves as evidence-based environments where analytical thinking is the main driver of decisions. These are firms where innovation is critical and highly valued, when it occurs in technical R&D groups. Design thinking can be a challenge for such firms. However, it can be integrated into the processes of these firms with the right approach. The keys are (1) being flexible and adapting design thinking to the actual circumstances, and (2) recognizing that it takes time to build innovation capabilities like design thinking. A successful design thinking adoption requires intentional learning and adaptation of methods, tools, and mindsets over time.

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