



The  
**SUPRAOPTIMIZATION**  
*of Design Thinking*



An intentional shift  
towards complexity



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Ryan Voisin



**The Supraoptimization of Design Thinking:  
An Intentional Shift towards Complexity**

by Glen Lombard and Ryan Voisin

Submitted to OCAD University in partial fulfillment of the requirements  
for the degree of Master of Design in Strategic Foresight and Innovation

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**ABSTRACT**

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## Abstract

First introduced decades ago, the term “design thinking” has been used to describe the ways designers think, how non-designers can think like designers, and how organizations can embrace design to become more complex-capable. The research project sought to identify and validate the core competencies related to design thinking. An online questionnaire was used to validate a set of six mindset themes identified in the literature review and to reveal how they are connected. A design probe activity was used to understand how individuals can develop in each of the six mindset themes. Despite a limited sample size, the data revealed promising connections between the mindsets themes. User Focus, Diversity and Problem Framing appeared to be the three core mindset themes with a sixth mindset theme, Process Wayfinding, acting as a balancing force. The research project concludes with recommendations on the role of design thinking for organizations, how individuals can understand and improve their capacity for design thinking, and how a design thinking instrument could support both of these goals.

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## Acknowledgements

We would like to thank our family, friends, and colleagues that supported us throughout our research project. A special thanks goes to our families for picking up the slack while we devoted the entirety of our free time to the completion of this project; to our principal advisor, Helen Kerr and our secondary advisor, Geoff Malleck, for their advice, support, and commitment to our work; and to the entire SFI community for the same.



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PASO PEATONAL EN DOS TIEMPOS

# INTRODUCTION



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## Chapter 1

# Introduction

*“We are what we behold. We shape our tools, and afterwards they shape us.”*

*Marshall McLuhan*

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# Design Thinking Put in Context

The modern day business organization has been compared to a living and breathing organism where the innate quest for survival and self-preservation permeates its strategies and operations (Geus, 1997). To do this, organizations are learning and evolving—constantly adapting to their surroundings and making calculated moves toward an uncertain future. Many look to adjacent domains to find transferable innovation processes that generate competitive advantages. In these spaces, consultants and business architects look to commercialize processes and tools that are often misidentified as panaceas, one-size-fits-all approaches that seek to simplify the complexities within which organizations exist into a series of easily recalled and repeatable processes designed for common use and application.

Design thinking is a **methodology** that is no exception to this trend. As a methodology, it has been applied widely as a linear series of steps using a well-articulated set of tools that yield human-centered results. It has gained so much popularity that it is now being taught in the K–12 education space as well in colleges

and universities (Wagner, 2015). Companies are rolling out design thinking training at all levels of their organizations (Brown, 2010). From its use in product and service design to its application within complicated systems, design thinking has quickly become a leading methodology for arriving at creative solutions within a complex environment. Rule books and toolkits have been developed and applied with much success across industries, sectors, and domains.

Perhaps ironically though, the tools themselves have rarely been addressed as more than a series of linear steps and actions that people, teams, and organization can use to arrive at better results. This process approach has been applied with efficiency in mind; as have tools like Six Sigma, Lean, and Project Management. Critics have suggested that design thinking represents a process trick to produce change. It is interpreted as “a linear, gated, by-the-book methodology that [delivers], at best, incremental change and innovation” (Nussbaum, 2011).

Like an artist’s supplies—brushes, paints, and

canvases—tools have been applied in isolation of a deep understanding of design thinking. This includes a lack of creativity needed for strong outcomes, no understanding of the underlying intentions in the tools and methods, as well as missing out on other opportunities or possibilities that may only be activated through the careful facilitation by a trained practitioner. Such a practitioner would need a deep understanding of the context within which an organization implements a design thinking project to create lasting impact. Consultants in this space often neglect to focus on the facilitative **mindset** needed to navigate the complexity and ambiguity of nonlinear processes, thus leaving many organizations dependent on external facilitators to support the work.

A quick online search of “design thinking” will yield thousands of hits focused on design toolkits, guides, and proprietary templates for yielding innovation through the methodology of **design**. In such, design thinking as a methodology has gained much popularity, however not much has been examined beyond the tools. This is particularly true with respect to the

specific competencies required by individuals to successfully implement design thinking projects—including how these competencies are reflected and balanced across teams and the role organizational structure and culture play in the successful implementation of the methodology.

Similarly, while several existing instruments and inventories seek to measure and make explicit individual personality traits, team dynamics, conflict preferences, and even creativity, there is not currently a tool that measures an individual's competencies related to design thinking. This research will attempt to establish a preliminary framework for assessing these competencies as well as how individuals, teams, and organizations might develop the skills and mindsets associated with effective design thinking projects.

#### 1. Introduction

Design Thinking Put in Context

#### ▶ Introduction to the Research Study

#### 2. Literature Review

#### 3. Research Questions

#### 4. Methodology

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# Introduction to the Research Study

Our research project seeks to broaden preliminary research related to the successful implementation of design thinking by developing a better understanding of the human element of its application.

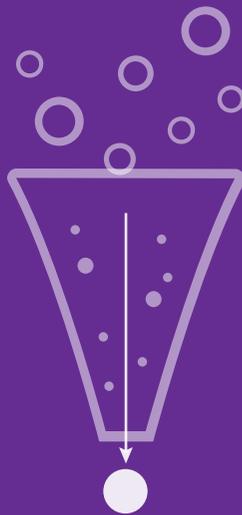
*How might we define a set of competencies necessary for people, teams, and organizations to apply design thinking, understand the relationships between those competencies, and develop their capacity in those areas?*

*How might we broaden the application of design thinking beyond a linear methodology and, in so doing, achieve more consistent success?*

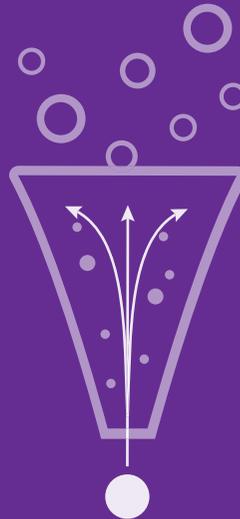
As a result of the findings, our research project concludes with a set of recommendations for individuals, teams, and organizations

## Supraoptimization

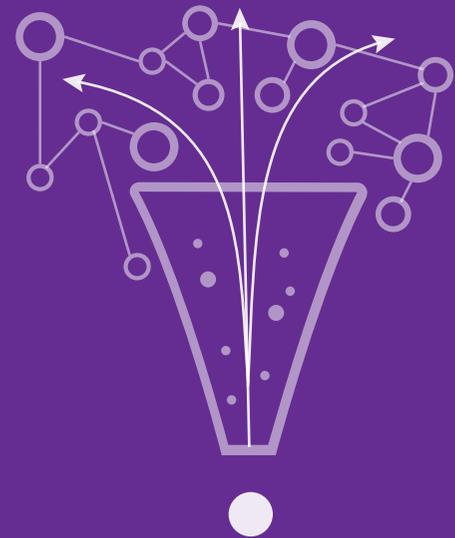
In 1971, researchers from Stockholm University discussed the distinction between suboptimization and supraoptimization relating to differences between values in American and Swedish business students. Suboptimization involved a “closer identification with business owners and emphasizing aggressiveness and honesty, directed toward the goals of individual achievement and organizational profit” (Jerdee, Brooks, and Barsk, 1971, p. 265). Whereas, supraoptimization referred to a “closer identification with employees and emphasizing cooperation and rationality, directed toward the goals of individual well-being and organizational productivity” (Ibid, p. 265266).



**SUBOPTIMIZATION**



**SUPEROPTIMIZATION**



**SUPRAOPTIMIZATION**

interested in using design thinking or similar collaborative methodologies to become a learning organization—one that is capable of navigating the complexity and ambiguity inherent in these processes and the world around them. Through this research, we aim to uncover a **supraoptimized**—less optimized, more complex—version of design thinking.

A series of recommendations flow from this work—the first of which focuses on the Design Strategy Map—an adaptation of a classic business modelling tool developed for organizations looking to embed design in their activities. The second recommendation is for individuals that are members of these organizations and involves the use of growth mindsets to develop them as complex-capable design thinkers. The final recommendation is to the development of a design thinking instrument that can support both organizations and their members in evaluating and improving their capacity for design thinking. Our research project concludes with next steps in each of these areas.

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Moving Forward

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# LITERATURE REVIEW



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## Chapter 2

# Literature Review

*“Design is the conscious and intuitive effort to impose meaningful order.”*

*Victor Papanek*

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# The Evolution of Design Thinking

Much has been written about the advent and advantages of design thinking as a methodology for achieving user-centered results in both product and service design. Since it was first conceived as an approach, design thinking has been discussed at length. Both in this literature and its application, design thinking is often reduced to a series of phases and tools that problem solvers can utilize to address complex problems (Mootee, 2013), and researchers and practitioners have written and discussed the implications of the design thinking approach at length.

There has also been a proliferation of tools to apply the methodology in a variety of domains, from IDEO's first-of-its-kind human-centered design toolkit specifically created for everyday practitioners working toward social sector impact (Design Kit: The Human-Centered Design Toolkit, , n.d.) to design schools—such as the Hasso Plattner Institute of Design at Stanford University—that are attempting to develop 'creatives' who can reliably find solutions to the complex challenges they tackle (A place for explorers & experimenters at Stanford University, n.d.).

In understanding the application of design thinking in its modern manifestation, it is useful

to return to the roots of design thinking—beginning nearly 70 years ago—in order to:

- Understand the original intentions of practitioners and researchers working in the design thinking space;
- Link to related research and related sectors throughout the evolution of design thinking; and
- Articulate where the private sector began to take over and suboptimize the concept of design thinking.

Going back to the original intention of design thinking will be powerful—it will clarify why and how design thinking evolved over time, it will lead to a better understanding of design thinking competencies, and it will illuminate how designerly education may strengthen implementation of design thinking at the individual, team, and organizational level. Our goal is to highlight gaps and opportunities for further research and exploration related to the continual growth and development of the whole domain, rather than a further **suboptimization** of any given part of design thinking.

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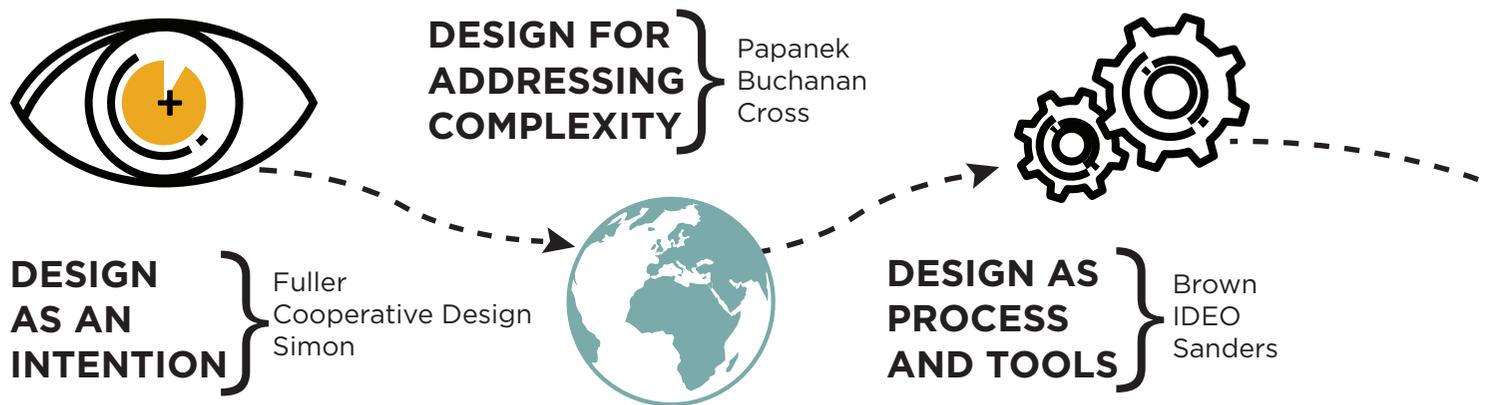
### 6. Discussion

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During the 1970s and 1980s, there is a call from Victor Papanek, Nigel Cross, and Richard Buchanan to begin applying the process of design to real world problems. There is a strong critique in this era of design as creating “meaningless” artifacts. Here we see the emergence of design being applied to complex system level problems.



In the 1950s and 1960s, Buckminster Fuller introduces the use of cross-disciplinary teams at the same time and fully independent of the emergence of participatory design through the Scandinavian Design Cooperative. Herbert Simon introduces the “phases of design” as a repeatable process of design.

In the early 1990s, IDEO is formed as the first modern design thinking firm. They create a series of tools and processes that are well known today—many of which are still applied in creating commercially viable products. There is a systematic simplification of the complexity associated with the process.

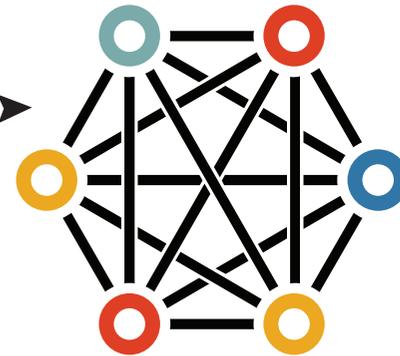
Recently, there is an emergence of academic literature that has begun to look at the behaviours, mindsets, and practices associated with design thinking. Here, researchers are beginning to understand the behavioural and cognitive conditions correlated with successful design thinking applications.

**DESIGN AS  
MINDSETS &  
PRACTICES**

Carlgren, Rauth, & Elmquist  
Howard, Senova, & Melles  
Junginger



**DESIGN  
AS A  
SYSTEM**



This research project seeks to broaden the understanding of design thinking by looking at the complex behavioural facets of design thinking application. In addition, it seeks to understand how individuals, teams, and organizations can enhance their competency for design thinking by identifying a series of core competencies.

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## Design as an Intention

### Buckminster Fuller and the Scandinavian Cooperative Design

As early as the 1950s, Buckminster Fuller was teaching an early precursor to the design thinking process. In the Creative Engineering Lab at MIT, Fuller pioneered Comprehensive Anticipatory Design Science which incorporated a “strategy for design” that was intentionally integrative (Fuller, n.d.). Within the lab, students from elite backgrounds in engineering, industrial design, chemistry, and materials sciences worked in cross-disciplinary teams and began to tackle problems using defined processes (Ibid). Fuller used the course to test his Eight Strategies for Comprehensive Anticipatory Design Science. The strategies led to the development of the Industrially Realizable, Comprehensive, Anticipatory Design Science. The theory and strategies promised to develop well-rounded effectiveness in individuals that could be successful despite the overwhelming prevalence of socioeconomic patterns and challenges that faced mid-century Americans (Ibid). Fuller’s focus on cross-disciplinary teams is a prevailing element of design thinking that persists today.

In tandem with Fuller's movement toward elite, exclusive teams working through process-driven exercises, there was an emerging cooperative counter-culture of design—referred to as the Scandinavian cooperative design culture. Often attributed as being at the root of current day service design and participatory design (Greenbaum, 1993 and Holmlid, 2012), the Scandinavian design culture emerged out of a call—and eventually legislation—for workers to be more involved in management decisions surrounding the implementation of technology in the workplace (Bødker, Grønbæk, & Kyng, 1993). This user focus and participatory methodology have since influenced the culture of design where stakeholders that are directly influenced by the outcomes of a project, service practice, or product are integral to the front-end of the modern design thinking practice.

Also out of this discipline come theoretical writings that argue for the dissolution of existing “disciplinary boundaries between natural sciences, social sciences, and humanities [that] are dysfunctional for the subject matter of

designing computer [software]” (Ehn, 1988, p. i). Ehn continues by arguing “the alternative [Scandinavian cooperative design culture] emphasizes social systems design methods, a new theoretical foundation of design, and the new potential for design” (Ibid). Ehn states that out of this discipline emerges a strong emphasis on including diverse stakeholders in the design process (Ibid). This ‘democratic’ approach to design runs at odds with Fuller’s more elite, exclusive approach—however, both emphasize the importance of diversity and cross-disciplinarity within design teams.

## Herbert Simon and The Sciences of the Artificial

Herbert Simon was among the first to introduce the modern understanding of design in *The Sciences of the Artificial* (1969). In this work, Simon offers a salient understanding of design juxtaposed against the systems of logic, thinking, and linearity that underpin the natural sciences. He states design “is concerned with how things ought to be, with devising artifacts to attain goals” (1996, p. 4). Simon’s research interests evolved from economics into areas related to understanding decision making in organizations (Augier, 2000).

In his paper, *A Behavioural Model of Rational Choice*, Simon begins to assemble the basis of his theories related to bounded rationality. Here, he unpacks the limits to which humans are able to make rational decisions when in the midst of complex problems—due to the limits of their own cognitive processing and the context of the environment in which they exist (Simon, 1955, p. 99). Simon was curious about the process by which people create alternatives and the models and methods by which they make choices when confronted with alternative options and scenarios.

Through this work, Simon developed a decision-making model that in many ways has served as a foundation for modern design thinking. The model for decision making and problem-solving consists of three defined phases: *Intelligence*, *Design*, and *Choice*.

- The *Intelligence Phase* is the stage in which the problem is identified, and information is collected, and the phase culminates in a decision statement that outlines the nature of the decision to be made (Simon, 1996).
- In the *Design Phase*, several alternative options are generated through **research** as ways to address the decision and problem **frames** (Ibid).
- In the *Choice Phase*, there is an evaluation of the alternatives generated in the Design Phase and an actual decision is made (Ibid). This evaluation may take the form of testing alternatives.

Fuller’s and Simon’s works are early foundations to the body of work that has emerged in the nearly 70 years since. Many of the aspects associated with Fuller’s focus on the Scientific Method

and Simon's three phases resemble aspects of the modern Design thinking process and have been adapted by design companies. Design Firms such as IDEO, Idea Couture and others have built on this foundation to structure 4 or 5 stage "design processes" that assist practitioners in wayfinding through the overall arc of identifying problems, generating ideas, assessing alternatives, and implementing solutions.

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## Design as a Way to Address Complexity

### Victor Papanek and Design for the Real World

In his 1972 book *Design for the real world*, Victor Papanek criticizes the field of design—specifically industrial design and marketing design—as utilitarian fields that seek to create and convince people to become “purchasing-disposing” consumers (Papanek, 1984, p. 16). Papanek accuses the designer of being, “the cancerous growth of the creative individual expressing himself egocentrically at the expense of spectator and/or consumer.” Papanek calls for the designer to consider the implications and focus of their work to extend beyond simply imagining and creating the products with aesthetics that appeal to the capitalistic consumer. He identifies the bias toward evolving the aesthetic form of consumer goods, rather than the function itself.

Papanek builds on the work of Simon to situate design as, “the conscious effort to impose meaningful order” (Ibid, p. 17). Here, Papanek and Simon develop the roots of what is today widely understood to be human-centered interaction (HCI) and the ethnographic roots of **human-centered design** (HCD)—much of which is focused on addressing the complex

and systemic social problems that face vulnerable populations. There is an overarching emphasis on design fulfilling a function, rather than simply a form. There is continuity with Fuller and Simon's work which emphasizes the process of design.

Papanek introduces the term *integrated design* into the literature (Ibid). In this, Papanek calls for a different kind of design education—one that teaches “a more durable kind of design thinking sees the product (or tool, or transportation device, or building, or city) as a linear link between man and his environment. In reality, we must think of man, his means, his environment, and his ways of thinking about, planning for, and manipulating himself and his surround as a non-linear, simultaneous, integrated, comprehensive whole” (Ibid p. 299). Integration requires a view of design that considers the whole. To accomplish this holistic view, Papanek articulates the need for a more comprehensive approach to design education. An approach that, at the time, was not being offered to students in any design program.

In Papanek's integrated approach to design, he calls for a divergence that emphasizes not only the “skills, techniques, or mechanical processes [of design]” (Ibid, p. 303) and the linear sequences of a process, but also the complex system of human elements and biological functions occurring in any situation.

## Nigel Cross and Designerly Ways of Knowing

Building on the work of Simon and Papanek, Nigel Cross responds to the Royal College of Art's research on "Design in general education" and the concept of the third culture in his 1982 article *Designerly Ways of Knowing*. Unlike the humanities and the sciences, Design as the third culture studies "the manmade world", using "modelling, pattern-formation, and synthesis", guided by values of "practicality, ingenuity, empathy, and a concern for 'appropriateness'" (Cross, 1982, p. 221).

Cross argues that the third culture, design, should be included in general education. He goes on to pull from work by Ryles as well as Peters to emphasize the importance of behaviours and mindsets—"knowing how"—in addition to skills and knowledge—"knowing that" (Ibid, p. 223)—when introducing design in general education.

Throughout the article, Cross introduces design thinking topics as distinct from topics in humanities and science in that design problems are often wicked and time-constrained.

One such topic is problem framing—it is only

through understanding viable solutions that the problem can be framed. The solution must be constructed, not uncovered, as "designing is a process of pattern synthesis, rather than pattern recognition" (Ibid, p. 224). Another is interactive expertise—he borrows from Hillier and Leaman (1974) to discuss the use of codes, that designers leverage to make connections and communicate ideas between unlike domains (Cross, 1982, p. 131). Later in the article, Cross even explores the topic of "products of design"—he states that it is through the creation of new objects that designers are able to "embody new messages (Cross, 1982, p. 225). Similarly, designers are able to recognize and translate through abstraction, the messages that appear in objects (Ibid).

Cross connects these arguments back to the intrinsic value of a new type of design education—in offering a way to tackle a different type of problem (real-world problems) through abductive or constructivist thinking and the development of neglected cognitive abilities related to nonverbal forms of communication. This builds on Papanek's call for designers to

address complex and systemic social problems facing vulnerable populations—thereby extending the call to a more general audience.

In his conclusion, Cross calls for more research into “designerly ways of knowing”, “the scope, limits, and nature of innate cognitive abilities relevant to design”, and “the ways of enhancing and developing these abilities through education” (Ibid, p. 226).

### **Richard Buchanan and the Application of Design Thinking to Wicked Problems**

Richard Buchanan builds on the work of Simon, Papanek, and Cross to explore the distinct problem-solving approach design takes, in comparison to the humanities or sciences. He advocates for this kind of ‘design thinking’ to increase collaboration and drive mutual benefit. Like Papanek and Cross, Buchanan is motivated to leverage design as a process by which to address complex and wicked problems.

To support his perspective, he highlights four areas—visual communications, material objects, activity/service design, and systems design—in which design is found in the world (Buchanan, 1992, p. 9-10). Across these areas, Buchanan touches on design in the communication of ideas and arguments through words and images, in understanding the relationship between products and people, in decision making and strategic planning, and in soft systems. He also suggests that designers in many of these domains have begun pushing the boundary that traditionally defined their roles.

Buchanan argues that part of the shift in perspective present in design thinking is the

### Diversity of Thought

Buchanan comments on the need for diversity in design thinking and, in particular, the need for sharing experience of design thinking applied in “remarkably different problems and subject matters”. The issue, as he notes, is that “without appropriate reflection to help clarify the basis of communication among all the participants, there is little hope of understanding the foundations and value of design thinking in an increasingly complex technological culture” (Buchanan, 1992, p. 8). This further highlights the need for a common way of discussing the competencies and mindsets used by design thinkers and discussing the education and experiences need to develop these competencies.

transition from categories—which often have particular meanings within a framework—to placements. Placements are dynamic and adapt over time as designers apply them in new and increasingly diverse environments. The boundary that defines a placement is not as rigid as a category, which act to constrain meaning while still leaving room for new possibilities.

Buchanan then suggests “planning of the artificial” as a common theme across all types of design, as accepted by design professionals. He points out, however, that scientists may not share in this common understanding of what unites that infinitely diverse applications of design in the world. Instead, what unites designers and scientists is the concept of wicked problems. The concept of wicked problems is the first explicit attempt to move away from a linear process of design, flowing from problem definition to problem solution.

Buchanan goes on to examine what makes design problems inherently wicked problems. He points to the fact that the domain of design only operates in the context of its application.



The rules and structures are not embedded. The subject matter of design is instead generated for the specific application and, as Buchanan writes, this “is not an undetermined subject matter waiting to be made determinate—it is indeterminate subject matter waiting to be made specific and concrete” (Ibid, p. 17). Thus, the problems of design are inherently wicked. Buchanan explains that placements are the reason designers are able to create and **iterate** upon contextual subject matter, framing and reframing problems and solutions as new information is uncovered (Ibid).

A designer creates a hypothesis with every new wicked problem. Buchanan believes this can help justify design as an “integrative discipline”—since the process of creating a new hypothesis and contextual subject matter for each application of design means design does not have to reduce itself to any one of these domains. Buchanan highlights the “indeterminacy of subject matter in design and its impact on the nature of design thinking” (Ibid, p. 19) here again, suggesting that design is often instead only recognized as the application of any one of these domains.

This view of design—as a series of discrete, bounded steps that occur in a vacuum and result in a defined outcome—overlooks and oversimplifies the complexities of the behaviours and mindsets that are needed to realize these outcomes and new possibilities. The impact of design thinking is a shift in culture—where designers must hold in tandem both the realities of complex, ambiguous problems and the tools and mindsets necessary to realize change across disciplines (Ibid, p. 21).

## Donald Schön and The Reflective Practitioner

Donald Schön is a key figure in design research in the latter half of the 20th century. Like Cross, Papanek, and Buchanan, Schön is not fixated on the process of design itself. Instead, his work focuses on the *context of the problem* to which the process of design responds. Schön focuses sharply on what he calls, “problem setting” (Schön, 1983, p. 39). For Schön, fixating on problem-solving necessarily focuses on arriving at a solution—rather than trying to fully understand the context within which a problem exists: “problem setting is a process in which, interactively, we name the things to which we will attend and frame the context in which we will attend to them” (Ibid, p. 40).

His focus on the concept of framing is a key aspect of how Schön informs the discipline that evolves from his work. Defining and/or framing the problem is a necessary component of most multi-stage design processes. However, by creating a box around the practice of problem framing (i.e., it happens after empathizing, but before ideating), it has transformed from a continuous practice into a discrete step. This bounding of the practice

oversimplifies framing and detracts from its importance. For Schön, problem setting was much more iterative and in many cases would happen throughout a project.

In his “seeing-moving-seeing” process, Schön advocated for an iterative approach that enabled, in this case, an Architect to sketch a concept, learn from the artifact itself, and then iterate upon it (Schön & Wiggins, 1992). As the architect begins to iterate on their initial drawing, they are motivated by a specific intention—however, they are incapable (as per Simon’s concept of bounded rationality) of holding all possible outcomes in their minds. In this, Schön’s work is at the forefront of modern design thinking which promotes the move from problem framing to **ideation**, experimentation, and implementation.

Acting (as in prototyping) is in and of itself a process by which the designer learns and shapes downstream ideas. Schön believes that the act of making is more powerful than any one person’s cognitive ability to consider the variety of options and consequences related

to a particular implementation in advance. Schön's seeing-moving-seeing cycle intentionally leverages the "remarkable ability of humans to recognize more in the consequences of their moves than they have expected or described ahead of time" (Schön, 1992, p. 7). Herein, Schön's work advocates for the importance of reflection in the practice of the designer. This reflection creates a kind of feedback loop through learning that jump starts iterative cycles. For Schön, these cycles are important not as process steps alone, but for the learning that informs the design itself.

### Ulla Johansson-Sköldberg, Jill Woodilla, and Mehves Çetinkaya and the Study of Design

Though design thinking is written about widely and has become popular within much of the innovation literature (e.g. Brown, 2008, Martin, 2009, Brown, 2015, and Kolko, 2015), there appears to be little sustained development of the concept within academic literature (Johansson-Sköldberg et al, 2013). This lack of clear scholarly framing and lack of consistent meaning create challenges as scholars attempt to make meaning of the ambiguity around design thinking concepts. Johansson-Sköldberg and colleagues scan the literature related to design thinking and identify and delineate two main discourses—'designerly thinking' and 'design thinking'—as well as point to several sub-discourses that form the body of theoretical perspectives related to the field (Ibid).

The first—**designerly thinking**—"refers to the academic construction of the professional designer's practice (practical skills and competence) and theoretical reflections around how to interpret and characterize [...] the designer" (Johansson-Sköldberg et al, 2013, p. 123). This body of work attempts to link theory to prac-

tice and lives within the academic domain of design. This study is evident in the work of others (e.g. Kimbell, 2012) where there is explicit reference to “design-as-practice”—a habitual, rule-governed, routine activity that is embodied and situated (Kimbell, 2012). Kimbell acknowledges that studying designers is inherently about understanding what the designer knows, says, and does.

The second discourse—**design thinking**—refers to the practice of design by individuals without formal scholarly background in design (Johansson-Skoldberg et al, 2013, p. 123). It is in this discourse where there has been widespread adoption and the “mainstreaming” of design principles and practices into disciplines such as management, business, strategy, and innovation. When the term design thinking is used in popular literature, this is often the discourse to which authors are referring. IDEO, a California-based design and consulting firm founded in 1991, are largely credited as having a key role in the popularization of this second discourse.

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## Design as Process and Tools

### David and Tom Kelley and IDEO

In 1991, IDEO—representing the merger of three discreet companies—assembled a talented team from disparate fields, including designers, engineers, anthropologists, and business strategists. The goal was to build the firm's capacity to tackle complex problems through creativity, collaboration, and a human-centred approach (Brown, 2008). Building on the more theoretical work of Fuller, Simon, Papanek, Buchanan, and Schön, IDEO began to define a practical, stepped approach that later became synonymous with design thinking.

Three phases with a series of embedded steps defined IDEO's rapid design thinking process: inspiration, ideation, and implementation (Brown, 2008). Extensive research that focused on understanding human interactions, relationships, and behaviours began the process. This human-centred approach culminated with a clear frame around a problem space, that if leveraged, could create necessary and desired change. Once there was clarity around the nature of the problem, creativity was employed to create a series of possible solutions. These solutions were then implemented in

low-risk settings by creating low fidelity prototypes of a range of possible solutions in order to test hypotheses and learn rapidly through feedback from **users**. These learnings could be used to narrow and hone the range of possible solutions and converge upon a single suite of implementable actions.

In addition to a series of repeatable steps, IDEO emphasized the concept of project groups being made up of diverse, cross-disciplinary teams. Rooted in Papanek's ideas of integrative design, IDEO's approach ensured that there was always a range of people, skills, and experiences at the table.

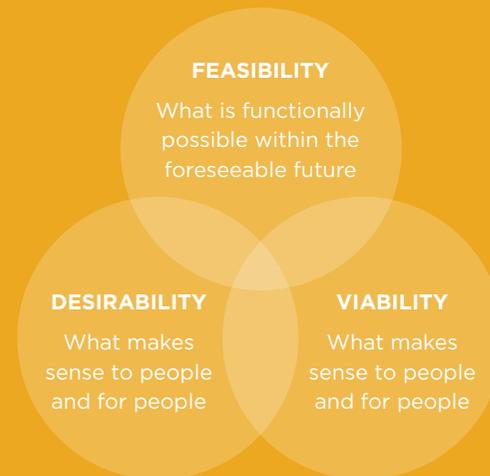
The process and approach were hailed for their ability to achieve innovation irrespective of the field in which it was applied. The IDEO approach, brought together what is desirable from a human point of view with what is technologically feasible and economically viable.

For this reason, private sector organizations latched onto the process as a panacea for innovating their offerings into success. In such, IDEO thrust design thinking into the mainstream.

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## Balanced Breakthrough Model

In his 2009 book, *Change By Design*, Tim Brown introduces a set of overlapping criteria, later called the balanced breakthrough model, that can be used to visualize constraints (p. 18-19):



*Figure 2.* The balanced breakthrough model.

The goal of the design thinker is to then develop potential solutions and iterate upon these solutions until one strikes a balance between these three criteria for successful ideas.

In time, their work evolved from product design to incorporate projects that directly addressed complex human-centred social problems. At first glance, this appears to respond directly to calls from Papanek, Cross, and Buchanan to move beyond creating simple artifacts to addressing the complex, wicked problems that face the world.

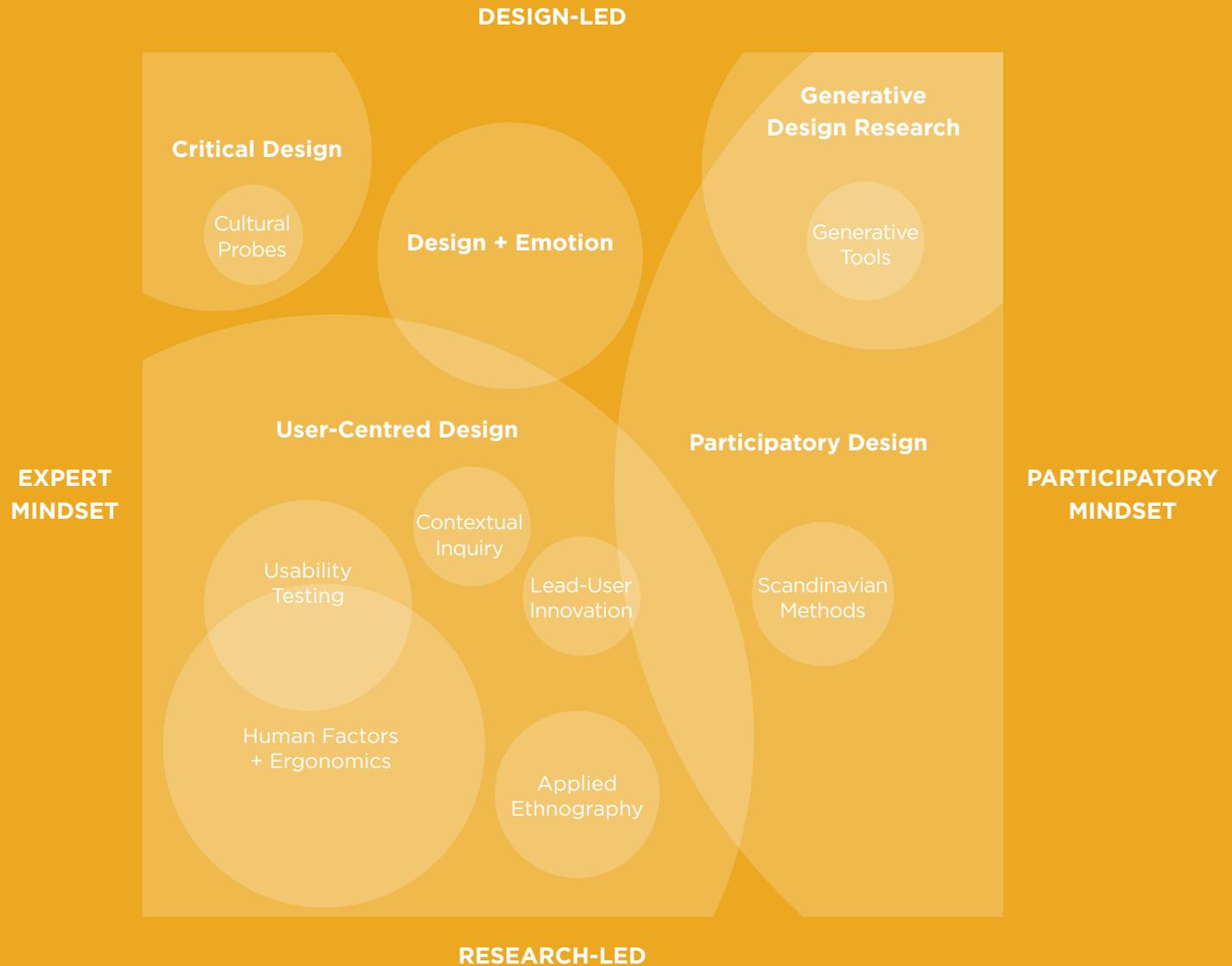
Worldwide, design consultancies have adapted the IDEO design process into a series of apparently repeatable and replicable steps that can be applied in any discipline or problem space. Through its popularity and relative conceptual simplicity, design thinking has sometimes been misappropriated and misapplied as a checklist of actions to be completed using a series of over-simplified tools.

### Liz Sanders and the Convivial Toolbox

In *Convivial Toolbox: Generative Research For the Front End of Design* (2012), Elizabeth Sanders and Pieter Stappers create a framework for understanding how designers can approach the front end of the design thinking process that requires research to inform intelligent design. Their work provides a broad outline of the variety of techniques and tools used by designers. One of Sander's major contributions to the field of design thinking is her categorization of design research methods into various 'mindsets' of design.

Sander's work seeks to create a framework and outlines a series of tools through which those participating in design research can focus on utilizing creativity through various research methods to make explicit the latent needs of users. Her focus on ethnographic approaches serves as a foundation for human-centered designers to obtain the qualitative data required to abduct insights.

Sanders represents a further suboptimization of the mainstream design thinking that evolved out of the work of IDEO. It seeks to expand and build upon the toolbox designers can utilize to gain data about and for users.



*Figure 3.* Design approaches. From Sanders and Stappers's emerging landscape of design research approaches and methods (2012, p. 19).

### Stanford University's d.school and the Suboptimization of Design Thinking

The Hasso Plattner Institute of Design, more commonly known as the Stanford d.school, has in many ways become synonymous with the craft and educational field of design thinking. Launched in 2005, the d.school takes students through a series of experiences that enhance their creative confidence and create the mindsets and build the skills necessary for students to be able to frame problems through empathy and deliver complex solutions through the design process (d.school website, 2017).

The d.school is an attempt to further commercialize on the practice of design thinking through the teaching of a linear process with accompanying toolkits and methodologies. It represents the commercial pinnacle of the suboptimization that has come out of the body of work around design thinking since Herbert Simon. Though the d.school suggests it is an institution with “research faculty who love implementation, practitioners who love to study new ideas” (d.school website, 2017), there is much evidence through marketing materials and published work that the d.school is contributing to the narrative of design think-

ing being simply, a series of steps that can be learned and executed as steps, rather than skill born of competencies—both hard and soft.

These more comprehensive approaches to understanding are complemented by a recent wave of other writers and practitioners who have democratized design thinking through their more mainstream writing and applications.

## Roger Martin and The Design of Business

Roger Martin, former Dean of the Rotman School of Business at the University of Toronto, extended the trend of applying design thinking in mainstream contexts in his paper, *The Design of Business* (and, later, his book by the same name). His argument focused on a concept he called the knowledge funnel (Martin, 2004). The knowledge funnel describes the flow of a business through four distinct phases: mystery, heuristic, algorithm, and code (Martin, 2005, p. 7-8). As the business moves from one phase to the next, they converge on a specific instance of a product or service.

In his paper, Martin describes three key implications for business people. First is that new kinds of training and education are needed as design and business skills converge: “the skill of design, at its core, is the ability to reach into the mystery of some seemingly intractable problem and apply the creativity, innovation, and mastery necessary to convert the mystery to a heuristic—a way of knowing and understanding” (Ibid, p. 9).

The next implication is the fundamental shift businesses will make, from traditional ways of working to iterative, project-based approaches

that use abductive reasoning to respond to wicked problems: “this new world into which we are delving will require us to tackle mysteries and develop heuristics—and that will require a substantial change in some of the fundamental ways we work” (Ibid, p. 9).

The last implication of three is the shift from the business of design to the design of business. This builds on the first two implications, arguing that business people must become designers in the way that think, act, and learn when designing businesses: “Business people don’t need to understand designers better: they need to be designers. They need to think and work like designers, have attitudes like designers, and learn to evaluate each other as designers do” (Ibid, p. 10).

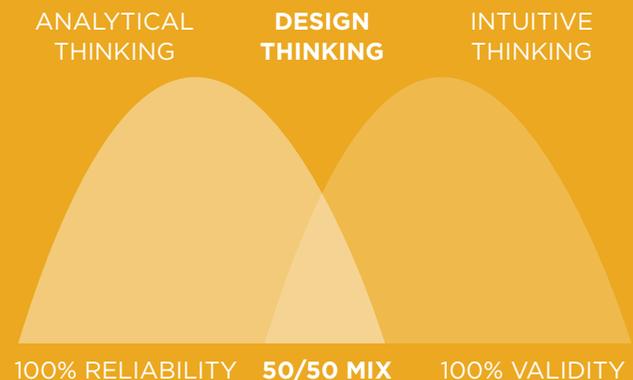
Here, Martin points to the idea that it is not enough to mimic the approaches designers use and leverage their tools, individuals, and organizations must become designers. This involves moving beyond *knowing* what the tools and approaches are, into *understanding* how and why a designer behaves the way they do—the motivations and the complexity embedded within their practice.

## The Predilection Gap

In Roger Martin's book *The Design of Business: Why Design Thinking is the Next Competitive Advantage* (2009), he describes the difference between analytical thinking (which focuses on reliability) and intuitive thinking (which focuses on validity). Martin's argument is that businesses must balance both for transformation. The overlap between these two ways of thinking is the space of design thinking, and can be achieved through the use of abductive reasoning—"with little to go on, the design thinker employs abductive reasoning to discern a pattern in what to others is still an amorphous whole" (Ibid, p. 74). Abductive reasoning is how design thinkers move from observation to a theory that explains the observation in the simplest way possible—colloquially known as a creative leap.

In the conclusion of his book, Martin describes five ways an individual can improve their capacity for design thinking and working with diverse groups (with extreme analytical or intuitive perspectives). They include reframing views as creative opportunities, empathizing with colleagues, learning the language of reli-

ability and validity, describing new concepts using existing language, and starting small (2009, p. 167-177).



*Figure 4.* The predilection gap. This describes the balance between two modes of thinking (Martin, 2009, p. 54).

### Bruce Nussbaum and Why Design Thinking Has Failed

There are a number of critiques of the recent suboptimization and commercialization of design thinking—even from within the discipline. Once such critique comes from Richard Buchanan himself. Though Buchanan continues to advocate for more design education within traditional business schools, he does challenge design schools to shift their focus from the artifact created through the design process (where he claims there is still a bias in design thinking), to the “way the artifact is embedded in the lives and practices of people” (The Harbus, 2011). Here, Buchanan nods to the work of Simon and Papanek who were concerned with the intention of design—rather than the artifact itself. Buchanan further warns of the formulaic approach used by consultancies like IDEO which brand their process as “design thinking” but fail to consider the full range of soft skills associated with successful implementation (Ibid).

Others, like Bruce Nussbaum, have written extensively around the pitfalls of packaging design thinking as a bounded process that purports to engineer creativity. Nussbaum

claims the success rate of companies applying design thinking is quite low, since, companies turned the process of design thinking into a staged process that at best accomplished incremental change (Nussbaum, 2011). In his 2013 book, *Creative Intelligence: Harnessing the Power to Create, Connect, and Inspire*, Nussbaum builds on his original work to advocate for a paradigm shift—away from focusing on process to focusing on creativity. For Nussbaum, Creative Intelligence, or CQ, is about creative competencies which he refers to as “literacies” or “fluencies” (Nussbaum, 2013).

Some companies have taken this advice to heart. They have embedded design thinking within their organizational culture and work toward its saliency. An example of this is Umpqua—a community oriented bank in California. Their teams work towards design thinking mastery through a series of online modules. Furthermore, the competencies and behaviours associated with its implementation are embedded within the performance evaluation process where employees

are challenged to demonstrate how they *practice* design thinking in their day-to-day work. Tim Brown, in a 2015 article in Harvard Business Review, references Umpqua in his challenge to organizations in the next decade—“how might organizations build deep design thinking skills and creative leadership at all levels?” (Brown, 2015).

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## Design as Mindsets and Practices

### Howard, Senova, and Melles and the Role of Mindset in Design Thinking

In *Exploring the role of mindset in design thinking: implications for capability development and practice*, Howard, Senova, and Melles explore the role of mindset within design thinking capability and practice (2015). They draw further attention to the connection between design thinking and the application of the tools. Building on the work of Johansson-Skoldberg, there is evidence that this commodification has made the practice of design accessible and of utility to managers. However, “presenting design thinking as a toolkit or systematic process provides a limited viewpoint of design thinking focused on *design doing*” (Ibid, p. 186). Though this approach certainly aims to distill and simplify the process, there appears to be little evidence that this fosters an overarching proficiency in design thinking or equates to achieving impactful outcomes (Ibid).

Through their research, Howard, Senova, and Melles identify two design thinking mindsets—design thinking as *a way of life* and design thinking as *a way of work*. In the latter, design thinking is co-opted as a method of

structured processes that exist at the practical and tactical levels for achieving particular outcomes or objectives (Ibid, p. 188).

Conversely, design thinking as a way of life takes the view that “[design thinking] is associated with the mindset of how a person exists and behaves in the world: how they think, their disposition, and how they work” (Ibid). This points to a fusion of the mindset with the individual but stops short of saying everyone is innately capable or equal in their capacity for design. Rather, that “the proposition that everybody can design is different from the proposition that everybody can design well” (Ibid, p. 189). While design and its embedded creativity may be instinctive, people must invest energy and resources in developing the associated capabilities in order to elucidate its potential and realize its potential.

The underlying motivations for organizations to embrace design as a way of work versus as a way of life are different; for the former, leveraging the design process to gain competitive advantage through innovation to achieve com-

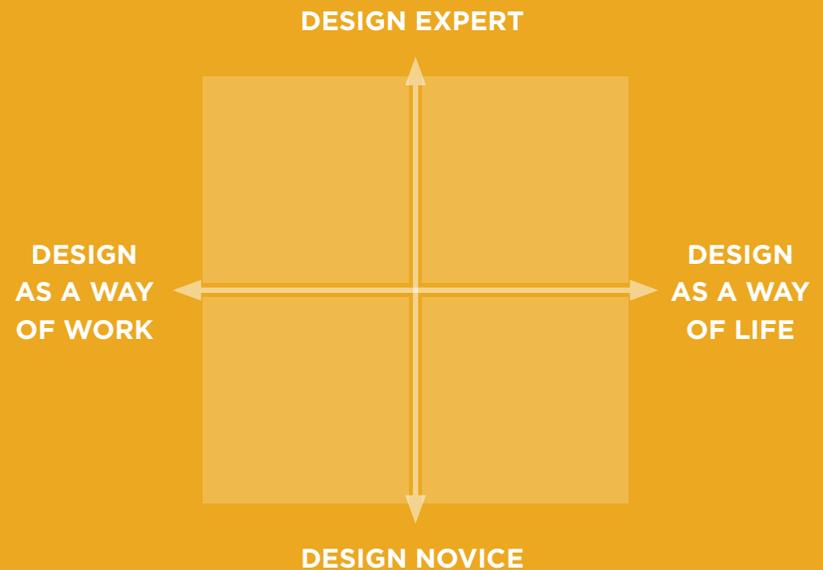
mercial success; the latter, embracing design as a mindset for tackling complex problems focused on improving people’s lives (Ibid).

In both cases—design as a way of life and design as a way of work—the key characteristics are the same. There is a focus on human-centeredness and empathy, collaboration, creativity, visualization, and prototyping. These characteristics begin to point to the specific skills and mindsets required by designers to successfully implement design thinking projects (Ibid).

Interestingly, Howard, Senova, and Melles suggest that organizations that focus on design thinking as a way of work may simply be less ‘mature’ in their learning and competency of the tool. “Focus on process and tools [may be] a symptom of their infancy or alternatively their commercial orientation [...] where design thinking represents a skill set and tool set for innovation” (Ibid, p. 193). As an artifact of their research, they introduce a Design Thinking Maturity Matrix that creates a more fluid view of design thinking—one where through intentional practice and focus, individuals and

organizations may grow into new quadrants or dimensions of proficiency. It proposes a “scale where moving along the spectrum depicts a growing and deepening understanding” (Ibid, p. 194). This supports the work of Cross who calls for design in general education and others (Lawson & Dorst, 2009), that call for design education that may specifically help practitioners move from one level of proficiency to another (Ibid, p. 195). As a practitioner moves along the spectrums identified in the Design Thinking Maturity Matrix, design thinking becomes a cognitive process that underpins their decision-making process.

Howard, Senova, and Melles end their work with a call for a deeper dive into the specific competencies associated with their meta-level design thinking mindsets.



*Figure 5.* Design thinking maturity matrix. This diagram was developed to describe how people develop as design thinkers (Howard, Senova, & Melles, 2015, p. 195).

### Junginger and the Danish Design Centre

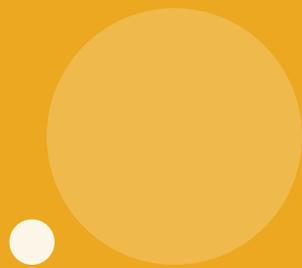
In parallel to the work of Howard, Senova, and Melles, the Danish Design Centre—an organization that seeks to foster design within organizations in order to professionalize the design industry—picks up on the concept of design maturity within the organization (About the Danish Design Centre, 2016). In 2001, they publish for the first time the concept of the Design Ladder. The tool was devised for illustrating how embedded the concept of design was within an organization’s culture (The Design Ladder: Four steps of design use, 2017). Much like Howard, Senova, and Melles, the work of the Danish Design Centre points to a bias toward design thinking as a learnable and scalable organizational competency.

On the first rung of the Design Ladder, there is little design applied systematically within the organization. As an organization takes the first step, they embrace design as “form-giving”—focused on the aesthetic and the finish of a product or service. On the third rung, design becomes embedded in organizational processes. Finally, as an organization reaches design maturity, design becomes part of their

strategy—situated as a key part of a company’s business model and innovation DNA (Ibid).

This rating model is leveraged by the Danish Design Centre to help organizations tool up their design practices but is largely focused on the realm of product design. In *Design in the organization: Parts and wholes*, Sabine Junginger (2009) contributes further to the concept of design maturity. For Junginger, there are four places in which design can play a role within the organization. These are best illustrated in *Figure 6*. The four places of design.

Much like the work of the Danish Design Centre, Junginger promotes designerly maturing that moves from Howard, Senova, and Melles’ design as a way of work (Design as part of the organization), through to design as a way of life (design integral to all aspects of the organization) (Ibid, p. 5). In the early stages, design is seen as having distinct boundaries around tasks, projects or outcomes. As an organization matures from engaging external designers (graphic designers) or design led departments (engineers, marketing) to its



### **SEPARATE**

**Design as external resource.**

Design thinking and methods have no continuous presence in the organization.

They are add-ons, limited to traditional problems: form, communication, function.



### **PERIPHERAL**

**Design as part of the organization.**

Design thinking and methods practiced somewhere within the organization.

They apply to specific products and services.

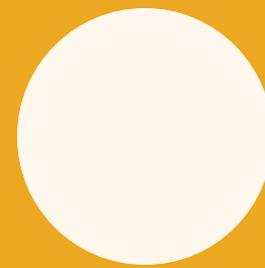


### **CENTRAL**

**Design at the core of the organization.**

Design thinking and methods are highly visible and take a central position.

The unify products and services across an organization; apply to corporate design and brand strategy.



### **INTEGRATED**

**Design integral to all aspects of the organization.**

Design thinking and methods are being applied at an organization's top level as means to inquire into a wide range of organizational problems with the aim to develop integrated solutions.

*Figure 6.* The four places of design. Developed by Junginger, these describe where design sits within the organizations (2009).

application of design thinking, these boundaries become blurred. Thinking becomes less linear, and management practices and design thinking become less discreet practices (Ibid, p. 6). Embracing this model means an organization has made design a key aspect of its culture and, in such, can identify “system disconnects, understand when and where customers get lost, how and why procedures conflict, what structures work and which fail—but more importantly, it works on remedying the situation by reorienting itself around the people it serves” (Ibid, p. 8).

Similar to the work of Papanek, Junginger calls for design to focus its attention on major human challenges and believes that design thinking will play a key role in overcoming system dilemmas such as climate change and rising populations. She cautions, however, like Papanek, Buchanan, and Nussbaum that design thinking needs to be recognized and practiced as more than a *method* for arriving at creative and novel innovations (Ibid). There is an opportunity for design to delve more deeply into the cognitive, behavioural

and complex human environments it embeds itself into; to create new solutions to a range of wicked problems. To do so, it must move beyond method and process to uncover and change “fundamental assumptions, beliefs, norms, and values” (Ibid).

### Carlgren, Rauth, and Elmquist

In *Framing Design Thinking: The Concept in Idea and Enactment*, Carlgren, Rauth, and Elmquist seek to provide, with some success, a frame for Johansson-Skoldberg's 'design thinking' that is researchable in terms of both theory and practice (Carlgren, Rauth & Elmquist, 2016). Their paper attempts to make sense of the ambiguity of terms, approaches, tools, and methodologies that constitute the body of work around design thinking. Furthermore, they seek to explore more specific competencies (mindsets) that inform the work of Howard, Senova, and Melles.

Their work became a significant touchstone in our own research. It is the first attempt we could detect of a scholarly approach to understanding the linkages between the act of doing design thinking (tools, phases, methods) with the competencies required to facilitate and exercise mastery of design thinking (aptitudes, mindsets, and skills) amongst individuals that lack a formal scholarly background in the field of design.

Carlgren and colleagues specifically focus their work on what they call the 'managerial discourse' of design thinking—akin to Johansson-Skoldberg's 'design thinking' which refers to the general human centred approach to complex systems, problems, and idea generation put forth by mainstream business writers such as Tim Brown (2009) and Roger Martin (2009).

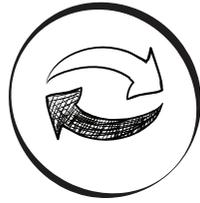
Carlgren and colleagues designed a study to better understand how design thinking is applied in practice and looked specifically at six sizeable companies that integrated design thinking into their organizational culture and practice. In all cases, the companies had extensive experience (between 4 and 10 years), significant revenues (between \$4 billion USD and \$84 billion USD), and a sizeable number of employees (between 5000 and > 100,000). The study focused on understanding how each company defined design thinking, the context of its use, motivations for adoption, and the main benefits and challenges related to its use. What grew from there was a preliminary understanding of the principles and mindsets required for successful application of design thinking.

After analyzing the data collected—and despite a multitude of applications, motivations, and precise practices—Carlgren and colleagues identified five core mindset themes that capture the uses of design thinking.

### **User Focus**

User Focus was described as “empathy building, deep user understanding and user involvement” (Carlgren et al, 2016, p. 46). They identify a series of core mindsets important for this kind of empathic work—“being open, avoiding being judgmental and being comfortable around people with different backgrounds and opinions” (Ibid). Techniques such as empathy mapping, journey mapping and conversations with customers and/or users were key to fostering key insights about products or services.



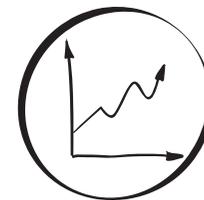


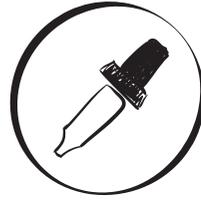
### **Problem Framing**

Problem Framing is explained as the extent to which those practicing design thinking can interact with the problem at hand. Carlgren and colleagues write, “Instead of trying to solve the problem, they tried to widen, challenge and reframe it. Many described how they repeatedly questioned and reformulated the initial problem, and how identifying a larger problem space helps create a larger solution space” (Ibid, p. 47). Certain mindsets were seen as critical—“unconstrained and futuristic thinking, and openness to the unexpected” (Ibid). People need to feel “comfortable with complex problems and to accept ambiguity” (Ibid). Techniques for engaging in the practice of Problem Framing include methods such as “how might we?” questions, brainstorming, and “five whys?”.

### **Visualization**

Visualization refers to the practice of making ideas and insights visual, tangible and explicit. This includes data visualization, creating rough visual representations of concepts and externalizing knowledge. Thinking through doing and a bias towards action are important mindsets for those engaging in Visualization. Carlgren and colleagues discovered that techniques such as “sketching, storyboarding, creating physical mock ups, role-play, and creating wireframes” (Ibid, p. 47) are often used to visualize ideas and insights and provide a medium through which to generate more ideas and glean early feedback.





### **Experimentation**

Experimentation is about “testing and trying things out in an iterative way, and moving between divergent and convergent ways of thinking” (Ibid). This means resisting the urge to develop one solution in isolation of feedback and in isolation of a multitude of options. “Curiosity, playfulness, optimism, and displaying a sense of humour” as well as open-mindedness (Ibid, p. 48) were seen as key mindsets necessary for people to contribute meaningfully to the design thinking process. Intentional brainstorming techniques, space design and allocation were all key to fostering the kind of experimentation necessary for successful design thinking implementation.

### **Diversity**

Diversity refers to the intentional “collaboration in diverse teams, and the integration of diverse outside perspectives throughout the process” (Ibid). It includes intentional structures such as those that promote cross disciplinary teams, inclusion of outside voices and a holistic approach to design. It correlates with mindsets and behaviors associated with integrative thinking, openness to difference, and a democratic spirit (Ibid, p. 50).



Carlgren, Rauth, and Elmquist assert that their research helps managers to identify both the tools and techniques as well as the principles and mindsets necessary to achieve success on projects that employ design thinking. Their results are among the first to tangibly address the challenges raised by Papanek, Cross, and others to understand design thinking as not simply a series of steps, but rather a comprehensive approach to understanding, managing, and implementing change.

Our own research leverages the work of Carl- gren, Rauth, and Elmquist extensively and attempts to create a deeper understanding of the associated behaviours in individuals, teams, and organizations required to incorporate successful design thinking practice. These five mindset themes, with an additional mindset theme identified as Process Wayfinding, informed the design of our online questionnaire.



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## The Design of Organizations

As part of this research, it is important to consider not only the evolution of design and design thinking, but also the dynamic environments in which design thinking is implemented. These organizations and their environments range in terms of their existing and required level of competence in different areas, their level of complexity, and their readiness for change. There are a number of key organizational theorists that provide a framing through which to better understand the context within which design must embed itself.

## Taylor and Weber

Classical Organizational Theory emerged out of the work of Frederick Taylor (1917) and Max Weber (1947). Taylor's contribution to management is framed within the context of the scientific management theory—often referred to as *Taylorism*. The theory proposed four key tenets (Taylor, 1917):

1. Optimize work by finding the most efficient ways for task completion
2. Pair appropriately skilled workers with appropriate tasks
3. Oversee the completion of work and leverage reward systems to motivate workers
4. Ensure Management understands its role as planner and controller

Taylor's ideas around management and organizational life are still present in many modern organizations. Taylor's classical organization presents a variety of challenges for organizations looking to become designerly. Firstly, Taylor's classical organization was designed and structured for function and promotes a culture where individual performance was more important than team performance.

These two elements are immediately at odds with the cross-disciplinary teams that Fuller and Simon advocate for. Moreover, Taylor saw management as a critical link in making decisions and planning the outputs of workers through methodical process and mechanization. Again, this approach is at odds with the design mature organization that is adaptive, and people focused (Rosenbrock, 2012, p. 3).

Weber built on the work of Taylor and suggested organizations need to be designed to minimize ambiguity and diversity. Weber was ultimately suggesting that the more standardization that exists within the workplace, the less room for error, disruption, and calamity (Weber, 1947). Furthermore, Weber promoted strong power and control within the organization. His ideas became the basis of the bureaucratic organization—a hierarchical construct that favoured stability and uniformity. The modern challenge for the bureaucratic organization is the pace at which change is impressed upon the organization from the outside (Ibid). For the latter half of the 20th Century, organizations in many ways defined the relation-

ship with customers and users. Today, this paradigm has shifted, and organizations can no longer define these customer relationships through authority and control. Consumers and workers alike demand greater transparency and input into the work and outputs of the organization (Corporate transparency: why honesty is the best policy, 2014).

The highly process-driven, rule-focused, and hierarchical organizations of Taylor and Weber are still present today. Whether in their full embodiment or as embedded heuristics that sit at the very foundations of many modern organizations, the work of Taylor and Weber provide good insights into the challenges that might exist for organizations looking to embrace a design culture which in some ways may seem diametrically opposed to the classical organization.

## Peter Drucker

Building on the work of both Taylor and Weber, late 20th Century management theorist Peter Drucker began signalling the shift in management paradigm in the 1970s. Drucker understood that organizations are becoming more complex. He advocated for a decentralization of power structures which enable increasingly independent business units to operate in unison (Drucker, 1974). In this evolving structure, Drucker advocated for each unit to have “its own management which, in effect, runs its own autonomous business” (Drucker, 1974, p. 572).

Drucker’s call for decentralization set the stage for the evolution of large, complex, multinational companies. Drucker recognized and embraced the complexity of organizational life, and it is during this era that approaches such as project management, Lean, and other methodologies began to take form within organizations. The project management approach, for instance, began to radically change the dynamic of power and control in the classical and bureaucratic organizations of Taylor and Weber. In these situations, project managers

became the locus of information, resource allocation, and decision-making. These managers began to play an integrative role between units and as resource advocates—thereby democratizing the rigid hierarchies and structures put forth by Taylor and Weber.

It is here that the evolution of matrix organizations began—organizations that exist with a set of permanently defined departments created along functional lines within which employees operate in clear accountability structures overlaid with cross-functional teams that have responsibilities across departments within the scope of particular collaborative projects (Sy, Beach, & D’Annunzio, 2005).

Matrix organizations are still quite prevalent today and represent hybrid organizations that may be stuck in Tayloristic or Weberistic norms and are trying to leverage collaboration and integration to adapt to internally and externally complex realities.

## Peter Senge

Peter Senge introduced systems thinking into management and organizational science and emphasized the importance of the learning organization as being resilient to change. For Senge, “learning organizations are organizations that are continually enhancing their capacity to create” (Senge, 1990, p. 127). He saw the management paradigm shifting, again, from top-down control to systemically learning and adaptive systems. Senge picked up on the work of Russell Ackoff in *On Purposeful Systems* (1972) wherein there was a rallying cry for thinking about how to purposefully design and influence systems (Ackoff, 1972). Senge saw the organization moving from an outcomes-driven approach to a purpose-driven system (Senge, 1990).

This purposeful shift is a corollary to the critiques by Nussbaum and Buchanan of the suboptimization of design thinking—whereby in focusing primarily on the outcomes, products, or services created through design thinking, organizations miss the opportunity to realize critical learning which ultimately drives sustainability.

Senge advocated strongly for managers and workers to view themselves as part of a larger system—as opposed to being fixated on their own role, function or departmental objectives (Senge, 1990). To do this, managers and workers must develop learning “loops” based on immediate feedback in order to improve and grow. These loops are feedback constructs by which managers and workers can gain knowledge and information about past behaviours. In this, there is a shift away from individual performance toward dynamic team performance which fosters collaboration and learning within the organization. Ultimately, learning organizations better support their members in becoming complex-capable.





**RESEARCH  
QUESTIONS**



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## Chapter 3

# Research Questions

*“Only a fool tests the depth of the water with both feet.”*

*African Proverb*

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# The Suboptimization of Design Thinking

A review of the literature and key writers in design and design thinking reveals an evolution of the discipline since the methods, processes, and practices began appearing more explicitly in literature and research over 70 years ago. Embedded within this literature is an arc that explains a certain crossroads the field has arrived at today.

Beginning with the work of Buckminster Fuller, the Scandinavian Cooperative, and Herbert Simon, there was a clear emphasis on advancing work using cross-disciplinary teams and a structured process that followed clear phases and steps to achieve outcomes associated with designing how things ought to be. This focus on designing a preferred future state using a structured process continues today as a core tenet of design thinking practice.

There emerged out of their practices a shifting focus away from designing ‘things’ to instead the practice of design attending to the complex, social problems emerging in the latter half of the 20th Century. Writers and theorists like Victor Papanek and Nigel Cross picked up

on the need for a new kind of design education that addressed the gaps existing between dichotomous disciplines such as arts and humanities and natural and physical sciences. This proposed ‘third culture’ advocated for a general education in design. It is here the arc of research began to democratize the role of the designer away from being a trained discipline typically held by engineers, industrial designers, and architects to a practice more broadly applicable to ‘non-designers’.

The split—between designerly thinking and design thinking—represents a divergence in the evolution of design thinking. The former represents the formal theory and practice associated with the archetypical designer, while the latter fosters design-like practices and thinking in non-designers. Papanek’s and Cross’s emphasis on “comprehensive design” and “integrated design” is advanced by Richard Buchanan’s focus on the systems perspective in design thinking—which attempts to address the complexity and ‘wickedness’ of modern problems.

Buchanan critiques the linearity of Simon and

Fuller’s stepped approach. He suggests that the complexity of wicked problems necessitates a different kind of process navigation—one that is more iterative and complex and one that requires repeating loops of divergence and convergence. Schön builds on this work and emphasizes how important problem framing, prototyping and the reflective practice embedded within the process of design is in informing the practice of the designer.

It is at this point in the literature that the popularization and commercialization of design thinking for non-designers begins, as led by agencies and organizations like IDEO. This divergence represents a suboptimization of design thinking that focuses on process rather than philosophy. Some writers (e.g. Friis, Teo, & Sang, 2017) emphasize the linearity and steps needed to embark upon a design thinking process thereby oversimplifying the complexity for a broad audience.

Researchers like Liz Sanders go on to codify the tools, from anthropological and ethnographic perspectives, that companies like IDEO and

other design companies utilize on the front end of their processes. Leveraging these tools, a variety of companies and organizations have adopted and applied the IDEO version of design thinking. In attempting to make the methods and processes relevant and their specific contexts, there has been a further suboptimization of design thinking.

Roger Martin's concept of the knowledge funnel—used to describe how an idea flows through a set of phases from mystery to heuristic to algorithm to code (2009)—is another good example of the suboptimization of design thinking. It is an attempt to describe how businesses can leverage a linear process to become design thinking companies. The goal was to create a safe space for the application of design thinking for private sector organizations—since ambiguous outcomes represent enormous risk to shareholders.

In addition, the concept of the knowledge funnel can be applied to design thinking as a way to understand its evolution. In the beginning, design thinking was created as a heuristic to

make sense of the world around it. The heuristic slowly evolved into an algorithm practiced by companies like IDEO. Ultimately, the algorithm was codified into a set of tools and repeatable processes that other companies and organizations could apply broadly.

In the last few years, writers like Nussbaum and Buchanan have picked up on this oversimplification. For them, design thinking is “a very ambiguous term that's gotten out of hand” (The Harbus, 2011). In an interview with The Harbus in 2011, Buchanan says, “for some people it is a cognitive process, for others it is a set of skills and habits, for some it is a business slogan. And I'm afraid it has deteriorated into that [a business slogan] in many ways, particularly at a company like IDEO. They have a formula that they regard as “design thinking” (Ibid).

The domain of design thinking has arrived at a critical crossroads where key decisions about its future applications and relative level of success hang in the balance. On one path, a continued suboptimization of the design process which further divorces design thinking from

the human element inherent in its application. On the other, a call for a more ‘whole’ or supraoptimized version of design thinking that carefully considers the interconnection of specialized skills and tools inherent in the process—in addition to the complex web of human behaviours and mindsets required to navigate and facilitate the recurring loops of convergence and divergence.

The review of the literature points to a significant gap in the study and work related to the application of design thinking as a culture, set of behaviors, competencies, and mindsets. That is, instead of focusing on design education, companies are focused on supporting non-designers to act in designerly ways through the use of design thinking tools.

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# The Supraoptimization of Design Thinking

Carlgren, Rauth, and Elmquist looked at the realized, successful strategy of design thinking in organizations. They discovered that in organizations that successfully implemented design thinking there was a focus on developing a design thinking culture specific to the organization's context (2016). Carlgren, Rauth, and Elmquist do not see design thinking as a five step process, but rather a set of mindsets and behaviours that permeate organizational culture (Ibid).

Carlgren, Rauth, and Elmquist argue that organizations implementing design thinking should not simply seek to leverage the extrinsic value of design thinking. Instead, these organizations should focus on the intrinsic value of developing the associated cognitive abilities related to design (Ibid). This is echoed in the work of Howard, Senova, and Melles (2015). In many cases, initiatives fail because organizations have suboptimized the wrong part of the philosophy of design thinking—they have focused all of their energy on the process. Accordingly, there is an emerging recognition that, “the stages [of the design process] should be understood as different modes that contribute to a project, rather

than sequential steps” (Friis, Teo, & Siang, 2017).

The literature review retraced the steps taken in the evolution of design thinking in order to articulate a view that is holistic, more complex, and less refined than the suboptimized version commonly found in organizations today. Our research project seeks to codify the behaviours, mindsets, and practices required by individuals, teams, and organizations wishing to implement design thinking successfully. Through this project, we aim to uncover a supraoptimized—less optimized, more complex—version of design thinking.

Our research began by leveraging the five defined mindset themes identified by Carlgren, Rauth, and Elmquist in order to validate them and understand which are critical to the success of design thinking applications. Based on other research (e.g. Buchanan, 1992 and Walters, 2011) related to the inherent and sometimes uncomfortable ambiguity of the design thinking process, we supplemented the work of Carlgren, Rauth, and Elmquist by adding a sixth mindset theme related to Process Wayfinding.

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## Focus of Our Research Project

Our research project examines, broadly, the competencies associated with successful design thinking as identified in the literature review—User Focus, Problem Framing, Visualization, Experimentation, Diversity, and Process Wayfinding.

Specifically, the questions we explored in this project are:

*Of the defined competencies related to design thinking teams, which appear to be core/critical?*

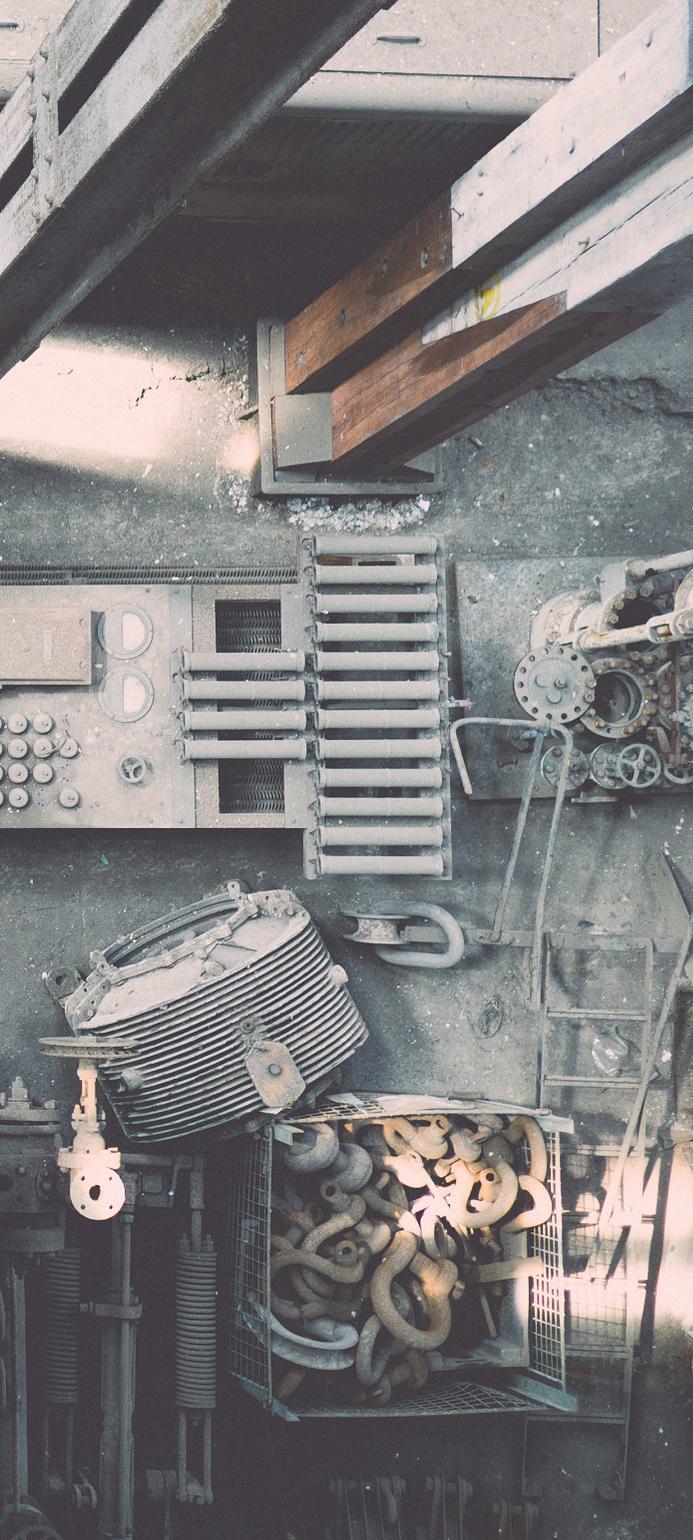
*How are the competencies related and how might they influence one another?*

*How might individuals improve their aptitude with respect to the competencies?*





# METHODOLOGY



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## Chapter 4

# Methodology

*“As long as one keeps searching,  
the answers come.”*

*Joan Baez*

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## Approach to Research

Our research project examines design thinking competencies, their influence on one another and how these competencies might be improved for individuals, teams, and organizations. In our research, we sought to build on work by Carlgren, Rauth, and Elmquist who developed a framework for understanding design thinking mindsets and competencies that cuts across that various perspectives on how design phases, tools, and practices are used in design thinking.

To extend these competencies further and understand the relationships and patterns between them, we conducted an online questionnaire. To then explore how individuals might improve their relative ability in any one competency, we used a design probe activity. Together, these methods form a holistic response to the research questions.

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# Research Methods

## Online Questionnaire

We used an online questionnaire to explore the research questions. There are a number of benefits inherent in the use of an online questionnaire. Through the use of multiple online platforms, this approach supported the efficient distribution of the questionnaire across a variety of demographic groups. We designed the questionnaire to include a mix of questions to support the collection of both quantitative and qualitative data. Having both quantitative and qualitative data supported a variety of analysis techniques and enabled us to balance the data standardization, data manipulation, and data visualization characteristic of quantitative methods and the contextual analysis achieved through qualitative methods.

The questionnaire focused specifically on three key questions:

*Which of the mindset themes—identified in the work of Carlgren, Rauth, and Elmquist—do individuals and team members perceive to be most important to their work and how much do these mindset themes contribute to project outcomes?*

*How do individuals rate themselves, their teams, and their organizations on the mindset themes? Where do they see their strengths and relative areas for development?*

*What relationships between the mindset themes do individuals perceive to exist?*

In addition to the five mindset themes identified by Carlgren, Rauth, and Elmquist, Process Wayfinding was identified as critical through other sources (e.g. Buchanan, 1992 and Walters, 2011). Given its importance, Process Wayfinding was added to the survey as a sixth mindset theme.

The first page of the questionnaire asked respondents to evaluate themselves, their teams, and their organizations across the six mindset themes. We asked respondents to assess their individual, team, and organizational abilities related to the six design thinking mindset themes on a five-point Likert scale. Respondents were also given the opportunity to provide context for their responses. Specifically, we asked for qualitative feedback in terms of how important they felt each mindset theme was to their work and to project outcomes.

The second page introduced the concept of design thinking and asked respondents to identify whether or not they, or their organizations, had experience related to design thinking. We also asked if they had ever

received formal training in design or design thinking specifically later in the survey. These two pieces of information enabled us to compare data from respondents associated with individuals, teams, and organizations that formally used design thinking practices and individuals and organizations where other collaborative approaches were used.

The third page asked them to evaluate themselves on specific behaviours across the six mindset themes. We asked respondents to identify the frequency with which they demonstrated specific practices associated with each mindset theme. We presented questions to each respondent in a random order and we did not group them together by their relationship to a specific mindset theme. For each mindset theme, 4-8 practices were explored. We included a variety of practices to ensure there was internal consistency within a set of behaviours associated with a mindset theme.

In addition to these core sections, participants were asked a series of demographic questions about themselves and their orga-

nization. This helped us ensure the online questionnaire had coverage across age, gender, education level, sector, and size of the organization. The full online questionnaire can be found in the Appendix.

We sent the online questionnaire out to multiple professional networks related to design thinking, and collaborative project methodologies more broadly, and we left it open for approximately two months. During this period of time, we sent multiple follow-up communications across numerous online platforms, including email and social media, reminding members of these networks to complete the questionnaire and to consider sharing the questionnaire with their colleagues.

## Design Probe

In order to develop a deeper series of insights related to the relationships that exist between these mindset themes and the use of particular tools, practices, and phases of the process, we used design probes to establish:

*Which of the mindset themes identified in the questionnaire were actions or strategies that individuals and teams attempted to improve, and which were they willing to try out over an identified time period?*

*Which of the actions or strategies identified in the previous part of the design probe did individuals and teams perceive to improve their aptitude with respect to the design thinking mindset themes?*

Design probes are a qualitative approach useful in exploring an individual's relationship with a given concept. The "concept" in our approach was a tool corresponding to a given mindset theme. Participants were identified through contacts working in related spaces. After agreeing to the informed consent, participants were asked to complete the online questionnaire to evaluate themselves in each of the six competencies. Each participant was then given a design thinking tool to support them in improving in one of the six mindset themes:

- Empathy mapping activity for User Focus;
- Five whys activity for Problem Framing;
- Ideation activity for Experimentation;
- Sketching activity for Visualization;
- Dot voting activity for Diversity; and
- Facilitation activity for Process Wayfinding.

In each case, we provided participants with a brief overview of the technique as well as an explanation clarifying the underlying motivation for using the technique. We used this approach to explain not only *how* to use a particular tool ("here's a tool, here's how you can

facilitate it”), but also *the context* for its importance (the underlying motivations, purpose, and possible outcomes). We gave participants about a week to use the tool. We then asked a series of reflection questions on their experience. The design probe reflection questions can be found in the Appendix.

We sent the design probe activity to a number of participants. We then followed up with these participants, and sent the design probe to other participants, until we received at least one response to the reflection questions for each of the six mindset themes.

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## Limitations of the Data

Both the online questionnaire and the design probes were well-designed to respond to the mindset themes. We were grateful for the time respondents took to complete the online questionnaire and design probe activity. Both of these undertakings took a nontrivial amount of time to complete.

## Response Rate

Though the online questionnaire and design probe activities both received interest, the sample size of both research methods was lower than ideal. This introduces a limitation for how the data can be used. The small sample size, especially for the online questionnaire, has an impact on the strength of the findings. A much larger sample size would have supported better and deeper analysis of the design thinking mindset themes and the relationships between them.

The approach to research completed in this project was also designed to include qualitative questions that could offer insights within the research area. However, the conclusions drawn from this limited sample size will have to be validated in future research. Further research will have to include developing a baseline or set of behaviours that are used (and admired) in other problem-solving approaches and that are not used in design thinking. In addition, it would be wise to think critically about how the online questionnaire might be broken up into a series of smaller (and quicker to answer) sets of questions.

The design probe, on the other hand, was explicitly designed to generate a limited number of responses. The goal set was two responses per mindset theme, and only one was received. Despite a lot of enthusiasm at the beginning of the process, many respondents failed to follow through on their reflection using the tool provided to them. Informally, we heard how useful these tools were. However, only respondents that completed the reflection were included in the analysis. This limited response rate requires a cautious approach to the analysis; distilling insights but refraining from drawing overarching conclusions.

### Diversity of the Data

In terms of the quality of the data collected, the respondents were diverse in many ways. For example, the online questionnaire received responses from people of many ages, a mix of female and male respondents (60/40 split), and people working in a diversity of sectors and fields. The breadth of respondents could have been better in a few key areas, however: education and location. The diversity of respondents could have been improved in terms of highest level of education received since most of the respondents reported earning a bachelor's degree or higher. Similarly, the diversity of geographic locations could have been stronger since all respondents were located in Canada and mostly in Ontario.

### Bias in the Data

Another factor that may have impacted the data and limit the depth of analysis was related to the questionnaire respondents themselves. Specifically, respondents with a lack of familiarity with design thinking may have chosen to opt-out prior to completing the full questionnaire. This may have created a divide within the response data often referred to as survivorship bias, whereby those respondents who completed the full questionnaire may have inherently had a greater comfort level and awareness surrounding design thinking (or similar collaborative problem-solving approaches). Conversely, the respondents that did not complete the entire questionnaire may have had minimal understanding of design thinking and, as a result felt intimidated to complete the questionnaire.

The group of respondents that did not have exposure to design thinking may be an interesting group to glean more information about in a future project. For example, their responses may hold interesting insights around which competencies differentiate individuals with some design thinking background and those

with none. Ultimately, any approach that may seek to broaden the successful application of design thinking will need to consider its application in a variety of domains and disciplines. This should include everything from skeptical private-sector organizations—motivated largely by profit and clear return on investment metrics—to industries transitioning to more automated, knowledge-based work who may find it difficult to embrace additional change.

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# Analysis

## Approach to Data Analysis

To understand the data collected, we used a sense-making process to understand data patterns within the design thinking competencies identified in the online questionnaire, including:

*Which were, on aggregate, perceived to be critical by individuals?*

*Which were often associated with others?*

*What relationships exist when demographic filters are applied?*

*Where are the biggest differences between those with experience in design thinking and those without?*

*What distinct personas exist within the questionnaire population?*

We then validated these specific patterns through additional literature review of related or analogous domains and topics. We used data collected from the design probes to shape the patterns that emerged from the online questionnaire analysis.

The ultimate goal of our research was to build the foundation of a research instrument that can be used by individuals and teams to understand their aptitude for core design thinking competencies and how they might go about improving them.

### Data Analysis Techniques

Building on our approach to data analysis, we used a variety of analysis techniques to understand the quantitative and qualitative data collected. These techniques included:

- Correlation analyses (including matrices and scatter plots) to determine which behaviours and practices were related and the relative strength of these relationships;
- Sorting data to understand patterns and trends;
- Visually representing responses to understand the data in different ways;
- Clustering responses to detect similar and dissimilar attributes;
- Computing derived values to understand responses to Likert scale questions relative to a respondent's average responses to detect trends and patterns; and
- Filtering based on responses to key questions to determine differences between groups of respondents.

Based on the research of Carlgren, Rauth, and Elmquist, we developed a series of behavioural practices associated with each mindset theme.

We coded 37 behavioural practices against the six mindset themes (see Appendix A, Page 3). In the preliminary analysis of the data, we evaluated these practices for internal validity. When looking at respondent data, there appears to be a strong relationship within and between the questions coded for each mindset theme. Responses to individual behavioural practice questions within each mindset theme were correlated with the overall score for the corresponding mindset theme. Any question for which the responses did not correlate would have suggested that the particular practice was not a strong indicator for the mindset theme. Since this was not present in the data, there appears to be internal validity related to the set of behavioural questions coded to each of the mindset themes.

Once internal validity was established, we assessed the quantitative data for patterns, correlations, and associations. We constructed correlation matrices to understand relationships that existed between mindset themes. A series of patterns emerged that helped us understand the dynamic nature and

relationships between the mindset themes. We sorted the data by responses to particular questions to validate these relationships. In order to analyze and code the qualitative data, we reviewed responses to the short answer questions for each mindset theme and organized them into clusters. We then applied these qualitative responses and clusters to assess each respondent's impressions of which mindset themes were more and less critical.

Once these relationships were better understood quantitatively, we visually mapped the relationships between and across the behaviours associated with the mindset themes. We used a simple model to visualize each mindset theme in terms of its affinity and correlation with other mindset themes. The 'regions' that a particular mindset theme occupied within the map had significance in terms of what both the qualitative and quantitative data said about its relationship to, and distance from, other mindset themes. As a way to validate this model, we mapped each individual respondent's aggregate behavioural practice responses, relative to

their overall response across all behavioural practices, onto the model. The result was a heat map that defined clear 'regions' within which respondents clustered.

Finally, we filtered responses in order to uncover and examine patterns that may exist within and across groupings of respondents. This illuminated opportunities and obstacles that specific organizations or groups looking to apply design thinking should consider.

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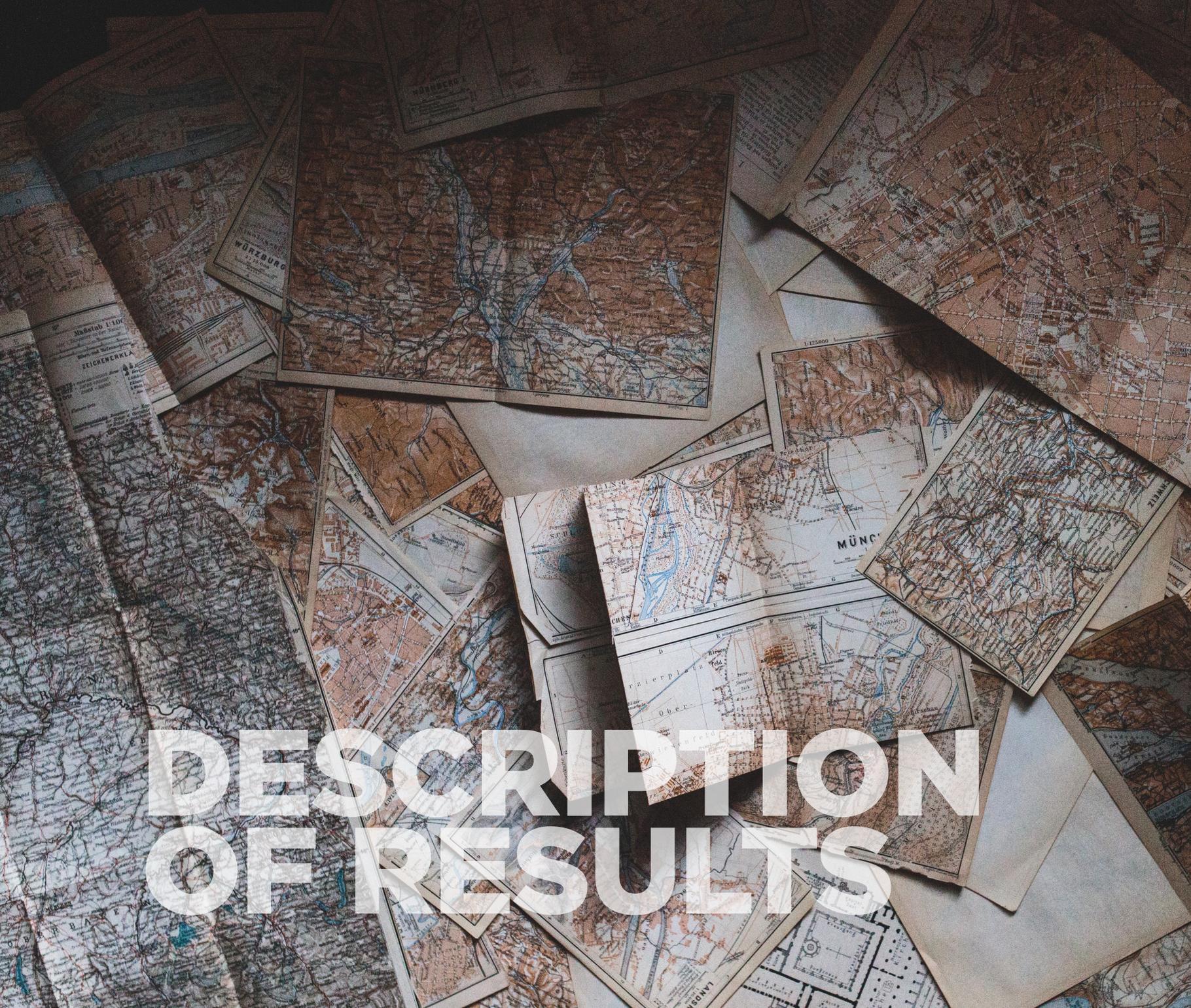
Imagining the Change  
Creating Purpose-Driven Organizations  
People as a Driver of Change  
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Moving Forward

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DESCRIPTION  
OF RESULTS



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## Chapter 5

# Description of Results

*“Doing the right thing is more  
important than doing the  
thing right.”*

*Peter Drucker*

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## Interpreting the Data

The data collected as part of this research project provided insight into organizations, teams, and individuals that are using design thinking and other collaborative practices. In this chapter, we present the results of our research and identify the high level trends and patterns in the data.

We were able to apply filters to illuminate similarities and differences between different groupings of respondents. Looking at discreet demographics—for example, individuals who had received training in design, or organizations that had adopted formally adopted design thinking—so that we might identify how their responses were unique from other groups of respondents.

Through the data, we identified a series of core mindset themes, or competencies, and the correlations that exist between them. Each of these mindset themes are described in this chapter—including respondents' qualitative responses which provide further context around the importance of the mindset themes.

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## On Organizations and Teams

The first filter applied to the responses was used to highlight and examine the differences between organizations that had adopted design thinking approaches and those that had not. Overall, respondents whose organizations had adopted design thinking rated their organizations 10–17% higher on the mindset themes than those respondents whose organizations had not adopted design thinking. The highest difference was within the Experimentation mindset theme where respondents from design thinking organizations rated themselves 17% higher than respondents whose organizations had not adopted design thinking.

## Non-Design Thinking Organizations

Even in the case of organizations that had not formally adopted design thinking, there were several instances where design thinking methodologies and tools were being leveraged and where individuals had received formal design thinking training. The application of this filter highlighted embedded ‘experts’ in design thinking and the barriers and obstacles they face within more classical organizations.

Respondents who had utilized design thinking or collaborative project methodologies in organizations that had not formally adopted design thinking suggested, for instance, that “organizational hierarchy unduly influenced project and organizational outcomes.” In these organizations, respondents suggested that there is a reliance on management and senior leadership to set strategy. As a result, individuals and teams don’t necessarily feel empowered to leverage the talent within a team to drive innovation. Among these respondents, qualitative responses included terms like “bureaucracy” and “organizational politics” as key dynamics that teams needed to understand and navigate in order to successfully “sell” their strategies and projects to management.

According to these respondents, management was more likely to focus on making data-driven decisions. Teams responded by ensuring their requests and proposals contained the required data and the preferred format for the analysis of these data. Furthermore, it appears that the qualitative responses from this group indicate that their organizations focus less on their users/stakeholders. Respondents made comments like, “we’d like to do more of [User Focus], but it’s not always valued by management.” Persuasive views expressed by “approval authorities” were more valued than the integration of opinions from multiple sources. In other words, leadership and hierarchy seemed to matter more than what users/stakeholders thought.

Respondents suggested that management was more likely than any other member of the team to define problems and set the resource constraints. In cases where design thinking practice is not embedded within the organizational culture and dynamic, individuals and teams were more likely to fall back into “conventional methods” and approaches for completing projects.

Individuals who had been exposed to design thinking and were trying to implement the behaviours and practices into their work often exhibited a tone of frustration about the way their organization made decisions and approached projects. Respondents made comments like, “It’s in their hands,” referring to the decisions to be made and the direction to be set.

Finally, there appeared to be less openness to Experimentation in organizations where design thinking had not formally been adopted. Respondents made references to Experimentation not being valued as it presented a possibility of “failure or waste” to leadership. In resource-constrained environments, the risk of loss meant Experimentation was not seen as a worthwhile investment of time and resources.

### **Design Thinking Organizations**

Respondents from organizations that had formally adopted design thinking methodologies (n=21) consistently rated their organization’s abilities related to the six mindsets higher than respondents whose organizations that had not formally adopted design thinking. In these organizations, a more balanced approach to project work—using both quantitative and qualitative data—was favoured by respondents and their organizations.

In organizations that had formally adopted design thinking, respondents recognized that ideas could come from anywhere within the organization and that “democratized ideation” was encouraged. The fact that ideas came from a diversity of sources helped to provide a wide range of options when dealing with complex problems. Respondents were clear that building on ideas from many points of view was perceived to “make the final solutions stronger.”

In these organizations, hierarchy seemed to matter less in decision-making than in organizations that did not formally adopt design

thinking. A collaborative approach to research and consultation was favoured. This also appears to be positively correlated with the belief held by respondents that end projects and accompanying outcomes were focused on the needs of users.

Respondents from organizations that had formally adopted design thinking echoed language within the questionnaire such as “ambiguity” and “complexity” when describing problems. Respondents from these organizations also recognized “trust” and “safe space” as important characteristics within their organizations. They felt comfortable contributing and being creative because the risk of contributing would lower as the trust increased in their respective organizations. This supports the research by Carlgren, Rauth, and Elmquist that a non-judgemental and an open environment are important precursors to the mindset themes and behavioural practices associated with design thinking (Carlgren, Rauth, & Elquist, 2016, p. 50).

Respondents from organizations that had formally adopted design thinking seemed to value and communicate the importance of the Experimentation mindset theme. However, there was still hesitation around the behavioural practices associated with Experimentation, especially among consultants that worked with clients that had not formally adopted a design thinking culture and were “paying for time” or “[didn’t] have money for play.”

In these organizations, respondents had a bias toward making problems, ideas, and solutions visual through mapping, sketching, and other Visualization techniques. This affirms the body of research about design thinking methodology that suggests Visualization positively correlates with a stronger practice of navigating complexity and ambiguity (Carlgren, Rauth, & Elmquist, 2016, p. 47 and Buchanan, 1992, p. 9).

The differences between data reported by individuals from organizations that have adopted design thinking and organizations that have not adopted design thinking highlight organizational adoption as a key driver of successful design thinking application. This is discussed in more detail in Chapter 6: Discussion.

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## **On Individuals**

In sorting data by individual responses and looking for connections, a number of important patterns emerged.

## Self Evaluation of Mindset Themes

Respondents were asked to evaluate themselves, their teams, and their organizations in each of the mindset themes. On average, they rated themselves (3.96 on average, across all mindset themes) higher than their teams (3.67 on average, across all mindset themes) and rated themselves and their teams higher than their organizations (3.49 on average, across all mindset themes). The greatest differences between the rating individuals gave themselves, and their teams were found in Experimentation (10% difference), User Focus (9%), and Problem Framing (8%). There was less than a 5% difference between the rating respondents gave themselves and the ratings they gave their teams for Visualization, Diversity, and Process Wayfinding.

### Individuals Inside and Outside of Organizations That Have Adopted Design Thinking

Further analysis was done to understand how respondents from organizations that had formally adopted design thinking rated their individual, team, and organizational competency related to the mindset themes as compared to

respondents from organizations that had not formally adopted design thinking. The greatest difference in scores was in the Experimentation and User Focus mindset themes. Here, individuals whose organizations had not formally adopted design thinking rated their individual competency significantly higher than their organization's (17% higher for User Focus, and 20% higher for Experimentation) as compared to respondents from organizations where design thinking had been formally adopted (9% and 10% differences respectively).

Respondents that had received design thinking training had similar self scores related to the mindset themes as did respondents who had not received formal design thinking training. However, when examining the behavioural practice scores related to each mindset theme between these two groups, there were moderately higher scores amongst respondents that had received formal design thinking training. The largest differences were within behaviours coded to and associated with the User Focus and Visualization mindset themes.

## Understanding Motivations

The qualitative responses provide further evidence of the differences between how individuals working in organizations that had formally adopted design thinking differed from individuals working in organizations that had not. In order to understand these differences, the qualitative responses attached to the mindset themes were analyzed separately for organizations that had adopted design thinking and organizations that had not.

In organizations that had not formally adopted design thinking, User Focus seemed to be valued for its utilitarian outcomes. The value of User Focus was important in these situations because of how it enabled organizations to drive particular results-oriented outcomes. One respondent that worked in banking said that, “we have to understand our customer to make a compelling pitch”. Another respondent that also worked in banking suggested that User Focus was important but that it was “not a driving force”. A respondent from a consulting firm suggested that “pleasing the user through an outcome can secure repeat business” and was important “for

maintaining competitive advantage”. In these instances, focusing on the user was important insofar as it generated a positive reaction or feedback loop from the user. This is consistent with the critique of design thinking that frames the recent suboptimization of the process as a way to simply drive commercial outcomes (Nussbaum, 2011). Comparatively, individuals that had formal training in design thinking saw User Focus as “a key ingredient” to the overall culture of their organizations. These organizations suffered in the areas of User Focus, Diversity, and Problem Framing due to “budget constraints” and “logistical challenges [that are] prioritized over engaging in deeper consultative processes.”

## A Lack of Self Awareness

There are varying correlations between respondents' self scores related to the mindset themes and their scores on actual behaviours associated with each mindset theme. The majority of respondents rated their individual capacity for User Focus, Experimentation, and Visualization themes higher than their practice of the behaviours associated with that theme. Conversely, the vast majority of respondents (77%) demonstrated behaviours related to Process Wayfinding that was stronger than their self score rating related to the mindset theme. Though to a lesser degree, respondents' average scores related to the behaviours associated with Problem Framing and Diversity were also stronger than their self scores in these areas.

These discrepancies seem to indicate a lack of self-awareness between a respondent's self-assessed strengths and weaknesses and their practice of the associated behaviours. This presents a major impediment for design thinking individuals, teams, and organizations looking to understand which competencies are in need of the greatest development.

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1. Introduction
2. Literature Review
3. Research Questions
4. Methodology
5. Description of Results
  - Interpreting the Data
    - On Organizations and Teams
    - On Individuals
  - ▶ On Core Competencies and Mindset Themes
    - On Tooling Up
6. Discussion
7. Conclusion

Read

Unread

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# On Core Competencies and Mindset Themes

## General Observations

### Across the Mindset Themes

The focus of the analysis shifted to the patterns present in the responses to the behavioural practices. Through this work, a variety of correlations and relationships were illuminated.

### Identifying the Correlations Amongst Mindset Themes

A noticeable correlation exists between the behavioural practices associated with Problem Framing and Diversity ( $r=.63$ ), and between Diversity and User Focus ( $r=0.66$ ). Similarly, a strong correlation exists between the Process Wayfinding behavioural practices and Problem Framing ( $r=0.54$ ), Diversity ( $r=0.56$ ), and User Focus ( $r=0.57$ ).

There also appears to be a correlation between Problem Framing and User Focus ( $r=0.47$ ), between User Focus and Experimentation ( $r=0.52$ ), and between Experimentation and Diversity ( $r=0.48$ ). The first six correlations are represented in *Figure 7. Map of mindset relationships*. The last two correlations are not shown in the figure. When they were present, they formed an additional triangle connection Diversity, User Focus, and Experimentation.

They were later removed to simplify the figure since few (if any) respondents scored high in Experimentation—especially relative to their scores in other areas. Visualization did not have a correlation coefficient as high as 0.47 with any mindset, nor did respondents score high in Visualization—especially relative to their other scores.

### Understanding the Relationships Between the Core Competencies

These data enabled us to better understand and respond directly to the research question regarding the core competencies of design thinking and the relationships between these competencies. It appears as though Problem Framing, Diversity and User Focus are three “core competencies” with Process Wayfinding—as the most correlated competency of the four—keeping these three core competencies in balance. Identified in both the quantitative and qualitative data, Process Wayfinding is central to navigating complexity and appears to play an anchoring function. A disproportionate number of respondents that identify

	User Focus	Problem Framing	Visualization	Experimentation	Diversity	Process Wayfinding
User Focus	1.0	<b>0.471</b>	0.316	<b>0.592</b>	<b>0.658</b>	<b>0.566</b>
Problem Framing		1.0	0.233	0.427	<b>0.629</b>	<b>0.536</b>
Visualization			1.0	0.427	0.366	0.233
Experimentation				1.0	0.476	0.343
Diversity					1.0	<b>0.559</b>
Process Wayfinding						1.0

Table 1. Behavioural practice correlation matrix.

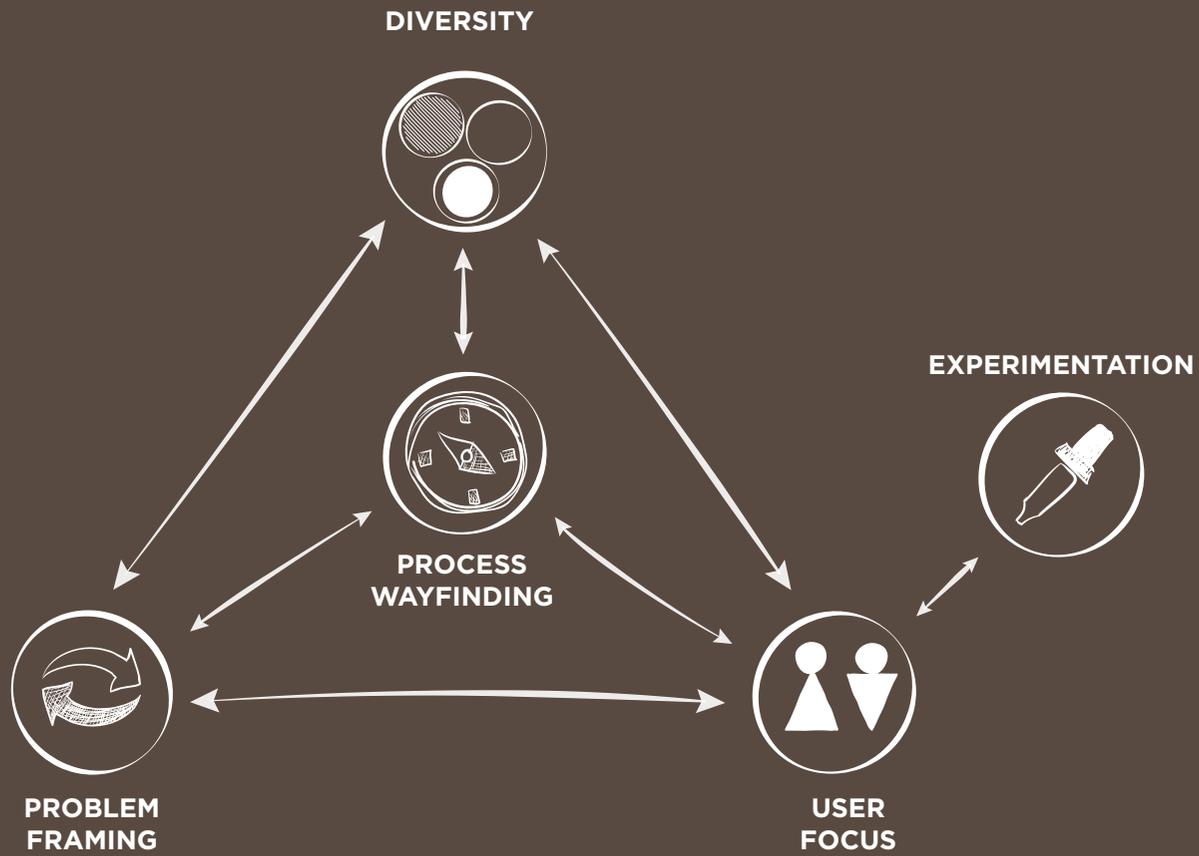


Figure 7. Map of mindset relationships.

as ‘designers’ report high scores in the Process Wayfinding behavioural practices.

Experimentation and Visualization appear to be more peripheral competencies according to the data collected from respondents. The qualitative data indicate that respondents understand the importance of these mindset themes—however, they consistently report low scores in the corresponding behavioural practices. Though Experimentation was found to be correlated with User Focus, neither Experimentation nor Visualization have any other strong correlation to any of the other mindset themes. That is, the few respondents that rated themselves highly in either of these mindset themes rated themselves relatively low or average in the other areas.

### **Action Orientation as a New Mindset Theme**

There is, however, a relationship between respondents that ranked highly in Visualization and respondents that ranked highly in Experimentation ( $r=0.43$ ). When we collapsed the data from these two behavioural practices and compared it as one distinct

	User Focus	Problem Framing	Action Bias	Diversity	Process Wayfinding
User Focus	1.0	<b>0.471</b>	0.458	<b>0.658</b>	<b>0.566</b>
Problem Framing		1.0	0.381	<b>0.629</b>	<b>0.536</b>
Action Bias			1.0	<b>0.472</b>	0.347
Diversity				1.0	<b>0.559</b>
Process Wayfinding					1.0

*Table 2.* Correlation matrix including action bias.

subset, there is little evidence that individuals in the amalgamated mindset theme correlate with any behavioural practice except User Focus. Correspondingly, respondents that ranked highly in any of the other behavioural practices (except User Focus) were consistently under-developed in the behaviours associated the new amalgamated mindset theme. This collapsed subset was renamed to “Action Orientation” as both mindset themes displayed behaviours—according to Carlgren, Rauth, and Elmquist—associated with action, play, and “thinking through doing” (2016). Similarly, the behavioural questions posed to respondents focused on making, creating, mapping, experimenting, and prototyping, which further support the collapse of these behavioural practices.

### **Mapping the Respondents Against the Core Competencies**

As a method for better understanding how individual respondents exist within the system of mindset theme relationships, all respondents (n=70) were placed on the Mindset Relationship map. Using their relative scores related to the behavioural practices, individuals seemed to gravitate towards distinct areas on the mindset relationship map. This is shown in *Figure 8*. Mindset relationship heat map.

Six distinct profiles emerged out of this heat mapping exercise that are helpful in understanding the key behaviors associated with design thinking teams. These behavioural profiles are explored in more depth in Chapter 6 under the heading “Behavioural Profiles of a Design Thinking Team”.

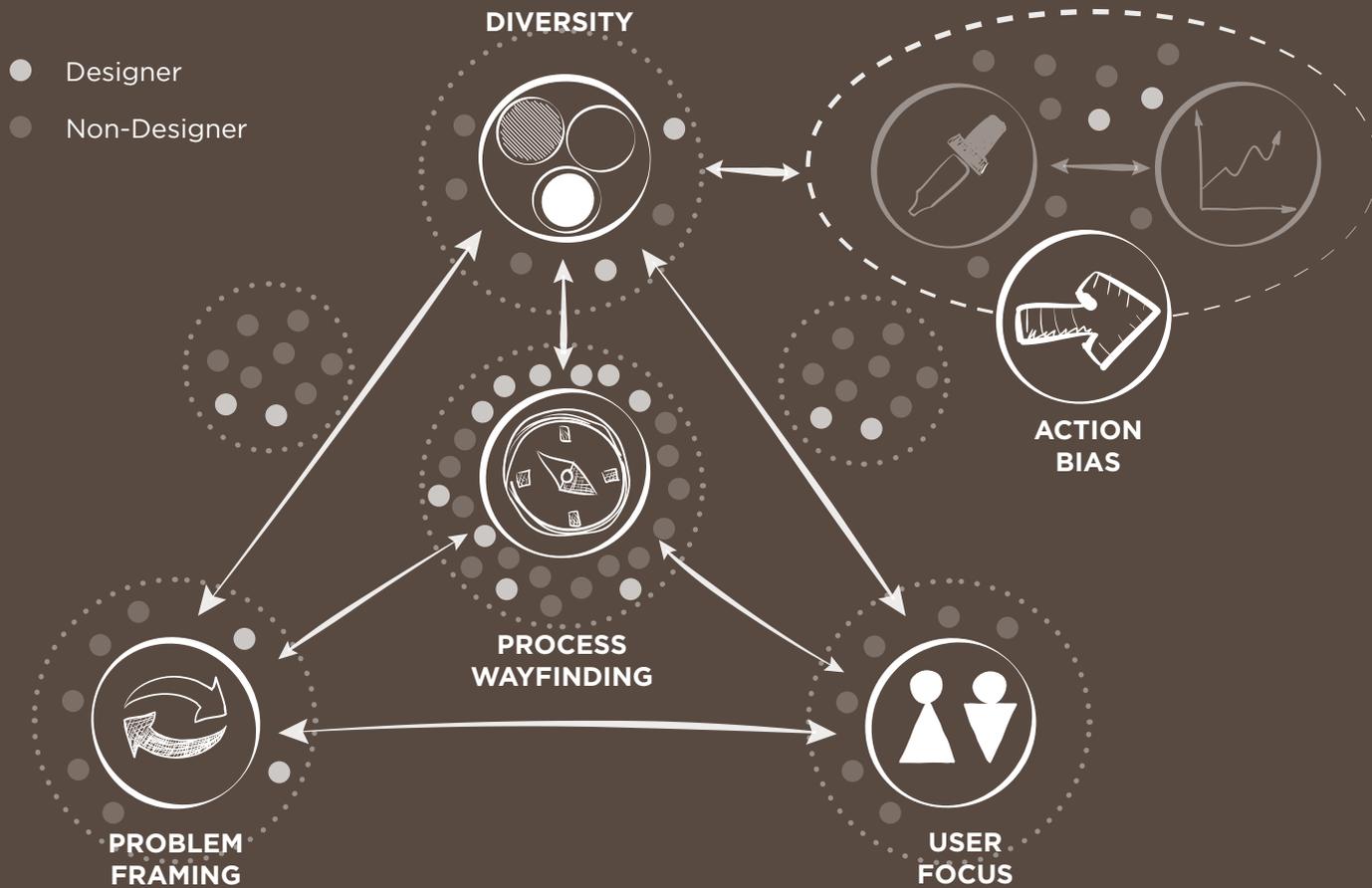


Figure 8. Mindset relationship heat map.

### Observations Specific to Each Mindset Theme

An important part of the research conducted was to validate the mindset themes proposed by Carlgren, Rauth, and Elmquist as a preliminary step to developing an instrument that may be used by individuals, teams, and organizations to benchmark their practices and improve their relative performance in key areas. Part of this validation is understanding how individual respondents perceived the mindset themes and associated practices.

Across the entire dataset, there is a clear recognition that all six mindset themes associated with design thinking are important in doing successful work, carrying out project implementation, and getting to the desired outcomes. This is supported by the quantitative data as well as the qualitative responses from respondents. These data are outlined below and grouped by mindset theme.

### User Focus Mindset Theme

Participants in the online questionnaire reported that the User Focus mindset theme is extremely important to their work, even if their teams or organizations do not see it as a priority. They said it isn't encouraged enough (or that their colleagues don't pay enough attention to the needs of users).

*“Incredibly important and is always what we come back to in all projects.”*

Participants said that User Focus is key to success, and has a strong impact on outcomes. Users are the reason the organizations exist. User Focus is—or at least ought to be—the main goal.

*“It's important to always remember why you started, especially when working in teams as I believe it can be easy to become derailed and lose focus on the end outcome.”*

Participants suggested that understanding the experiences of their users helps them deliver on outcomes. It supports them in building a product, service, or program that will actually work for the user.

*“Very important. Balancing the needs against desires of our clients continuously frames our objectives and animates new strategies towards achieving desired outcomes.”*

Participants even touched on User Focus as the focus of the sales process. Sales depend on understanding the needs of prospective clients. This ability is also in and of itself a selling feature—clients and partners are interested in working with organizations that do a good job at focusing on the needs of users.

*“Tailoring the service to them helps us win new work and secure repeat work.”*

Participants elaborated on the topic of User Focus and went on to explain that it isn't always the end user on whom they need to focus. Sometimes they don't work directly with the end user of a product, service, or program. Instead, they need to understand the impact of their work on all users.

*“We aren't directly working with users, but we have to take into account every possible persons' needs.”*

Some participants said User Focus isn't a driving factor for their team or organization. They cited a lack of leadership at the organization level and personal agendas at the team level as reasons why. At the same time, they recognized the need to focus on real needs of users, instead of the assumptions they make as an organization or industry.

### **Problem Framing Mindset Theme**

Participants reported Problem Framing as critical to success. Participants point to the fact that a solid understanding of the problem is very important for achieving the ultimate outcomes set out by an individual, team, or organization.

*“Problem Framing is the most important part of doing design work. If we don’t know what we are looking to solve (or make better), it is harder to make an impact and create change.”*

Participants listed being open to change, being flexible in their approach, and developing a solution that can be adapted as key elements of Problem Framing. These enable them to grasp the ambiguity of a complex problem or project.

*“When dealing with mostly people, you always have to be open to unexpected changes on your*

*course, and sit with the ambiguity and comfort that what you create now, may need to be tweaked or radically changed as you learn more. So we have to create complex, adaptable solutions to those big problems.”*

Participants said that the ability to comprehend complexity is very important in their work, since the problems they are working on are rarely simple. Their work involves complex relationships spanning large networks of both people and problems.

*“Because my work is about creating programs and supports for the end user, it is crucial to remain open to change and to work hard to comprehend the complexity of the user’s desires and needs.”*



Participants suggested Problem Framing is important to understand where to focus, but that sometimes the real problem is out of their hands. Sometimes participants have to reframe the problem to match what is feasible for their team or organization.

*“Essential. We often have to come up with creative solutions as sometimes what the client wants we are unable to do.”*

There can also be a difference in opinion of what the objectives of the work ought to be. In this vein, participants stressed the importance of Diversity when attempting to frame a problem. A third-party perspective is often needed to shine a light on the problem area.

### Visualization Mindset Theme

Participants said the Visualization mindset theme was fundamental in supporting them and their team to make sense of complexity. Visualization helps them communicate complex ideas and insights so that the entire team is on the same page. Participants noted it is hard for colleagues and users to understand what they can't see.

*“Visualization of ideas is extremely important. It is difficult for people to understand things that they can not see.”*

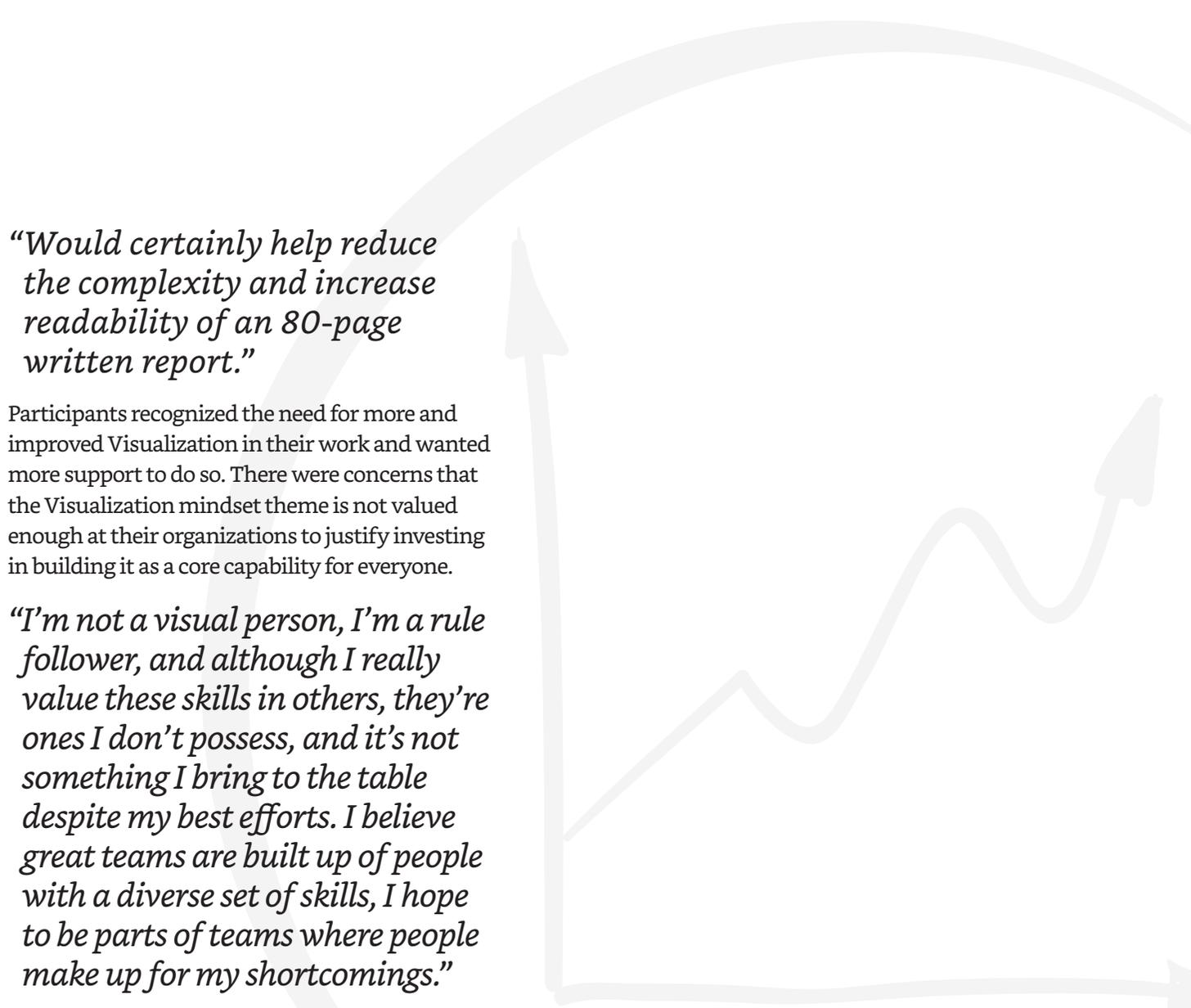
Participants said Visualization improves their communication of both the “what” and the “how” of their idea. It helps them empathize with others and helps them get others to empathize with them. Visualization effectively offers new and different kinds of context that written and oral communication cannot.

*“It’s very important as software doesn’t exist (ever) in a tangible form. It requires abstraction to discuss and models on comparative approaches or previous development.”*

Participants suggested that this improved communication leads to far better outcomes for their work. Participants quoted both the length of the project and the overall impact of the work as two ways they see Visualization accomplish this.

*“Important to have/develop a shared understanding, of the concepts in question, throughout the process.”*

Participants also said they see a lot of improvement in how they use Visualization—especially at the team level. At the same time, participants added that the nature of the work (e.g. the format of a report) tied their hands in terms of what is and isn't possible.



*“Would certainly help reduce the complexity and increase readability of an 80-page written report.”*

Participants recognized the need for more and improved Visualization in their work and wanted more support to do so. There were concerns that the Visualization mindset theme is not valued enough at their organizations to justify investing in building it as a core capability for everyone.

*“I’m not a visual person, I’m a rule follower, and although I really value these skills in others, they’re ones I don’t possess, and it’s not something I bring to the table despite my best efforts. I believe great teams are built up of people with a diverse set of skills, I hope to be parts of teams where people make up for my shortcomings.”*

### Experimentation Mindset Theme

Participants believed the Experimentation mindset theme to be very key in finding the best way forward. Experimentation is what enables them to explore the viability of a range of options to find the solution that benefits the user the most.

*“Experimenting is when the magic happens.”*

*“Iteration is also very important. testing ideas and seeing how they would play out before making a decision makes the decision stronger.”*

*“Very important...the work changes considerably as we learn from different iterations.”*

Participants went on to include the value of Experimentation in leveraging Diversity. It is through building many iterations of a solu-

tion that participants are able to combine and extend ideas from a range of stakeholders.

*“I need to be able to try out different ideas because of the diversity of my audience. No one solution fits all.*

*Experimentation is useful in familiarizing myself with the audience’s likes and dislikes.”*

*“Testing and evaluation help us get to where we need to be in terms of outputs. In my work, I need to understand how the user experiences things and their feedback has a huge impact on the project itself.”*

Participants said that they have difficulty working in this way for projects with demanding timelines. They said it takes time to truly diverge and converge through many iterations, so they end up experimenting around a pro-

posed solution, instead of building a solution up over multiple rounds of feedback.

*“Would be a good way to challenge the status quo; difficult to get the team on board with divergent thinking under stress and with multiple deliverables due.”*

*“We do the iteration part quite well. I think we need to work on implementing the feedback from one design cycle into the next.”*

Participants also suggested that Experimentation is an exception to the rule, as opposed to being a rule itself. They said this is particularly true at the team level, or for projects that organizations must outline each step up front in order to successfully win the bid for the work.

*“Clients don’t pay for Experimentation, they want answers, and they want them fast.”*

### Diversity Mindset Theme

Participants were very clear when it came to the importance of Diversity. The ability to seek and understand multiple perspectives through consultation and engagement activities is vital. This goes hand in hand with the User Focus mindset theme.

*“As a young professional (and likely as a millennial) it took me some time to realize that my way wasn’t always the best way. I now understand that everyone has an opinion on the way something should be approached or solved.”*

*“Our client is often the City or Province, so every decision is a balance between the desires of different departments and jurisdictions, so it often comes*

*to us to be the middle-man between all these conflicting desires and find a way to satisfy everybody and move the project design forward.”*

Participants said that this mindset theme has a direct impact on outcomes. The more Diversity in the process, the stronger and more impactful the solution would be. This is true for outcomes at all levels of the organization.

*“This has a direct impact on the outcomes. It isn’t necessarily a mandated approach, but it is the right one for us because we’re getting insight and holistic collaboration from the get-go.”*

Participants suggested Diversity leads to a more ambiguous process. They said that it was through this ambiguity that impactful solutions became obvious and that working in this way leads to a more holistic view of the problem and solution.

*“This is extremely important in the work that I do as it enables the design of user supports that take into consideration the variety of users and their needs.”*

*“It’s important to me to approach everything in a consultative way because that’s when we find the best most whole solutions.”*

Participants said that this mindset theme is or ought to be ingrained in the entire culture of the organization. It helps get buy in from their colleagues and users, even if it is not always possible to validate every single opinion.

*“We have to always be conscious and aware of different cultures and ideas.”*

Participants also had difficulty with the Diversity mindset theme. They said it is not easy work-

ing with groups with many different ideologies. Sometimes hierarchy trumps the best, most inclusive way forward. If they can get it right, however, it leads to a strong, integrated team.

*“This is hard for everyone. You have to remove your ego and your idea of what ‘the solution’ is from the work in order to let the varied voices and perspectives surface the solution. This takes patience and trust that the process will work.”*

### Process Wayfinding Mindset Theme

Participants said the Process Wayfinding mindset theme is possibly the most important one. It is the mindset theme that holds all of the other mindset themes in balance. They said that it enables you to leverage all of the tools and methodologies that exist for doing their work.

*“Design isn’t a linear process—having multiple methodologies to solve problems is important.”*

*“As for my organization, it goes back to the big ship. I think we’re doing what we can in the best way we can, but it’s hard. There’s a lot of people with a lot of problems with a lot of competing ideas.”*

Participants agreed that Process Wayfinding has a large impact on project outcomes. Not only does it support teams in reaching their desired outcomes, but participants also stated that getting it wrong can have a significant negative impact on outcomes.

*“Personally, facilitation is key to keep my process on track. It contributes to outcomes inasmuch as it provides focus in the moment and a map of the process after the fact.”*

*“Very important. If we did this better, we might stop spinning in one area and get to better outcomes. This is typically an area that contributes to negative project outcomes if we don’t do it well.”*

Participants did admit that developing their own capacity for Process Wayfinding hasn’t been easy. Some participants struggled with articulating the need for it, while others don’t believe their organizations will ever go for it.

*“I wish we practiced facilitation and other collaborative*

*techniques more regularly as an integrated way of functioning.”*

*“I work with people who are too nice. They’d rather give up on something than deliberate.”*

Participants also touched on the increasing importance of Process Wayfinding as the size and complexity of the project grew. While smaller organizations saw the need for it for managing the work internally, participants from larger organizations were particularly interested in having strong process wayfinders to support them in collaborating with others on large projects.

*“Most of our projects are quite complex, often with unclear objectives, multiple stakeholders, and multiple partners. They... require lots of engagement and collaboration with other consulting firms or stakeholders.”*

Participants pointed out that the Process Wayfinding mindset theme isn’t always about finding the most efficient path forward. Participants said that while be effective at making progress towards the outcome of the project is important, they must balance the need to embrace ambiguity and let their colleagues meander a little bit.

*“Sometimes I think I’m really great at process and sometimes not. I think that the team I work with does an excellent job of figuring out how to get to interesting places with the process—it’s not always as direct as I would like to be, and can feel a bit fat as far as process goes, but we get to good insights. I think we could still work on getting leaner and trusting ourselves more as designers.”*

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## On Tooling Up

The design probe research method asked participants to use a tool for a week or so and then reflect on their experience. The goal was to understand how individuals might use a tool to improve their capacity for design thinking within a given mindset theme. Each mindset theme was assigned a tool:

- User Focus Tool—Empathy map
- Problem Framing Tool—Five whys
- Visualization Tool—Sketching
- Experimentation Tool—Ideation
- Diversity Tool—Dot vote
- Process Wayfinding Tool—Facilitation

We asked participants to use the particular tool and reflect on their experience. All participants rated the tool they were given as helpful (or very helpful) and saw potential in the tool for future use in their practice. The qualitative responses received suggest that as participants struggled with the newness and ambiguity inherent in the use of the tools, they grew more comfortable as they moved through the process. The initial hesitation of participants was countered with comments

# My SKETCHING EXPERIENCE

I'd say it's more **DOODLING...**  
not so much SKETCHING.

1 How helpful did you find the tool?

**VERY HELPFUL**

3 What **INSIGHTS** did you gain by using this tool?

People ♥ what I communicate

It is easier to talk and point to stuff

It is a form of sense-making

WOW! AMAZING



= CLARITY



INSIGHT TOO!

2 What stood out to you while using this tool?



HELPED ME LISTEN BETTER

HELPED ME SEE CONNECTIONS I DIDN'T KNOW WERE THERE

I CAN BE CREATIVE EVEN IF I DON'T DRAW GREAT

IT HAS SHOWN ME + GIVEN ME CREATIVE CONFIDENCE

IT FORCED ME TO SYNTHESIZE BETTER

IT HELPS ME KNOW WERE THERE

IT'S FUN

IT FORCED ME TO SYNTHESIZE ON THE FLY + CUT OUT THE CLUTTER

IT HELPS ME COMMUNICATE MY THINKING WITH OTHERS

IT'S FUN

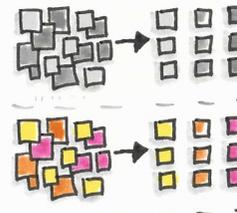
IT FORCED ME TO FOCUS ON PROGRESS, NOT PERFECTION.



4 How did it help and/or hinder your progress/work?

HELPED ME SORT THROUGH COMPLEX INFORMATION

HELPED ME CLARIFY MY OWN THOUGHTS



HELPED ME WORK **FASTER**

MY OWN DESIRE TO BE 'EXCELLENT' AT DRAWING INITIALLY HINDERED MY DESIRE TO SHARE MY WORK



5 Any other comments?

**JUST TRY IT!**

Figure 9. My sketching experience. Visualization of responses to the reflection questions from a design probe participant.

in their closing reflection like “this helps to ensure you are planning the conversation that you *want* to have”.

In each case, participants had to utilize a degree of Process Wayfinding to facilitate and guide themselves through the process of engaging with the tools.

When using the tool for the first time, participants felt a little uneasy. Despite a lot of ambiguity in the process, participants still felt as though they were able to get to meaningful outcomes. For example, the Experimentation tool felt slow at first, but ended up quickly highlighting new areas of focus and other areas that weren’t worth further exploration. The Process Wayfinding tool received similar comments: “it can all loop around but in the end provide you with a [strong plan]”. As did the Problem Framing tool: “going through the exercise helped me gain a new level of understanding of the problem I was working on and honestly took me somewhere within the problem space I did not expect to land at the onset of the exercise.”

Participants even saw opportunities for using these tools on an ongoing basis. For example, the participant that used the Problem Framing tool noted “at the time of using the tool I already had an in-depth understanding of the problem... However, had I done this exercise at the onset of the project I think I would have found the results of the exercise much more meaningful as it would have truly deepened my understanding of the problem.” Without additional context or training, however, participants weren’t always clear on what the immediate next steps might be: “what’s the next step? I need a clause that says ‘It’s okay, you don’t have to follow through with all of these ideas, and you don’t have to do it now’”.

In all cases, participants recognized the power of the tool to improve their capacity for a given mindset theme. This research method provided deep insights into how individuals may improve their capacity for design thinking. The implications of this research are discussed in a few places in the next chapter.





DISCUSSION



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## Chapter 6

# Discussion

*“It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things.”*

*Niccolò Machiavelli (1513)*

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## Imagining the Change

In the discussion that follows, we examine the importance and applicability of our research to organizations, teams, and individuals looking to apply design thinking. We illuminate some of the barriers and challenges organizations might face when implementing design thinking and introduce a framework and tool that will help organizations to think about and overcome the various challenges they face in becoming complex capable.

We also discuss the important role that individuals play in this implementation, as well as the kinds of support, coaching, and mindsets that may make them more successful. We introduce a theoretical framework as well as a series of design thinking behavioural profiles—archetypes that capture the essence of how clusters of respondents behave and prefer to approach their work.

Finally, we identify a series of next steps associated with our research and how we might advance the creation of a design thinking instrument that could enable organizations, teams, and individuals to enhance their understanding of strengths and opportunities for further development.

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## Creating Purpose-Driven Organizations

As organizations look to evolve and develop their capacity for design, their focus shifts. Traditional organizations focus on meeting targets and driving short-term outcomes. Our research suggests design thinking organizations tend to align themselves with purposeful, holistic approaches to become complex-capable. To support organizations making this transition, our research helps to frame the challenges they currently face, frame the change required of them, and frame the necessary tools that give agency to management and teams. These are discussed in terms of the obstacles organizations face when implementing design, the complex systems they must navigate in order to realize change, and the specific tools that can help them move toward a more resilient future.

## The Obstacles Organizations and Teams Face

Across both our survey and design probe research methods, respondents consistently highlighted obstacles and barriers—of varying degrees of importance—for organizations implementing design thinking. These include the influence of an individual, a lack of understanding of the mindset themes, and a fear of failure. We used the Change Formula adapted by Beckhard and Harris (1977) as a model to understand the obstacles and opportunities that organizations may face when looking to apply design thinking. The 1977 model—which Beckhard and Harris attribute to David Gleicher at Arthur D. Little Management Consulting firm—suggests that in order for an organization to change, the following must be true:

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<b>Organizational Dissatisfaction</b>	x	<b>Vision for Change</b>	x	<b>Ability to Take Action Toward the Change</b>	>	<b>Resistance to Proposed Change</b>
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In our analysis, we applied Beckhard and Harris' Change Formula to frame the overwhelming resistance to implementing design thinking that appears to exist in classical organizations:

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<b>Managers Have Won in Existing Paradigm</b>	x	<b>No Vision for Better</b>	x	<b>No Tactical Action for Moving Forward</b>	>	<b>Overwhelming Resistance to Change</b>
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### Managers Have Won in the Existing Paradigm

Embedded within conventional power structures and hierarchies of organizations not practicing design thinking is a fear of personal and team conflict. Many respondents highlighted the ego of individual team members as a barrier to true collaboration—which requires

humility. In some cases, respondents suggested that their teams and organizations were so concerned with the feelings of their colleagues they avoided constructive conflict that in turn inhibited project outcomes.

Without the ability to air concerns and engage in constructive conflict upward and outward within the organization, uninformed, incorrect, and misleading conclusions are made by individuals in that they see themselves as experts in a particular subject matter area. This is further supported by the data, which suggest many organizations that have not adopted design thinking only consult users when they perceive there to be short-term commercial value in user feedback. Key decision makers operate on hunches, quantitative data, and experience to execute their strategies—often with no validation from actual users.

Other research (e.g. Nel, 2016 and Van Bavel & Packer, 2016) into team and individual performance has demonstrated that the typical management paradigm rewards individual performance over team performance and highlighted the concerns with this approach. A shift in this management paradigm is afoot in the current mainstream literature on management. In a recent article in the Harvard Business Review, Michael Schrage calls for a focus on teams where there's an imperative for work

to “go beyond the time and talents of committed individuals striving towards a desired outcome” (Schrage, 2015). Managers who have been awarded for individual performance in the existing paradigm are more likely to foster individualism. According to respondents from the online questionnaire, the focus on individual performance leads to personal agendas getting in the way of successful project outcomes. Decisions become politicized around accountability structures—sometimes at the expense of exceptional outcomes.

*The embedded power structures, fear of conflict, and focus on individualism inhibit an organization's ability to explore collaborative approaches to problem-solving—thereby creating a barrier to successful implementation of design thinking.*

### **No Vision of Better**

The next major barrier reported by respondents stems from a lack of understanding—both about the six mindset themes as well as how they are applied. For each of the six mindset themes, respondents commented that there was a lack of understanding or a lack of interest related to developing the mindsets as a core competency. Though there may be pockets of the mindset themes being practiced within the organization, the perceived return on investment of systematically developing the mindset themes across the organization is not apparent at a leadership level.

There were also many responses that pointed to organizations that don't have knowledge, comfort, or experience across the mindset themes—for example, in engaging their stakeholders. Some respondents suggested they don't work with the end user or customer directly, or that the format of documents and proposals tie their hands in terms of what they can do. Embracing a new approach without a clear indication of the individual competencies and organizational capabilities required to sustain a shift in paradigm is a potentially

frightening prospect for managers. Managers and leadership need to see the quantifiable value associated with implementing design within the organization in order to feel compelled to do so. The research in design pointed to a series of tools and instruments that enabled organizations to see their relative design maturity. Many examples of such tools—the Design Maturity Matrix and Design Value Map (The Value of Design)—assess organizations on their capabilities related to design and attempt to make explicit the 'gains' that may be experienced by implementing design. The tools, developed by the Design Management Institute, are intended to help organizations see the opportunities embedded in design (Ibid).

*Individuals and teams don't feel they have the agency to explore and implement a new collaborative approach to problem-solving. Management and leadership are stuck in a management paradigm that discourages risks without clear payoffs.*

### **No Clear Tactical Actions for Moving Forward**

The last barrier revolves around a fear of failure. This is persistent at all levels of the organization. Individuals and teams are afraid of experimentation because experimentation presents an opportunity for and/or the perception of failure. Instead, the organization sets up an expectation of getting it right the first time. Respondents reported feeling that the return on investment diminished with every round of experimentation.

Not surprisingly, respondents also suggested the management team at their organizations were cautious in how they explored new ways of working, especially when these activities might represent a major shift away from the current way of doing things. After all, the success and progress seen by these managers typically occurred within the existing, dominant paradigm.

Design is about the learning and feedback that comes from iteration and experimentation. This is fundamentally at odds with the traditional management paradigm which attempts

### **A New Order of Things**

“It must be considered that there is nothing more difficult to carry out, nor more doubtful of success, nor more dangerous to handle, than to initiate a new order of things. For the reformer has enemies in all those who profit by the old order, and only lukewarm defenders in all those who would profit by the new order, this lukewarmness arising partly from fear of their adversaries, who have the laws in their favour; and partly from the incredulity of mankind, who do not truly believe in anything new until they have had the actual experience of it.”

— Niccolò Machiavelli, 1513  
(in Machiavelli, 1950, p. 21)

to engineer out error, imperfection, and variation as the great perils of organizational life. Leandro Herrero acknowledges this in his *Nine Basic Contradictions in organizational life. Ignore at your Peril* (2015): “to be effective, we are expected to create and sustain predictable, repeatable, reliable, and reproducible processes. But innovation requires ‘unpredictable answers’, a ‘beta state’, and restless and unstable processes” (Herrero, 2015). The desire to engineer predictability in organizational life is fundamentally at odds with the restless experimentation and learning required to sustain innovation and change. This tension bears great influence on an organization’s reluctance to embrace a design perspective.

*The ultimate outcome of this fear of failure is a lack of leadership or, at the very least, a lack of an internal champion for exploring and moving towards a more collaborative approach to solving problems.*

### **The Result is an Overwhelming Resistance to Change**

Compared to the relatively low levels of dissatisfaction, vision, and tactical actions for moving forward, the resistance to change—in the organizations respondents work for—would appear to be quite high.

The literature review highlighted that both the organizations looking to use design thinking and the consultants supporting them have in many cases suboptimized design thinking to meet their needs, engineering complexity out of the process (Nussbaum, 2011). Many organizations that have been exposed to design thinking have seen the “what” of design thinking—in terms of the tools and processes it uses and the outputs it creates—but have not seen the “how” of design thinking—in terms of the way tools, processes, outputs, and impacts are all connected.

These organizations see design thinking as a toolkit to be applied to particular problems with clear boundaries—instead of a new, different, and transformative way of working as

an organization. The result is a set of organizations that have relatively low levels of design maturity. These organizations develop an active disinterest in exploring and implementing design thinking.

*In response to this, we are advocating for the supraoptimization of design thinking—a change that would signal an intentional shift toward complex, sociocultural systems with design at their core.*

## Overcoming the Obstacles to Change

### The Dual Paradigm Shift

To understand how organizations can overcome their obstacles to change, it is important to articulate the fundamental shift design thinking represents. In his book, *Systems thinking: Managing chaos and complexity: A platform for designing business architecture*, Jamshid Gharajedaghi argues that organizations must adapt to a dual paradigm shift in order to stay relevant (Gharajedaghi, 2011). According to Gharajedaghi, classical organizations struggle to respond to one or both of the two paradigm shifts—moving from mechanical to sociocultural systems and moving from analytical to holistic thinking (Ibid, p.8).

In his book, Gharajedaghi argues that classical organizations are designed to be mindless, mechanical systems (Ibid, p. 10). The organization is designed to take a set of stable inputs and use consistent, incrementally innovative processes to produce a consistent desired output. The nature of organizational life is mindless by design—shifting first toward becoming uni-minded, biological systems and finally toward becoming multi-minded, sociocultural systems (Ibid, p. 9–13). Successful organizations must support their members to work in new, complex ways towards a common objective or set of objectives.

Approach	Mindless System (Mechanical)	Multi-Minded System (Sociocultural)
<b>Analytical (Independent Variables)</b>	Existing organizational paradigm	Singular paradigm shift in nature of organization
<b>System (Interdependent Variables)</b>	Singular paradigm shift in nature of inquiry	Dual paradigm shift

Figure 10. Dual paradigm shift. Adapted from Gharajedaghi (2011, p. 9).

Organizations—and the variables they are based on—have historically been considered independent of one another. Analytical thinking was a useful way of understanding how the organization and each piece of it ought to operate. To work in complex and chaotic environments, it is vital that organizations challenge the assumptions they have about how they work. Organizations must shift from analytic thinking to system thinking. Gharajedaghi goes on to argue that failure to articulate this shift can lead to a strong resistance to change (Ibid, p. 9).

In order to successfully navigate these shifts now and into the future, organizations can use design to support their members to handle complexity. Gharajedaghi believes “development is the enhancement of the capacity to choose; design is a vehicle for enhancement of choice and holistic thinking” (Ibid, p. 23). In order to be effective, however, design can not be a superficial, suboptimized process. Design must be embedded deep within the culture and structure of the organization.

### **The Design Strategy Map: Embedding Design Within the Organization**

Robert Kaplan and David Norton introduced the concept of a Strategy Map in their 2011 book, *The Strategy-Focused Organization*. The Strategy Map extends Kaplan's and Norton's work on the Balanced Scorecard—first introduced as a tool to enable organizations to visualize how they create value. The Strategy Map contains four key areas: financial perspective, customer perspective, internal perspective, and learning and growth perspective. Organizations use the Balanced Scorecard framework and Strategy Map to capture, articulate, and connect their strategies for creating value (Kaplan, 2011).

As found in the literature review (Ehn, 1988 and Junginger, 2009) and in several of the data reported by respondents to the online questionnaire, a new approach to embedding design within the organization is needed. We propose introducing a new perspective into the Strategy Map and Balanced Scorecard Framework. The Design Perspective would be a fifth key area on the Strategy Map and would be placed below the learning and

growth perspective in order to support the organization and its staff in becoming complex-capable.

Embedding design deep within the organization, and explicitly naming their strategies for developing design will support an organization in articulating and communicating the shift towards becoming design-enlightened. This approach sidesteps many of the challenges faced at the individual and team levels, giving all members of the organization agency to develop their capacity for design and the capacity of the teams within which they are embedded.

Instead of focusing on the “what” of design thinking and missing the opportunity to understand the “how” or “why”, placing the design perspective at the root of the Strategy Map forces organizations to think more holistically. It challenges them to create strategies for improving their capacity for design and develop and test hypotheses related to these strategies—and how design impacts their organization overall. Design would no longer be a question of “should we or shouldn't we?”; instead, the question would become “how might we?”.

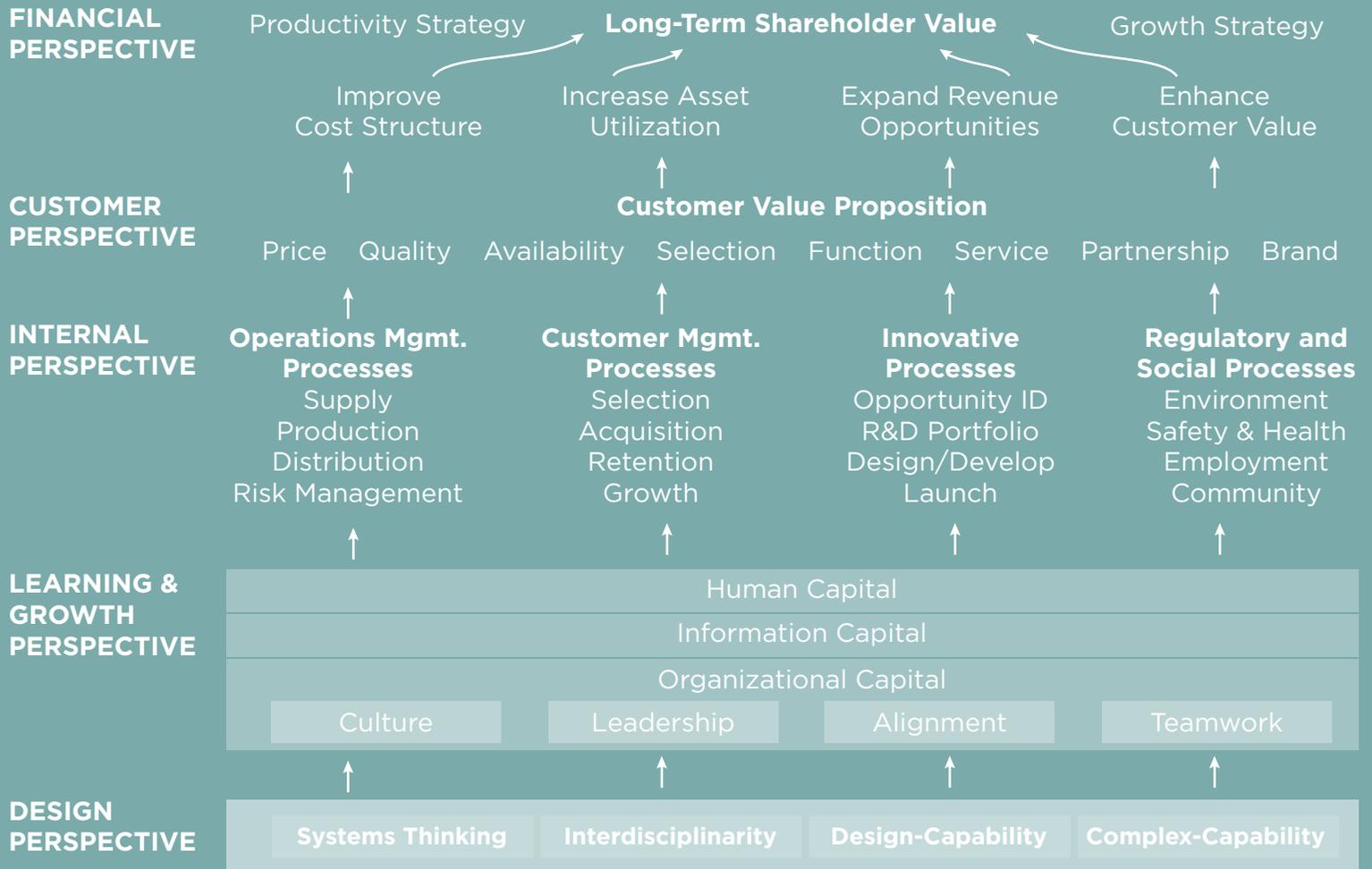


Figure 11. The design strategy map. Adapted from Kaplan and Norton (2011).

### **The Design Thinking Organization: Assessing Design Readiness**

Using the Design Strategy Map has a number of positive implications for how organizations can understand their approach to leveraging design thinking. At the same time, more research is needed to develop an instrument for better understanding if, and in what ways, an organization might embrace their capacity for design thinking. Specifically, organizations need to know the tactical and operational impact of implementing design, and what the first steps are towards a design transformation. They require a plan that starts with leadership and strategy and that scaffolds out to the tactical implementation.

Using a similar set of questions to the ones answered by participants in the Behaviours section of the online questionnaire, the leadership team of an organization could gain a better understanding of the mindset themes they are excelling at and, conversely, which themes they may want to improve upon. They may even ask their customers, partners, suppliers

and governors for their input. Doing so would give an organization a 360-degree picture of their performance across and within the core capabilities of design thinking.

More research is needed to understand how, at the organizational level, leadership might be able to improve their behaviours for a given mindset theme. It is logical to see that developing context-specific strategies for organizations—that are low in or across a given set of mindset themes—would support organizations in articulating why they need to change, the vision for how they will change, and the first steps they will need to take.

For example, an organization may be looking for a balanced score across the mindset themes in the instrument and discover after using the instrument that, on average, their organization is low in the User Focus mindset theme. The instrument could then provide insights into their results, identifying the specific facets of User Focus that need improvement, help them understand the risks of not developing in these areas, and provide a set

of customized next steps for getting started on empathizing with their end user. Embedded within this process would be the need to develop a robust understanding within the organization of how the act of building this capability would not only affect their end users, but would require change and the adaptation of their structures, their teams, and their employees' approach to work.

### Towards Supraoptimization: Creating Complex-Capable Organizations

As classical organizations have slowly given up the bureaucracy, hierarchy, and familiarity provided by Taylor (1917) and Weber (1947) over the last century and embrace diversity, and ambiguity, new systems will be required to support strategic decision making in these learning organizations (Senge, 1990). The Design Strategy Map is an important step towards creating complex-capable, learning organizations.

These systems will have to account for variations from organization to organization and from environment to environment. A promising method to distill insights from variation, borrowed from design, is identifying and leveraging the characteristics of positive deviants. These systems ought to be able to see individuals that perform better than expected across the organization, support the organization in understanding what about the individual or their environment supports their success, and how the organization might learn from the deviance.

Traditional bureaucratic organizations worked hard to weed out unpredictability and deviance. As organizations shift towards sociocul-

tural systems that use a holistic lens to view and action their work, there is a tremendous opportunity to change the underlying value structures that impact their strategic decision making. There is a critical opportunity to embed design and other philosophies deep in the organization in order to support their ability to thrive in complexity. This aligns with the work of Howard, Senova, and Melles who suggest an organization that makes a concerted effort may mature in their practice of design—moving from design as a *way of work* to design as a *way of life* (Howard, Senova, & Melles, 2015, p. 188).

### **The Power of People: Supporting Members of Complex-Capable Organizations**

The Design Strategy Map, and the broader shift towards complex-capable organizations, also impacts the members of the organization going through these transformations. Part of the justification for putting the design perspective at the foundation of the Design Strategy Map is how it supports the organization and, specifically, its members in developing a learning and growth perspective.

Design fundamentally changes how people see the world around them (Kolko, 2015). The literature highlighted the fact that designers solve problems differently. Embedded within the design process are a series of loops and feedback mechanisms that ensure learning from experimentation is captured and built upon.

In classical organizations, learning cycles are long, go through various filters (levels of management), and ultimately sit with leadership to interpret and develop strategy around. According to Martin, “most managers are trying to design variance out of the system, and cannot

handle a process which starts off not knowing where it will eventually get” (Martin, 159). In the complex-capable organization, learning happens in rapid sprints with teams interpreting and adjusting strategy in real time—based on the feedback inherent in the design process. In complex-capable organizations, management and leadership serve as obstacle-clearing structures rather than playing an approval or clearinghouse function. Strategies targeted at improving individual capacity for design necessarily support the whole organization in becoming complex-capable.

In the data analysis, respondents believed they were disempowered from developing themselves in any one of the mindset theme areas. They felt that developing a variety of skills beyond their own preferences was unnecessary because individual deficits were overcome by teammate competencies. This individualistic view creates a major impediment to teams and organizations developing their complex-capabilities. Rather, individuals need to be able to play a variety of roles in a design thinking environment.

In order to develop the capacity of individuals to play the cross section of roles required in complex-capable environments, organizations could benefit from having a framework or instrument for assessing and coaching individuals holistically. Seeing individuals as dynamic, sociocultural systems promotes a holistic view of teams where individuals develop a roster of mindset theme competencies that support adaptive, learning complex-capable organizations.

1. Introduction
2. Literature Review
3. Research Questions
4. Methodology
5. Description of Results
6. Discussion
  - Imagining the Change
  - Creating Purpose-Driven Organizations
  - ▶ People as a Driver of Change
  - Next Steps
7. Conclusion

Read

Unread

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# People As a Driver of Change

## The Need for Complex-Capable People

Organizations that embrace the dual paradigm shift and leverage the embedded possibility of the Design Strategy Map position themselves well to become design enlightened organizations. However, organizations cannot underestimate the critical role that people play in animating and realizing this enlightenment. Complex-capable individuals are an essential part of resilient teams and organizations. For organizations to be successful in responding to the complex systems they are a part of, they must create the conditions necessary for individuals and teams to succeed and thrive.

Our research would suggest that even in organizations that embrace design thinking methodologies and processes, there is still an overwhelming focus on teaching the specific tools and processes required to engineer outcomes. This is, in part, because individuals that have been trained in the practice of design are attempting to situate and apply design within Tayloristic organizations that are not yet fully ready to embrace the dynamic nature of design's capacity. This has created a number of impediments that became clear in our research project.

### **The Importance of Self Awareness**

In many cases, individuals can recognize their own limitations in a particular mindset theme and have a decent read on their own relative strengths and weaknesses. Interestingly, however, in cases where an individual recognizes a gap in their own behavioural practices or related to a particular design mindset theme, they are quick to suggest someone else may be able to and ought to fill that gap. They may lack the organizational trust necessary to take risks, and they may be hesitant, for instance, to experiment with Visualization skills and practices. In most cases, respondents alluded to deferring to someone else on the team who had a strong preference or competency at Visualization. Though the literature review would suggest that cross-functional teams are an important part of what makes design thinking a unique approach (Fuller, n.d. and Ehn, 1988), simply deferring a particular practice to another individual does not support members of the team to embrace a more dynamic, rich approach to learning.

In a complex-capable organization, all individuals need to be encouraged and challenged to develop the full breadth of the design thinking mindset. This encourages individuals to play a variety of roles and not simply defer to their preferred or characteristic role. The complex-capable individual is one that is constantly striving for improvement—building and growing across the full range of competencies identified as important.

This is especially true given the general lack of self-awareness related to, and as discovered by, the difference between an individual's self scores in the mindset themes and their actual practice of the associated behaviours. Their inability to see how their own competencies could grow and develop in less preferred practices is an impediment in developing a designerly mindset.

Once again, research by Cross, Papanek, and Buchanan support the idea that well-rounded design thinkers, who can play a variety of roles, are ultimately the most capable of handling complexity (Cross 1982, Papanek,

1984, and Buchanan, 1992). This perspective is further supported by Martin who suggests that “the design thinker has a stance that seeks the unknown, embraces the possibility of surprise, and is comfortable with wading into complexity not knowing what is on the other side” (Martin, 2009, p. 159).

The design probe research method also yielded promising preliminary results. When individuals understand why the mindset theme is important and how they might improve their capacity for a given theme, the experience of using a simple, related tool can support their development in that area. This development becomes particularly tangible through a short reflection on the use of the tool. The risk here is that individuals without broader support can and will suboptimize the process and pick the tools that are most useful to them. The data suggest individuals and their organizations will look for ways to make the process repeatable, engineering out the complexity needed for robust outcomes.

### **Embracing a Growth Mindset**

The term mindset was used throughout our research project to articulate the mindset themes found in design thinkers and design thinking organizations. Carol Dweck used the word in a similar context to describe the concepts of growth and fixed mindsets as a way of capturing what individuals believe about their strengths and weaknesses (2008). Consistent with the way mindset is used to describe the six design thinking mindset themes, Dweck uses the term mindset to articulate and differentiate the particular way an individual approaches and interacts with the world around them (2008). In a fixed mindset, individuals believe that their talents are innate and, more broadly, that their most basic qualities are fixed. In a growth mindset, individuals believe that their talents, intelligence, and other basic qualities can be developed (2008).



### **Mindset and its Impact on Innovation**

The section of Dweck's book dedicated to how a fixed or growth mindset makes a difference when it comes to innovation explains that it is easy for an organization to justify finding and retaining top talent—it will often appear in their strategic plan. If an organization believes that talent is a fixed trait and not something individuals can develop, it is easy to mistake acquiring “top talent” as a necessary driver for innovation:

It's nice that employees in growth-mindset organizations feel trusting and committed, but what about agility and innovation? That's something that organizations should and do care greatly about these days. Perhaps a company has to sacrifice some comfort and loyalty to be on the leading edge. Perhaps a belief in fixed talent motivates innovation. It doesn't look that way (Ibid, p. 143).

Instead, Dweck's research shows that “it's actually the employees in the growth-mindset companies who say that their organization supports (reasonable) risk-taking, innova-

tion, and creativity” (Ibid, p.143-144). In other words, an organization's approach to the development of its people is an important determinant of innovation. Organizations that have a growth mindset are open to learning and they, therefore, see the benefit of taking risks and learning from their mistakes.

### **The Concern with Fixed Mindsets**

This is in stark contrast to organizations that took a fixed mindset approach, in which employees reported that their organizations “are less likely to support them in risk-taking and innovation” and, beyond yet, “they are also far more likely to agree that their organizations are rife with cutthroat or unethical behaviour” (Ibid, p. 144). These organizations promote competition because they believe that one individual or team is innately better than another.

These are the same organizations that fall for the “success to the successful” system archetype. In this system archetype, resources are repeatedly given to the team that demonstrates initial success. It is the addition of

these resources that perpetuates their success—gains that are, however, incremental and largely linked to the addition of resources rather than a significant difference between the two teams in terms of skills and capabilities. This supplemental success, however, is used to justify the decision to give them additional resources. The problem with this is that the goals of the team begin to run counter to the goals of the organization, and the competition starts to become unhealthy. These organizations—that suboptimize their own organizational dynamic—are likely to suboptimize any process put in front of them (Braun, 2002, p. 10-11).

### **Supporting Individuals in Using a Growth Mindset for Design Thinking**

Individuals and entire organizations can embrace a growth mindset across all areas of design thinking. To enhance individual's sense of self, to provide focused feedback, and to ignite a growth mindset, there is an opportunity to develop an instrument through which individuals can evaluate their relative strengths and areas for development. An as-

essment instrument could provide a common framework and language to illuminate the specific behaviours individuals and teams could develop in their effort to improve their capacity for design. Such an instrument could be used to place individuals in specific categories or profiles that provide insights into their preferred ways of working, their strengths, and their areas for development. To support individuals on this journey, we have developed a set of behavioural profiles consistent with the data and analysis emerging from the online questionnaire.

In using such an instrument to empower employees, organizations imagine new possibilities for how they can become purpose-driven and complex-capable.

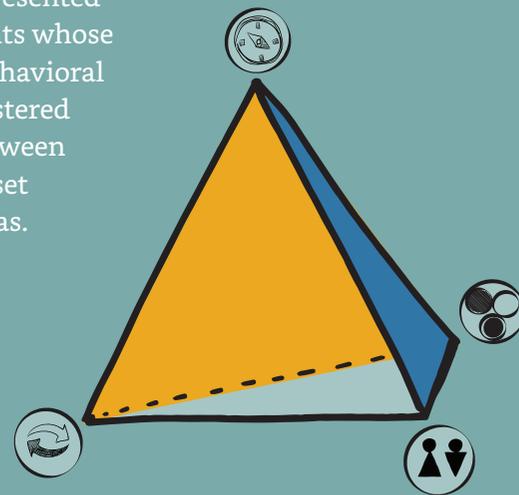
## The Behavioural Profiles of a Design Thinking Team

As complex-capable organizations look to develop their talent, they must enhance self awareness and growth mindedness amongst their employees. One significant possibility for doing this is to leverage a common framework for understanding how individuals can hone their skills and talents while learning to contribute in new and meaningful ways.

In our research, we saw a possibility to create Behavioural Profiles for each of the clusters of respondents that emerged in our analysis (see *Figure 8. Mindset relationship heat map*). As we re-evaluated the individual respondents that fell within each cluster—including their self scores, behavioural scores, and qualitative responses—an interesting narrative began to take shape. This narrative gives context to the competencies, preferences, and areas for development associated with individuals working on design thinking teams and on collaborative projects. The Behavioural Profiles—each representing aggregate data for the respondents that fell within a particular cluster—have been elaborated on here provide a foundation for the further development of a design thinking instrument.

## Visualizing the Behavioural Profiles

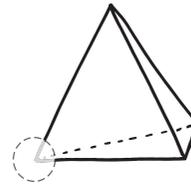
After clustering respondents in a heat mapping exercise, we created a three-dimensional model that demonstrates the distinct clusters of respondents' behavioural scores. This model attempts to visualize the relationship between design thinking profiles; whereby each corner and face of the prism represent a particular profile of a respondent. Profiles that exist at the corners represent respondents that had high relative behavioural scores in a particular mindset theme, while the profiles that exist on the faces of the prism represented respondents whose relative behavioral scores clustered evenly between two mindset theme areas.



*Figure 13. Visualizing the behavioural profiles.*

# The Framer

*Communications/Promotions, Education, Design*



## Strengths

- Understanding the problem through an analytical lens
- Detecting Patterns
- Distilling complex system into 'bite size' parts
- Tackling ambiguity by re-framing activities and approaches
- Being adaptable
- Using evidence-based approaches

## Opportunities for development

- Visualization, Experimentation, and/or User Focus

## Things they might say

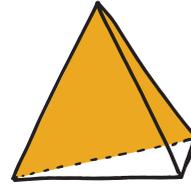
“Holding ambiguity through a reframing is, in my opinion, the most important skill in design thinking approaches.”

“[Problem Framing is] extremely important. The outcome of our projects is entirely based on how we approach the problem—and being able to create solutions that are easily adaptable as the project changes is paramount.”

“Very important to my work. The ability to manage complex threads and interrelationships of problems between different projects is at the core of project outcomes.”

# The Perspectivist

*Education, Consulting, Arts, Marketing, Sales*



## Strengths

- Being sympathetic (“I like to understand people’s challenges”)
- Grasping the problem through a diversity of perspectives
- Adapting to new ideas and voices
- Using collaboration, research, and consultation to identify problems worth solving
- Taking an intentional and purposeful approach

## Opportunities for development

- Visualization, Experimentation, and/or User Focus

## Things they might say

“[Problem Framing] is hard for everyone. You have to remove your ego and your idea of what “the solution” is from the work in order to let the varied voices and perspectives surface the solution.”

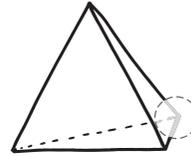
“Problem framing is the most important part of doing design work in my opinion. If we don’t know what we are looking to solve, it is harder to make an impact and create change.”

“Doing good design work always means working with complexity and ambiguity—if you’re unable to adapt to unexpected changes doing design work will probably be very difficult. Project outcomes are very dependent on being open [and good at Diversity].”

“As a young professional, it took me some time to realize that my way wasn’t always the best way. I now understand that everyone has an opinion on the way something should be approached or solved, and in my experience, the best solutions have come from a pinch of one person’s idea, and a pinch of another’s...”

# The Woke

*Social Work, Education, Design, Government*



## Strengths

- Understanding complexity
- Leveraging diversity
- Recognizing privileged perspectives
- Looking for and amplifying underrepresented voices
- Using divergent thinking and iterative approaches
- Being patient and open

## Opportunities for development

- Experimentation and/or Visualization
- Can get bogged down in listening to too many voices and may need help understanding which details are the most important.

## Might say things like

“Including diverse voices is extremely important as the population we serve needs to be reflected in our decisions.”

# The Inclusionist

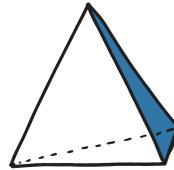
*Healthcare, Education, and Design*

## Strengths

- Being the Co-creator—working with end users
- Designing “with” others

## Opportunities for Development

- Consistently not as strong at Problem Framing, Visualization and/or Experimentation



## Might say things like

“The solicitation and valuing of diverse opinions is well ingrained in the organization’s culture.”

“We are trying to work within a new design approach that includes these various different perspectives from the ground up when designing the programs/developing the projects. [Diversity] has a direct impact on the outcomes. It isn’t necessarily a mandated approach, but it is the right one for us because we’re getting insight and holistic collaboration from the get-go.”

“[Users Focus is] super important to our work and contributes to project outcomes.”

“[User Focus] is huge. If we don’t consider our stakeholders, then our programs are irrelevant.”

“[User Focus] is essential to my personal work and has a significant impact on the outcomes of all my projects. The work completed is heavily influenced by taking into consideration how people will experience it and what impacts it will have on them.”

“[User Focus is] Critical to project outcomes. It’s at the heart of everything we do.”

# The Anthropologist

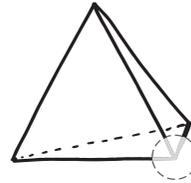
*Consumer electronics, social services*

## Strengths

- Playing the role of the ethnographer
- Using highly qualitative approaches
- Being empathic, or “being with”
- Not trying to solve the problem, trying to understand how people experience it

## Opportunities for Development

- Consistently Not as strong at Diversity and Problem Framing



## Might say things like

“If we’re not talking to our end user or customer, we’re failing toward irrelevance.”

“How can we expect to know what we’re doing if we never get up from our desks and go and talk to *real* people?”

# The Wayz Finder

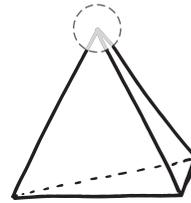
*Designers, Systems*

## Strengths

- Navigating ambiguity
- Facilitating groups
- Play the role of peacemaker and navigator between mindset themes
- Able to identify gaps within a team setting, and adapting the role they play within the team

## Opportunities for Development

- Consistently not as strong at Visualization and/or Experimentation
- Though they have some facility at Diversity, User Focus, and/or Problem Framing, they may wish to develop their facility playing these roles



## Might say things like

“Design isn’t a linear process. Having multiple methodologies to solve problems is important.”

“Facilitating workshops and brainstorms is a key skill set.”

“I think driving [a task to completion] or a solution is constantly on my mind, and is often on a team’s mind. I think Process Wayfinding sounds a lot like determination and I hope that’s a value others see in me. As for my organization, it goes back to the big ship. I think we’re doing what we can in the best way we can, but it’s hard. There’s a lot of people with a lot of problems with a lot of competing ideas.”

# The Doer

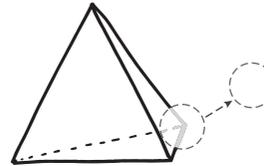
*Software Development, Scientific Research*

## Strengths

- Having a bias towards action—“let’s just get it done”
- Approaching complexity by testing possible solutions in low-risk ways to receive insight
- Using experimentation to validate research
- Mapping, sketching and using diagrams and visualizations to understand and communicate complexity
- Getting the team unstuck through experimenting with different techniques and frameworks

## Opportunities for development

- Consistently not as strong at Problem Framing and/or Process Wayfinding



## Might say things like

“[Visualization] is very key to exploring different solutions and often helps in wrapping my head around complex problems.”

“Visualizing the problem, mapping out each step, is important in understanding a concept and how it will be implemented.”

“I need to be able to try out different ideas because of the diversity of my audience. No one solution fits all. Experimentation is useful in familiarizing myself with the audience’s likes and dislikes.”

“There should be a whiteboard in every office!”

# The Behavioural Profiles of a Design Thinking Team

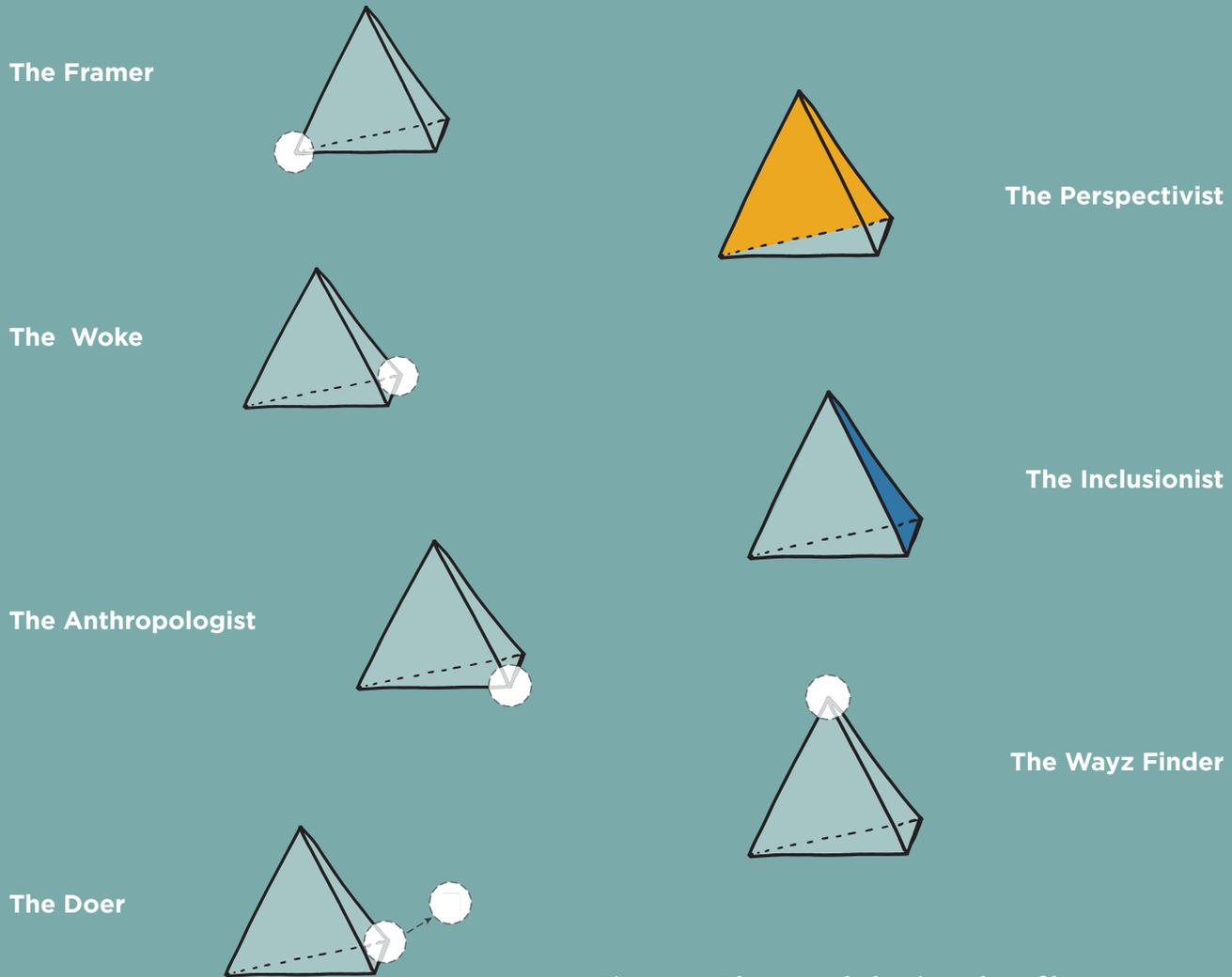


Figure 14. The seven behavioural profiles.

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## Next Steps

### Design Must Become a Way of Life

Our literature review focused heavily on design thinking. In reality, the learnings and insights apply to a variety of different problem-solving methodologies—ones that are entrapped by the same linear, outcomes-focused lens that has been applied to design thinking (Walters, 2011). The methodologies and approaches are not the problem themselves, however. Organizations have suboptimized complex and rich methodologies into repeatable, linear steps as a shortcut to managing complexity. It is clear from the literature review (Ehn, 1988, Senge, 1990, and Junginger, 2009) and the research conducted in this project that organizations could benefit significantly from taking a design perspective to create complex-capable individuals, teams, and organizations. Instead of applying methodologies to the creation of products, services, and outcomes, organizations need to consider the benefits of applying design to their internal culture and way of doing things. Without this lens, design thinking is likely to never realize its full potential.

Organizations that continue to focus on the mindset themes as they relate to the creation of the outcomes, products, or services they are

responsible for delivering to customers are likely to see short-term success. This is consistent with the suboptimization seen in the literature review with companies like IDEO (Nussbaum, 2011). These consultancies focus on creating commercially profitable end products rather than leveraging the tools and mindset themes to create lasting internal value by building capacity within their organizations. There is a significant opportunity for organizations to advance their design maturity and transition from designerly ways of working to designerly living.

## A Theoretical Framework

As a way to develop design maturity, we believe the creation of a design thinking assessment instrument, though outside of the scope of this project, would be an important next step in the research around design thinking competencies. Such an instrument could be used to assess design competencies and organizational readiness and would be of significant benefit to individuals, teams, and organizations. Leveraging the initial behavioural questions from the questionnaire, we will seek to validate and expand upon the question set. Using the seven behavioural profiles developed in this paper as a basis, further research would need to clarify the distinct differences and overlap between the profiles. A design thinking instrument would help individuals, teams, and organizations to evaluate themselves across the six mindset themes and all associated behaviours.

From this instrument, individuals could receive a report detailing their relative strengths and opportunities across the mindset themes as well as the various behavioural facets associated with each mindset theme.

This would include tangible ‘next steps’ in their development. They could be ‘placed’ within a particular behavioural profile region and be provided with information to better understand the tendencies, preferences, and styles associated with their assessed profile. They would be able to see how many other individuals, teammates or members from across the organization might share a similar profile.

Managers and team leads could take a similar assessment but on behalf of their team. They could receive aggregated team information as well as information from other teams, customers, and even suppliers in order to better understand their team’s relative strengths and opportunities. This report could also include information about next steps for managers and team leads in helping to develop their members complex-capabilities.

At an organizational level, leadership could assess their organization across the mindsets and associated behavioural facets. Their assessment could include an evaluation from customers, partners, and suppliers as well as

aggregated information from teams and individuals within the organization. Ultimately, such a report would provide leadership teams with a 360-degree perspective of their organization’s design readiness while identifying next steps, resources, and benchmarks for their industry and sector. An assessment of this kind would empower leadership to understand where the opportunities and risks may exist for developing their organization’s design perspective and, ultimately, their complex-capabilities.

## The Potential Benefits

There are a number of benefits associated with developing a design thinking instrument.

For individuals, an assessment instrument would increase their level of self-awareness related to the mindset themes and provide targeted development approaches that could be leveraged to grow their behavioural practices. This would respond directly to the research that suggests that many individuals lack an awareness of where their competencies are and how they align with the desired mindsets and practices. With targeted and customized information, individuals would have a basis in which to embrace a growth mindset.

For teams, understanding strengths and gaps as a cross-functional unit would enable teams and their managers to be more intentional about the design, structure, and approach to work. Furthermore, an instrument would enhance a team's ability to self-regulate and understand where and when to seek outside input. With data at their fingertips, managers and team-leads could focus less energy on assembling cross-functional teams (which would

ideally be more likely to self-organize given the data that stem from an instrument of this kind) and focus more on strategic leadership.

For organizations, an instrument that provides the leadership team with a snapshot of organizational strengths and gaps would create a foundation on which to develop design perspective strategies. With design at the root of an organization's approach to strategy, the leadership team would be in a stronger position to support the ongoing development of individuals and teams in becoming increasingly complex-capable.

## Testing the Hypothesis

In the traditional management paradigm, leadership plays a key role in being able to interpret data coming from the ‘machine’ of the organization and making calculated decisions about the optimization of the machine at large. As organizations shift to become holistic thinking socio-cultural systems, this mechanistic model begins to cause more harm than good. One of the goals for developing a design thinking instrument is to articulate the dual paradigm shifts organizations must make. The first shift is to visualize and imagine what a more interconnected sociocultural system looks like. The second shift centres around how this system is supported by complex-capable people at its core. People that, in addition to being individual contributors, leverage systems thinking to understand how their work integrates with other individuals and teams within the organization.

Building this instrument is based on the hypothesis that cross-functional, self-organizing teams are the best way to build resiliency into organizations. In particular, the instrument relies on a group of complex-capable people with knowledge, experience, and facility in a specific

set of mindsets themes—User Focus, Problem Framing, Diversity, and Process Wayfinding.

If the instrument works as intended, organizations should see a reduction in the amount of effort (resources and time) required to pull together a team from across the organization. Individuals should better understand their roles and feel more connected to other, more diverse members of the organization. The organization should see a reduction in chaos without an over-reduction in complexity or ambiguity. The processes used to navigate this complexity should remain intact as designed, and the organization shouldn’t feel the need to suboptimize them. The organizations should see an improvement in their strategic decision making, with an increase in awareness and understanding of how the organization is actually performing.

As the instrument is implemented and tested with a diverse set of organizations, the hypotheses outlined here should be kept top of mind.

## Where We Will Start

There is a tremendous opportunity to bring the results of this research into the real world for testing. Though this research has advanced the knowledge in the space, more, and broader, research is still needed to further the impact and applicability of this work.

In order to pursue this work, we would require additional funding. Either through existing granting agencies or through a sponsoring private organization, we would seek to build upon and validate our research findings. This would involve building upon the design thinking instrument, prototyping a report for individuals, teams and organizations that stems from the instrument, and implementing the design strategy map in organizations.

In order to iterate on the instrument, we would seek to validate the existing behavioural question set and incorporate additional behavioural practice questions related to each mindset theme. We would be intentional to ensure the questionnaire limited the selection bias we encountered in this study by dividing it into a series of shorter, less time consuming

sections that could be distributed to targeted demographics over the span of 3-6 months. The modified questionnaire would be distributed more broadly in order to ensure greater diversity of data (education level, geographic location). This would be done by reaching out to adjacent professional associations and networks within and outside of Canada.

Based on the data received through this modified approach, we would prototype the development of a Design Thinking Report. The Report could be used by organizations to assess their readiness for implementing design thinking, by teams to determine strengths and gaps, and by individuals to assess their competencies across the mindset themes. By prototyping such a report, we could gain valuable insights into the kinds of information that would be most useful across these groups as well as how best to represent the information.

One component of a Design Thinking Report would be the explicit attribution of respondents to a particular Behavioural Profile. To further the development of these profiles

and validate the preliminary findings from this study, we would observe individuals with particular Behavioural Profiles as they conduct work in design thinking and non design thinking teams. By observing these individuals and teams in action, we would develop further insights surrounding the profiles and adapt them to provide the most relevant information sensitive to the range of potential applications.

Lastly, in an effort to test our hypothesis related to the Design Strategy Map, we would seek to implement the design perspective in an organization already utilizing the Strategy Map. As consultants working in this space, we believe there are a number of small-to-medium enterprises that would be interested in experimenting with this iteration of Kaplan and Norton's Strategy Map. We would work with 2-3 such organizations to help them develop a hypothesis around how a design perspective might enhance their ability to respond to and become resilient in the face of complexity and ambiguity. As these organizations apply this new design

perspective and make explicit their strategies for enhancing their capacity for design in the broadest sense, we would capture learnings and adapt the Design Strategy Map.

To bolster the presence of our work, we would create a website that provides additional information about our research—the work completed to date, the ongoing research, and the ultimate goals of our work. There would be opportunities for collaborators to engage with our work and provide critique and feedback. Furthermore, we are interested in submitting research proposals to professional association conferences such as The Association of Registered Graphic Designers (RGD) annual DesignThinkers Conference, or The International Quality and Productivity Centre's annual Design Thinking Conference. These venues would provide extensive opportunities to further our networks and expose our work to prospective collaborators, theorists, and practitioners.

The ultimate goal of additional research would be to encourage organizations and their members to become more complex-capable. This intentional shift towards complexity is what will enable organizations to drive the supraoptimization of design thinking. This work cannot happen in isolation of the everyday realities of organizational life. This work must embrace ambiguity, it must thrive in the face of complexity, it must be resilient in the face of organizational barriers, and it must adapt over time.

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## 1. Introduction

Design Thinking Put in Context  
Introduction to the Research Study

## 2. Literature Review

The Evolution of Design Thinking  
Design as an intention  
Design as a Way to Address Complexity  
Design as Process and Tools  
Design as Mindsets and Practices  
The Design of Organizations

## 3. Research Questions

The Suboptimization of Design Thinking  
The Supraoptimization of Design Thinking  
Focus of our Research Project

## 4. Methodology

Approach to Research  
Research Methods  
Limitations of Data  
Analysis

## 5. Description of Results

Interpreting the Data  
On Organizations and Teams  
On Individuals  
On Core Competencies and Mindset Themes  
On Tooling Up

## 6. Discussion

Imagining the Change  
Creating Purpose-Driven Organizations  
People as a Driver of Change  
Next Steps

## ► Conclusion

Moving Forward

Read

Unread



**CONCLUSION**



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## Chapter 7

# Conclusion

*“You never change things by fighting the existing reality. To change something, build a new model that makes the existing model obsolete.”*

*Buckminster Fuller*

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## Moving Forward

Our research project sought to better understand the core competencies related to design thinking and the relationships that exist between these competencies. Through an in-depth review of the literature, a clear set of themes related to design thinking mindsets emerged. We validated and extended these mindset themes through an online questionnaire and design probe activity. The insights we uncovered through these research methods responded directly to the research questions.

User Focus, Problem Framing, Diversity, and Process Wayfinding were all validated as important and core mindset themes for research participants. The data show Process Wayfinding is correlated with each of the other three core mindset themes, just as the three core mindset themes were correlated with each other. Clearly, emphasis must be placed on these core mindset themes and their associated behavioural practices.

The research suggests that the stronger and more prominent the Process Wayfinding function becomes, the more integrated the other core competencies (User Focus, Problem Fram-

ing, and Diversity) likely are. As a result, we placed the Process Wayfinding mindset theme in the center of the mindset relationships model. This model validates the work of Carlgren, Rauth, and Elmquist and advances the development of an instrument that could be used by individuals, teams, and organizations looking to explore their capacity for design thinking.

To help organizations understand how they might improve their capacity for design thinking, we introduced the concept of a Design Strategy Map. The Design Strategy Map proposes an additional, design perspective, to be inserted at the deepest level of the organization. In addition, we plotted individuals on the mindsets relationship model to develop a set of behavioural profiles. These behavioural profiles might help individuals, teams, and organizations understand, evaluate, and improve their capacity for design thinking.

To support individuals, teams, and organizations on their design thinking journey, we propose additional research into the development of a design thinking instrument. This research must respond

directly to the limitations of the data we faced in our research project. It must be designed in a way to minimize selection bias, with questions designed to be accessible to a broad audience. The data collected through this instrument will support us in prototyping and refining what a report would look like as an output of the instrument for individuals, teams, and organizations.

Such an instrument would support individuals and teams in assessing their design thinking competencies and support teams and organizations in assessing their readiness for design thinking. It is clear that an intervention targeting just the individual, team, or organization would not be enough. Rather, the instrument must be designed to support a holistic, systems-based approach and to promote a learning orientation to support individuals, teams, and organizations in dealing with complexity.

Becoming complex-capable requires a commitment to deep education and ongoing learning. It requires a growth mindset, a way to visualize opportunities for growth, and a way to articulate the change sought. It requires a design perspective.



NATIONAL GEOGRAPHIC NOVEMBER, 1964 CHINA PRESIDENTS: PART I GEOGRAPHIC REPRINTS RANGER 7 VIKINGS

NATIONAL GEOGRAPHIC SEPTEMBER, 1964 PEACE CORPS ANCIENT GLASS CHESAPEAKE BAY VIET NAM RAILROAD

NATIONAL GEOGRAPHIC APRIL, 1967 RHINE RIVER WASHINGTON GALAPAGOS TOWER OF THE WINDS

NATIONAL GEOGRAPHIC JULY, 1967 FLORENCE FLOOD LAKE POWELL THAILAND SCILLY ISLES GIANT

NATIONAL GEOGRAPHIC JUNE, 1967 ILLINOIS FRENCH RIVIERA ANTARCTICA LA GORCE MEDAL NEW BOOKS TURTLES

NATIONAL GEOGRAPHIC MAY, 1967 EASTERN CANADA HOHOKAM INDIANS MAGNETIC DATING M

NATIONAL GEOGRAPHIC MARCH, 1967 SIBERIA NATIONAL GALLERY OF ART SQUIDS GUADALAJARA WHITE GORILLA

NATIONAL GEOGRAPHIC APRIL, 1966 CEYLON CONSHLF THREE SPACE RENDEZVOUS WYOMING

NATIONAL GEOGRAPHIC FEBRUARY, 1966 BOLIVIA ST. AUGUSTINE ALICE SPRINGS COMET YANKEE VIET NAM

NATIONAL GEOGRAPHIC JANUARY, 1964 U. S. CAPITOL RETURN TO TRISTAN MT. SINAI NIGHT DIVING

NATIONAL GEOGRAPHIC NOVEMBER, 1963 STATE PARKS SIKKIM ADVENTURES BOOK MALAYSIA ECLIPSE

NATIONAL GEOGRAPHIC OCTOBER, 1963 NILE MAP ANNIVERSARY EVEREST EXPEDITION NILE MONUMENTS KING TUT

NATIONAL GEOGRAPHIC AUGUST, 1963 WEST DISNEY DEVON FLUORESCENT SEA LIFE CHIMPANZEES

NATIONAL GEOGRAPHIC JULY, 1963 CENTRAL CANADA MAP CIVIL WAR ONTARIO ATHENS BYZANTINE SHIP

NATIONAL GEOGRAPHIC DECEMBER, 1965 WINDWARDS CHIMPANZEES GALILEE DOCTOR FISHES SEEING THE U.S.A.



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# References

*“The problems of today are caused  
by the solutions of yesterday.”*

*Peter Senge*

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# References

## Design and Design thinking

A place for explorers & experimenters at Stanford University. (n.d.). Retrieved from <https://dschool.stanford.edu/>

About the Danish Design Centre. (2016, December 12). Retrieved from <http://danskdesigncenter.dk/en/about-danish-design-centre>

Ackoff, R. L., Ackoff, R. L., & Emery, F. E. (2005). *On purposeful systems: An interdisciplinary analysis of individual and social behavior as a system of purposeful events*. Transaction Publishers.

Augier, M. (2000). Models of Herbert A. Simon. *Perspectives on Science*, 8(4), 407-443.

Beckhard, R., & Harris, R. T. (1977). *Organizational transitions: Managing complex change*. Reading, MA: Addison-Wesley.

Bødker, S., Grønbæk, K., & Kyng, M. (1993). Cooperative design: techniques and experiences from the Scandinavian scene. *Participatory design: Principles and practices*, 157-175.

Braun, W. (2002). The system archetypes. *System*, 2002, 27.

- Brown, T. (2008). Design Thinking. *Harvard Business Review*, June.
- Brown, T. (2015). When Everyone Is Doing Design Thinking, Is It Still a Competitive Advantage?. *Harvard Business Review*, August.
- Brown, T., & Kätz, B. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. New York: Harper Business.
- Brown, T., & Wyatt, J. (2010). Design Thinking for Social Innovation. *Development Outreach*, 12(1), 29-43. Retrieved from [http://ssir.org/articles/entry/design\\_thinking\\_for\\_social\\_innovation](http://ssir.org/articles/entry/design_thinking_for_social_innovation)
- Buchanan, R. (1992). Wicked problems in design thinking. *Design issues*, 8(2), 5-21.
- Carlgren, L., Rauth, I., & Elmquist, M. (2016). Framing Design Thinking: The Concept in Idea and Enactment. *Creativity and Innovation Management*, 25(1), 38-57.
- Corporate transparency: why honesty is the best policy. (2014, August 04). Retrieved from <https://www.theguardian.com/sustainable-business/corporate-transparency-honesty-best-policy>
- Cross, N. (1982). Designerly ways of knowing. *Design studies*, 3(4), 221-227.
- Design Kit: The Human-Centered Design Toolkit. (n.d.). Retrieved from <https://www.ideo.com/post/design-kit>
- Drucker, P. F. 1974. *Management: Tasks, Responsibilities, Practices*. New York, NY: Harper & Row.
- Ehn, P. (1988). Work-oriented design of computer artifacts (Doctoral dissertation, Arbetslivscentrum).
- Friis, R., Teo, D., & Siang, Y. (2017, March). 5 Stages in the Design Thinking Process. Retrieved from <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>
- Fuller, B. (n.d.). Eight Strategies for Comprehensive Anticipatory Design Science | The Buckminster Fuller Institute. Retrieved from <https://www.bfi.org/design-science/primer/eight-strategies-comprehensive-anticipatory-design-science>

- Geus, A. D. (1997). *The living company*. Boston, MA: Harvard Business School Press.
- Gharajedaghi, J. (2011). *Systems thinking: Managing chaos and complexity: A platform for designing business architecture*. Burlington, MA: Morgan Kaufmann.
- Greenbaum, J. (1993). A design of one's own: towards participatory design in the United States. *Participatory design: Principles and practices*, 27-37.
- The Harbus (2011, October 26). (Business) Design: Fad or Fact? Retrieved from <http://www.harbus.org/2011/business-design-fad-or-fact/>
- Herrero, L. (2015, March 21). Nine basic contradictions in organizational life. Ignore at your peril. Retrieved from <https://leandroherrero.com/eight-basic-contradictions-in-organizational-life-ignore-at-your-peril/>
- Hillier, B., & Leaman, A. (1974). How is design possible?. *Journal of Architectural Research*, 4-11.
- Holmlid, S. (2012, September). Participative; co-operative; emancipatory: From participatory design to service design. In Conference Proceedings ServDes. 2009; DeThinking Service; ReThinking Design; Oslo Norway 24-26 November 2009 (No. 059, pp. 105-118). Linköping University Electronic Press.
- Howard, Z., Senova, M., & Melles, G. (2015). Exploring the role of mindset in design thinking: Implications for capability development and practice. *Journal of Design, Business & Society*, 1(2), 183-202.
- Jerdee, T., Brooks, W., & Barsky, B. (1971). Values among American and Swedish Business Students: Suboptimization vs. Supraoptimization. *Acta Sociologica*, 14(4), 256-267. Retrieved from <http://www.jstor.org.ocadu.idm.oclc.org/stable/4193837>
- Johansson-Sköldberg, U., Woodilla, J., & Çetinkaya, M. (2013). Design thinking: past, present and possible futures. *Creativity and Innovation Management*, 22(2), 121-146.
- Junginger, S. (2009). Design in the organization: Parts and wholes. *Research Design Journal*.

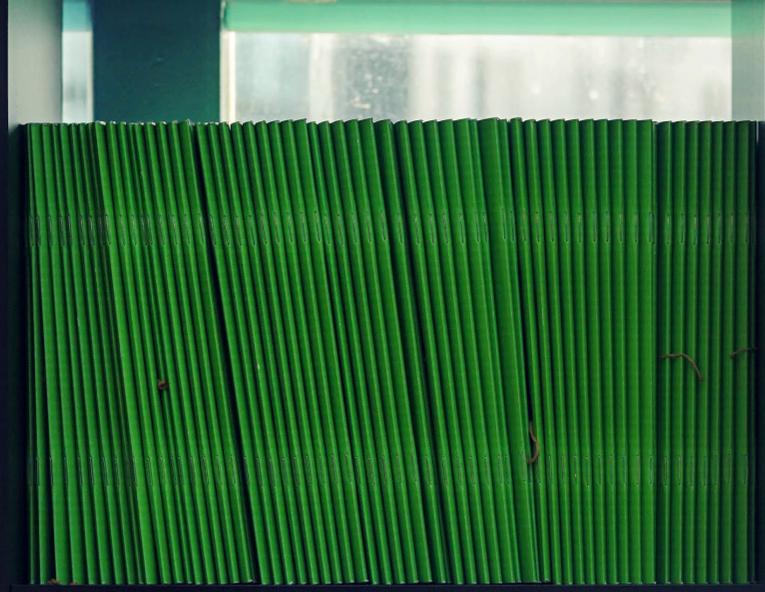
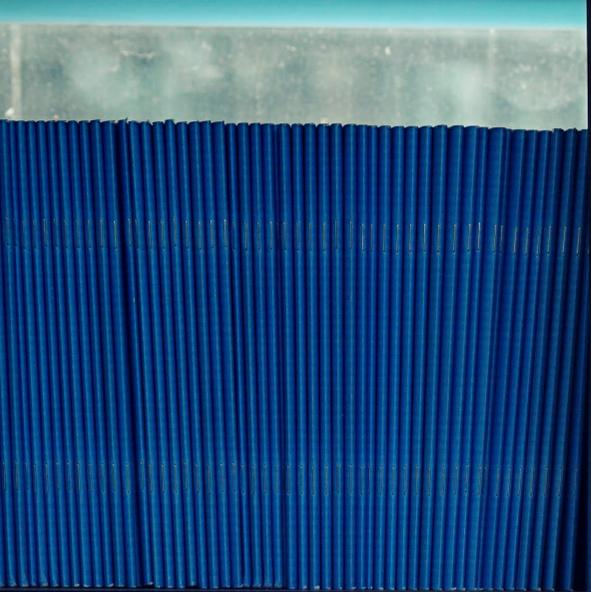
- Kaplan, R. S., & Norton, D. P. (2001). The strategy-focused organization. *Strategy and Leadership*, 29(3), 41-42.
- Kelley, T., & Kelley, D. (2013). *Creative confidence: Unleashing the creative potential within us all*. Crown Business.
- Kimbell, L. (2012). Rethinking design thinking: Part II. *Design and Culture*, 4(2), 129-148.
- Kolko, J. (2015). Design thinking comes of age. *Harvard Business Review*, 93(9), 66-71.
- Konrad, A. M. (2006). Engaging employees through high-involvement work practices. *Ivey Business Journal*, 26, 11-14.
- Lawson, B., & Dorst, K. (2013). *Design expertise*. Routledge.
- Machiavelli, N., & Lerner, M. (1950). *The prince and the discourses* (E. R. Vincent, Ed.; L. Ricci, Trans.). New York, NY: The Modern Library.
- Martin, R. (2009). *The design of business*. Harvard Business School Publishing, Massachusetts.
- Mootee, I. (2013). Design thinking for strategic innovation: What they can't teach you at business or design school. John Wiley & Sons.
- Nel, Belia. (2016) "The Demise of Traditional Performance Management Systems." *Performance Improvement*, vol. 55, no. 3, 2016., pp. 10-12.
- Nussbaum, B. (2011). Design Thinking Is A Failed Experiment. So What's Next? Retrieved from <https://www.fastcodesign.com/1663558/design-thinking-is-a-failed-experiment-so-whats-next>
- Nussbaum, B. (2013). *Creative intelligence: Harnessing the power to create, connect, and inspire*. Harper Collins.
- Papanek, V., & Fuller, R. B. (1984). *Design for the real world: Human Ecology and Social Change: Second Edition*. Chicago: Academy Chicago Publishers.
- Popova, M. (2014, January 29). Fixed vs. Growth: The Two Basic Mindsets That Shape Our Lives. Retrieved from <https://www.brainpickings.org/2014/01/29/carol-dweck-mindset/>

- Rosenbrock, H. H. (Ed.). (2012). *Designing human-centred technology: a cross-disciplinary project in computer-aided manufacturing*. Springer Science & Business Media.
- Sanders, L., & Stappers, P. J. (2012). *Convivial design toolbox: generative research for the front end of design*. Amsterdam: BIS.
- Senge, P. (1990). "The art & practice of the learning organization." in *The New Paradigm in Business: Emerging Strategies for Leadership and Organizational Change* (eds. Ray, M. and Rinzler, A.) 1993 by the World Business Academy. p. 126-138. New York, NY: Jeremy P. Tarcher.
- Senge, P. (1990). *The Fifth Discipline: The art and practice of the learning organization*. Crown Pub.
- Schön, D. A. (1983). *The reflective practitioner: How professionals think in action*. New York, NY: Basic Books.
- Schön, D. A. (1992). Designing as reflective conversation with the materials of a design situation. *Research in Engineering Design*, 3(3), 131-147.
- Schön, D. A., & Wiggins, G. (1992). Kinds of seeing and their functions in designing. *Design studies*, 13(2), 135-156.
- Schrage, M. (2015, June 30). Reward Your Best Teams, Not Just Star Players. Retrieved from <https://hbr.org/2015/06/reward-your-best-teams-not-just-star-players>
- Simon, H. A. (1955). A behavioral model of rational choice. *The quarterly journal of economics*, 69(1), 99-118.
- Sy, T., Beach, L., & D'Annunzio, L. (2005). Challenges and strategies of matrix organizations. *Human Resource Planning*, 28(1), 39-48.
- Taylor, F. W. (1917). *The Principles of Scientific Management*. New York, NY: Harper.
- The Design Ladder: Four steps of design use. (2017, March 01). Retrieved from <http://danskdesigncenter.dk/en/design-ladder-four-steps-design-use>
- The Value of Design—Design Management Institute. (n.d.). Retrieved from <http://www.dmi.org/?DesignValue>

Wagner, T., & Compton, R. A. (2015). *Creating innovators: The making of young people who will change the world*. Simon and Schuster.

Walters, H. (2011, June 22). "Design Thinking" Isn't a Miracle Cure, but Here's How It Helps. Retrieved from [https://www.fastcodesign.com/1663480/helen-walters-design-thinking-buzzwords?partner=homepage\\_newsletter](https://www.fastcodesign.com/1663480/helen-walters-design-thinking-buzzwords?partner=homepage_newsletter)

Weber, M. (1947). *The Theory of Social and Economic Organizations*. Henderson, A. M., and Parsons, T. (trans.) New York, NY: Oxford University Press.





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# Appendices

*“Transformation comes more from pursuing profound questions than seeking practical answers.”*

*Peter Block*

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# Appendix A: Online Questionnaire

## Page One: Evaluation

Please evaluate yourself as well as your team and organization if applicable on a scale of 1-5 in the following six areas (1=Not at all able, 2=Not very able, 3=Somewhat able, 4=Quite able, 5=Very much able, or N/A). Start with a self-evaluation of your ability, then think about what you have observed on your team and perceived across your organization more broadly in each area.

### User Focus

This is the ability to focus on the end user of the product or service—being genuinely curious about, empathizing with, and design for their physical and emotional needs.

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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### Problem Framing

This is the ability to handle the complexity and ambiguity of a hard/complex problem, and being open and adapting to unexpected changes in the problem being solved.

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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### Visualization

This is the ability to make abstract ideas and concepts tangible—through sketching, building and other techniques—in order to better communicate and test them.

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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### Experimentation

This is the ability to work iteratively in order to try out multiple, unique ideas and solutions to a given problem through divergent thinking (before converging on one solution).

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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### Diversity

This is the ability to integrate multiple—often conflicting—perspectives from a broad range of personalities and backgrounds in a holistic way.

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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### Process Wayfinding

This is the ability to navigate the ambiguity of complex methodologies and outcomes—including intersecting problems, opinions, and solutions—through facilitation and other collaborative techniques.

Self	1	2	3	4	5	N/A
Team	1	2	3	4	5	N/A
Organization	1	2	3	4	5	N/A

How important is this to your work and how much does it contribute to project outcomes?

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**Page Two: Design Thinking and Collaborative Project Delivery**

Design Thinking is a specific collaborative methodology that seeks to generate new solutions and offerings to complex problems using alternative tools. Typically, Design Thinking projects move between a series of predictable stages—Discovery, Interpretation, Ideation, Experimentation, and Evolution.

In most cases, projects that employ Design Thinking use cross-disciplinary teams and utilize a variety of tools to foster creativity, generate insights, and frame solutions. Select all that apply.

- I've used Design Thinking methodologies before
- My team uses Design Thinking methodologies
- My organization uses Design Thinking methodologies
- I haven't used Design Thinking but have been part of other collaborative projects

If applicable, please provide a brief description of the project and methodologies used.

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### Page Three: Practices

For each statement below, indicate your level of agreement on a scale of 1-5 (1=Never, 2=Rarely, 3=Occasionally, 4=Usually, 5=Always, or N/A).

#### User Focus

I look for underlying needs that my users may have	1	2	3	4	5	N/A
I ask my users about pain points they experience	1	2	3	4	5	N/A
I use my understanding of the needs of my users to guide my work	1	2	3	4	5	N/A
I use qualitative research	1	2	3	4	5	N/A
I use a context-specific approach to user research	1	2	3	4	5	N/A
I involve users when ideating / coming up with new ideas	1	2	3	4	5	N/A
I involve users when I prototype / build out new ideas	1	2	3	4	5	N/A
I involve users when I test my solutions	1	2	3	4	5	N/A

#### Problem Framing

I challenge the initial problem I am given to better understand the scope of the problem	1	2	3	4	5	N/A
I reframe the problem I am solving to expand or reduce the range of possible solutions	1	2	3	4	5	N/A
I look for patterns when I do research	1	2	3	4	5	N/A
I seek multiple, unique options when defining a problem	1	2	3	4	5	N/A

## Visualization

I create visualizations to communicate my ideas	1	2	3	4	5	N/A
I create visualizations of my insights to create new ideas	1	2	3	4	5	N/A
I attempt to make abstract concepts tangible through visualizations	1	2	3	4	5	N/A
I create visualizations to structure data	1	2	3	4	5	N/A
I make rough representations of my ideas to make my work more tangible	1	2	3	4	5	N/A
I create experiences to enable other's understanding	1	2	3	4	5	N/A

## Experimentation

I move through multiple iterations in my work	1	2	3	4	5	N/A
I come up with multiple unique solutions before converging on one	1	2	3	4	5	N/A
I make quick prototypes of my ideas	1	2	3	4	5	N/A
I create and share prototypes with users	1	2	3	4	5	N/A
I create and share prototypes with colleagues	1	2	3	4	5	N/A
I experiment in my work	1	2	3	4	5	N/A

### **Diversity**

I foster diversity in teams	1	2	3	4	5	N/A
I ensure everyone's opinion counts	1	2	3	4	5	N/A
I collaborate with external stakeholders	1	2	3	4	5	N/A
I seek diverse perspectives	1	2	3	4	5	N/A
I look for inspiration in a variety of fields, disciplines, and research	1	2	3	4	5	N/A
I consider multiple perspectives in my work	1	2	3	4	5	N/A
I use a holistic approach in my work	1	2	3	4	5	N/A

### **Process Wayfinding**

I am comfortable navigating the ambiguity of a complex problem	1	2	3	4	5	N/A
I am able to get “unstuck” when navigating complex problems	1	2	3	4	5	N/A
I am flexible and adaptable in my approach to solving problems	1	2	3	4	5	N/A
I move from detail-oriented to big-picture elements of the project to help drive outcomes	1	2	3	4	5	N/A
I am able to lead from within a group or team	1	2	3	4	5	N/A

*\*In the actual online questionnaire, these were not grouped by mindset and, instead, were displayed in a random order.*

#### Page Four: Demographic Information

**Please tell us more about the organization you were working for when answering questions on the last few pages.**

Approximate number of employees at organization

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Select all that apply

- Private Sector (for-profit business entity)
- Public Sector (government service entity)
- Not-for-profit Sector (social, educational, health, charitable or other not-for-profit entity)

Primary domain of the organization (e.g. municipal government, design consultancy, post-secondary education, etc.).

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**Please tell us more about yourself.**

Age

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Gender

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Location (province, territory, state, or country)

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Highest level of education achieved

- No certificate, diploma or degree
- High school diploma or equivalent
- Apprenticeship or other trades certificate or diploma
- College, CEGEP or other non-university certificate or diploma
- Bachelor's degree from a university
- Master's degree from a university
- Doctorate or degree in medicine, dentistry, veterinary medicine or optometry

Formal training in design

- Yes
- No
- Not sure

If yes, list the type of certification received

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Formal training in design thinking specifically

- Yes
- No
- Not sure

If yes, list the type of training received

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## Appendix B: Design Probe

### Tools

#### **User Focus Tool**

The Empathy Map tool used in the design probe activity is attributed to Scott Mathews.

#### **Problem Framing Tool**

Five Whys was based on the instructions found in Gamestorming, adapted for individual use.

#### **Visualization Tool**

The introduction to Sketch was based on Patricia Kambitsch's work in graphic recording.

#### **Experimentation Tool**

The Ideation tool was based on work by Linda Carson in creativity and design thinking.

#### **Diversity Tool**

Dot vote instructions were adapted from instructions found in Gamestorming.

#### **Process Wayfinding Tool**

The Facilitation framework used was based on ICA Canada's focused conversation method.

## Reflection Questions

### Reflect on the experience of using the tool

How helpful did you find the tool?

- Not at all helpful
- Not very helpful
- Somewhat helpful
- Helpful
- Very helpful

What stood out to you while using the tool?

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What insights did you gain by using the tool?

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How did it help and/or hinder your progress?

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Any other comments?

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## Appendix C: Glossary of Terms

**approach** the fundamental way a person goes about understanding or solving a problem.

**behaviour** the actions (and intents) used or exhibited by a person in their work.

**co-creation** two or more stakeholder groups working together to design, create, or implement a new product or service.

**design** a plan or the act of creating a plan for a product, service, or system, including the philosophies and approaches used in this work.

**Design Thinking** the practice of design (typically the tools and approaches) by individuals without formal scholarly background in design. Usually involves a five-stage process (e.g. empathize, define, ideate, prototype, test).

**design thinking** (or designerly thinking) the study of and theoretical reflections around a designer's practice (typically skills and competence).

**designerly thinking** see design thinking.

**diversity** a range of different characteristics (e.g. age, race, culture, religion, language, gender, ability, experience).

**diversity mindset** integrating multiple, differing point of views from a variety of sources to develop a holistic perspective.

**empathize phase** research with users to understand and articulate their needs and feelings. Usually involve a genuine interest in the users beyond the research.

**experimentation mindset** moving quickly between divergent and convergent activities with a playful, energetic, and creative attitude.

**frame** the current understanding of the problem area specific to the person or people doing the work.

**human-centred design** (or user-centred design) the overall movement or structure of processes that include design thinking and other approaches/methodologies focused on delivering value to the user more effectively.

**ideation phase** developing numerous ideas or responses to a specific question or problem.

**iteration** the continual repetition of a process or other series of steps.

**methodology** a set of methods and processes and/or a framework for applying the methods.

**mindset** a specific set of beliefs, assumptions, and methods a person uses to interact with the world around them.

**problem definition phase** articulating a given problem. Usually in the format of a “how might we...?” question.

**problem framing mindset** challenge a problem and its frame in an iterative, unconstrained way. Open to the complexity, the ambiguity, and the unexpected inherent in this work.

**process** a specific set of steps or action, typically completed in a linear fashion, used to achieve a desired outcome.

**process wayfinding mindset** having the awareness and flexibility to lead a group through the ambiguity of a complex problem, especially in moments when the group feels stuck. Usually refers to leading from within a group.

**prototyping phase** developing a model to communicate an idea or solution.

**research** investigation or line of inquiry used to better understand a person, environment, or system. Usually with a particular goal or end in mind (e.g. develop evidence and insights around a particular problem).

**suboptimization** the focus on a particular strength until it becomes the only right answer to the detriment to the system as a whole.

**supraoptimization** the intentional divergence of a given process, methodology or approach to reintroduce the complexity and balance lost in its suboptimization.

**testing phase** getting feedback on ideas and prototypes from users.

**tool** a specific item used to complete a task, goal, or method.

**user** any one of the people that experiences a problem or will interact with the solution.

**user focus mindset** using empathy and curiosity to understand the specific needs of a user and using these to guide work.

**visualization mindset** creating rough representations and experiences to make ideas and insights tangible. Having the bias towards these actions.

*The mindsets above are from the 2016 paper by Carlgren, Rauth, and Elmquist (p. 50). All other terms are based on our interpretation of the generally accepted definition, especially as relevant to their use in our research project.*

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## Appendix D: Image Credits

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To acknowledge their contributions to our work, we have listed their names here.

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- Jessica Ruscello
- Jonathan Simcoe
- Maarten van den Heuvel
- Tobias van Schneider
- Syd Wachs
- Mike Wilson

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## Appendix E: About the Authors



**Glen Lombard**

Glen works in Higher Education at an Ontario University where he provides strategic and operational leadership to various areas of ancillary operations and co-curricular programs. Glen is passionate about social justice issues, curious about the interconnected complexity of the world and excited at the possibility of creating resilient futures for the communities he is connected to. In his work and education, Glen is honing his knowledge of strategy, design, and systems thinking.



**Ryan Voisin**

Ryan is the lead for innovation programs at a Design firm. He designs and delivers programming for organizations to increase their capacity for innovation, facilitating conversations between organizations and their key stakeholders to understand and design for diverse perspectives. Through his work and education in knowledge integration and strategic foresight & innovation, he continues to develop his expertise in design thinking, strategic design, futures, and long term planning.



## **The Supraoptimization of Design Thinking: An intentional shift towards complexity**

**Authors:** Glen Lombard & Ryan Voisin

**Degree:** Masters of Design in Strategic Foresight and Innovation, OCAD University (2017)

First introduced decades ago, the term “design thinking” has been used to describe the ways designers think, how non-designers can think like designers, and how organizations can embrace design to become more complex-capable. The research project sought to identify and validate the core competencies related to design thinking. An online questionnaire was used to validate a set of six mindset themes identified in the literature review and to reveal how they are connected. A design probe activity was used to understand how individuals can develop in each of the six mindset themes. Despite a limited sample size, the data revealed promising connections between the mindsets themes. User Focus, Diversity and Problem Framing appeared to be the three core mindset themes with a sixth mindset theme, Process Wayfinding, acting as a balancing force. The research project concludes with recommendations on the role of design thinking for organizations, how individuals can understand and improve their capacity for design thinking, and how a design thinking instrument could support both of these goals.