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The Shortcomings of Design Thinking when Compared to Designerly Thinking


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ABSTRACT This paper contributes by clearly identifying the shortcoming of design thinking as well as pinpointing where to begin in terms of achieving a more solid conceptualization of the concept. To identify its potential shortcomings, this study examines the theoretical structure of design thinking and compares it to the theoretical structure of designerly thinking. This comparison suggests that the current conceptualization of design thinking lacks methodological approaches, that is, guidelines concerning how best to approach a given problem and how to competently select, configure, apply and

evaluate the tools and techniques needed to tackle that problem. In its present form, design thinking facilitates the general, non-situated application of tools and techniques, which is neither linked to nor anchored in a design paradigm.

KEYWORDS: design thinking, designerly thinking, methodological approaches, situated actions

Introduction

 When the concept of design thinking was first introduced, approximately 15 years ago, it was praised by universities, businesses and consultancies alike. Evidence of the increasing amount of attention being paid to the concept can be found in its widespread implementation within business practices by leading companies, such as SAP, IBM and Procter & Gamble, the growth and popularity schools that teaches design thinking e.g. d.schools (Korn and Silverman 2012) and the growing number of related studies in adjacent fields, such innovation management (Calgreen, Elmquist, and Rauth 2016).

However, despite the initial praise given to it by those in the business sector, a large part of the academic and practitioner design community rather quickly became critical of the design thinking concept. Even though it appeared capable of enhancing the design field's influence and reach at the strategic level of firms, design scholars and practitioners ultimately rejected the design thinking concept, arguing that it had nothing to do with their field or practice. For instance, Vinsel (2017, 1) noted, 'I am struck, however, by how many designers believe that [design thinking] is nonsense.'

Consequently, many design scholars disregarded and ignored discussions concerning design thinking, believing it to be irrelevant. More recently, innovation management scholars have criticized design thinking for its lack of both a clear definition and a clear methodology (Johansson-Sköldberg, Woodilla, and Çetinkaya 2013). Furthermore, studies have shown that implementing design thinking within organizations is very challenging, which has caused management scholars to question its value (Carlgren et al. 2016). As the mounting criticism of design thinking has a negative influence on how design in general is perceived, we argue that the concept should not simply be either adopted or ignored, but rather that a closer examination of design thinking is needed.

The Roots of Design Thinking and of Designerly Thinking

One of the cornerstones of the discussion concerning design thinking is the distinction between the concept of 'design thinking' and the design research field, which scholars refer to as 'designerly thinking' (Johansson-Sköldberg, Woodilla, and Çetinkaya 2013; Cross 2006).

The design thinking concept has been constructed from the beginning of the 21st century, with practicing designers as the main contributors including Kelley (2001), Brown (2008), Martin (2004), Dunne and Martin (2006) and Boland and Collopy (2004). 'Design thinking' was introduced as a label for exporting IDEO's design processes and methods to be deployed outside the context of design by people without a background in design, such as managers, consultants, and educators (Kelley 2001). The following development sought to explain design thinking as an iterative innovation cycle of proposal generation, prediction, testing, and generalizing, which would help companies to design better products, gain a competitive advantage and ultimately increase business revenue (Dunne and Martin 2006; Martin 2004). More recently scholars have started to research design thinking as a management theory on its own (Boland and Collopy 2004; Johansson-Sköldberg, Woodilla, and Çetinkaya 2013; Cross 2006).

Designerly thinking, however, is founded on the design research community's longstanding desire to understand design practice and to establishing itself as a discipline in its own right. It is rooted in works dating back to Archer (1968), Jones (1969) and Simon (1969) that defined design as the 'creation of artefacts' and strove to develop a rational and repeatable design methodology. Later scholars argued how design practice is significantly different from rational problem solving, since it involved the solving of a wicked problem (Rittel and Webber 1973). This view laid the grounds for the succeeding comprehension of designerly thinking as 'reflective practice' (Schön 1983) with a particular 'designerly way of knowing' where problem solving is built on neither deduction nor induction, but rather on abduction (Cross 2006). Designerly thinking is a practice-based approach to solving problems, making sense of things, and developing new knowledge (Buchanan 1992; Lawson 2006; Krippendorff 2006).

Although it is clear that design thinking and designerly thinking have different focuses, we and others argue that the design and design thinking community simply cannot ignore the fact that the two concepts rub-off on each other (cf. Rossi 2016; Johansson-Sköldberg, Woodilla, and Çetinkaya 2013; Cross 2006). Due to the interrelatedness of these two fields, we need to understand and to compare the theoretical structures of the concepts. In this paper, we take a first step towards achieving this. First, we introduce the key features of a theoretical structure that ensures the competent creation of knowledge. Then, we use that structure to compare the theoretical structures of design thinking and designerly thinking, with the aim of identifying any shortcomings in the design thinking concept. Finally, we discuss the consequences of the identified shortcomings in relation to the application by non-designers of process models, tools and techniques derived from design thinking to business practices. This may serve to illustrate why some within the design community consider design thinking in its current form to be a hollow

concept. It may also reveal why implementing design thinking within organizations is a challenging process that often fails (Carlgren, Elmquist, and Rauth 2016).

A Theoretical Structure That Ensures Competent Creation of Knowledge

Arbner and Bjerke (1997) have identified the key features of a theoretical structure that ensures competent creation of knowledge. The main argument of Arbner and Bjerke is that in order to obtain a deeper and more accurate understanding of any issue, it is important to be aware of, and to account for, different methodological approaches and unconscious assumptions. Building on Arbner and Bjerke's research (1997), we suggest the division of the theoretical structure into three categories: (1) methodological approaches; (2) ultimate presumptions or collective paradigm; and (3) situated actions.

Methodological Approach

Arbner and Bjerke (1997) argue that every researcher or practitioner has a very specific methodological approach that influences how they understand a given problem area as well as how they select and apply different tools and techniques to that problem area. For instance, if we ask an engineer, an anthropologist and a designer to address a problem and we provide them all with the same range of tools, the outcomes of their work would most likely be very different, since their perspectives on the problem and their applications of the tools and techniques would differ. The key reason why their results would differ is that their specific methodological approaches influence how they each understand a given problem area, how they select, understand and adapt tools and techniques to that problem area, as well as how they interpret the result(s). Whether the researcher or practitioner is conscious of it or not, their methodological approach reflects their assumptions of reality and, therefore, shapes their outcomes (Arbner and Bjerke 1997). However, in order to understand how and why a methodological approach influences both our perception of a given problem and our use of existing tools and techniques, it is necessary to first understand its basis.

Ultimate Presumptions or Collective Paradigm

A methodological approach is based on an individual's ultimate presumptions. These presumptions guide the way individuals view specific situations, people and objects, as well as how they see their own role with respect to those factors. Yet, when conducting research, we do not refer to our individual ultimate presumptions. Instead, we refer to the collective paradigm of the research community to which we belong.

A research community typically shares a paradigm that consists of the community members' most fundamental assumptions, understandings and values with respect to the world. The paradigm

changes over time. Hence, it provides an understanding of the community's present: (1) conception of reality; (2) beliefs about the objects/subjects they study; (3) scientific ideals; and (4) ethics and aesthetics (Arbno and Bjerke 1997). Whereas presumptions and paradigms are both abstractions, methodological approaches provide a framework for concrete actions. In other words, methodological approaches transform our understandings, values and beliefs into actions. For instance, if we perceive reality to be rational, we will adopt a rational methodological approach to it, and we will also most likely apply tools and techniques in such a way that will provide the most rational and measurable result(s).

Situating Tools and Techniques

Having determined on what methodological approaches are based, we are now able to describe both what they are and what they do. Methodological approaches guide researchers' understanding of the problem area and enable them to apply and transform general tools and techniques into relevant and efficient actions. Hence, methodological approaches help researchers to select relevant tools, to adapt them in a relevant way to the problem at hand, and to draw appropriate conclusions from their use. The paradigm and the methodological approach influence both the understanding of the problem area as well as the selection and application of appropriate tools and techniques. This means that methodological approaches enable researchers to engage in situated actions (Suchman 2006).

Examining Theoretical Structures

Along with the theoretical structure, Arbno and Bjerke (1997) also published a harsh critique alleging that many consultants and researchers in the business community who create technique-oriented studies would achieve only insignificant or superficial results. They found that consultants and researchers would simply randomly apply different tools and techniques, without considering how their methodological approach and ultimate presumptions might influence both how they interpret the problem at hand and how they select tools and techniques to approach that problem.

Since, the ambition of design thinking has been to export methods and processes from the design field to other fields and in particular to the business field, we found it relevant to explore whether Arbno and Bjerke's (1997) theoretical structure could be useful for understanding the challenges that have emerged with respect to design thinking. By examining the respective theoretical structures of design thinking and designerly thinking, we aim to identify any potential shortcomings in the design thinking concept, which may help to explain why some within the design community find that design thinking in its current form lack a significant element. We also aim to clarify why implementing design thinking is such a challenging process.

Research Design

The research process involved in the present study can be divided into two basic stages. First, the key contributions with respect to both design thinking and designerly thinking were identified. Second, the identified contributions were analysed according to Arbnor and Bjerke's (1997) theoretical structure, in an effort to compare the two concepts.

To identify the key contributions regarding design thinking and designerly thinking, we relied on a prior literature review of the two concept (Johansson-Sköldberg, Woodilla, and Çetinkaya 2013), which we updated to include literature from 2013 to 2018, identifying the most cited contributions during that period. Searches were performed using Web of Science and Scopus to identify literature published before 16 May 2018 that included the words 'design thinking' and/or 'designerly thinking' in the title, abstract or keywords. The search excluded all areas related to the health sciences, and it was further limited to publications with more than five references. After the search for relevant literature had been performed, the selection of the key works was based on a content evaluation of their influence on current studies concerning design thinking or designerly thinking (i.e. studies that are highly referenced for defining purposes). Sixteen core works were selected on the basis that they contributed to defining the concepts of design thinking or designerly thinking (see Table 1).

In addition to the key literature, the literature review covering the period from 2013 to 2018 also resulted in the identification of a number of contributions that attempted to organize and categorize the literature on 'design thinking' (e.g. Carlgren, Rauth, and Elmquist 2016; Fleury, Stabile, and Carvalho 2016).

During the second stage of the research process, the focus of the analysis was on identifying the central themes within the core literature that are commonly used in the argumentation and explanations concerning the concepts of design thinking and designerly thinking. The key literature was analysed according to Arbnor and Bjerke's (1997) model to synthesize and make explicit the different aspects of designerly thinking and design thinking as well as to create two theoretical structures that could be compared. The analyses focused on those levels within Arbnor and Bjerke's (1997) model that can be generalized, namely the paradigm, the methodological approach, as well as the tools and techniques.

Analysis

The first analysis concerned the literature on designerly thinking, while the second concerned the literature on design thinking. Tables 2 and 3 present an overview of the two analyses.

Table 1. Key literature concerning designerly thinking and design thinking.

<i>Designerly Thinking</i>	<i>Design Thinking</i>
Buchanan (1992) Wicked Problems in Design Thinking (peer-reviewed journal, 2316 citations)	Beckman and Barry (2007) Innovation as a Learning Process: Embedding Design Thinking (peer-reviewed journal, 451 citations)
Cross (2006) Designerly Ways of Knowing (book, 2251 citations)	Boland and Collopy (2004) Managing as Designing (book, 644 citations)
Dorst and Cross (2001) Creativity in the Design Process: Co-Evolution of Problem–Solution (peer-reviewed journal, 1664 citations)	Brown (2008) Design Thinking (peer-reviewed journal, 729 citations)
Krippendorff (2006) The Semantic Turn (book, 1488 citations)	Dunne and Martin (2006) Design Thinking and How It Will Change Management Education (peer-reviewed journal, 576 citations)
Lawson (2006) How Designers Think (book, 4224 citations)	Liedtka and Ogilvie (2011) Designing for Growth: A Design Thinking Toolkit for Managers (book, 282 citations)
Rittel and Webber (1973) Dilemmas in a General Theory of Planning (peer-reviewed journal, 11,962 citations)	Kelley (2001) The Art of Innovation (book, 1789 citations)
Schön (1983) The Reflective Practitioner (book, 57,561 citations)	Martin (2004) The Design of Business (book, 1356 citations)
Simon (1969) The Science of the Artificial (book, 24,489 citations)	Verganti (2009) Design Driven Innovation (book, 933 citations)

The Theoretical Structure of Designerly Thinking

The paradigms of designerly thinking

When analysing the literature on designerly thinking, we were able to identify three key aspects of the designerly thinking paradigm, namely:

1. *wicked problems* as a conception of reality;
2. *abductive reasoning* as a way of reasoning; and
3. *contextual meaning making* as the main value or ‘truth criterion’.

In particular, the works of Rittel and Webber (1973), Buchanan (1992), Lawson (2006) and Cross (2006) point to ‘wicked problems’ as being central to designers’ conceptions of reality. According to the concept of designerly thinking, problems are understood as complex, indeterminate and ill-defined, and they are considered to be

Table 2. Overview of the theoretical structure of designery thinking. The paradigms, methodological approaches and tools/techniques associated with designery thinking.

<i>Paradigms of Designery Thinking</i>	
Wicked Problems Complex, indeterminate and ill-defined problems.	Abductive Reasoning Propositions of potential futures, which are tested empirically.
<i>Methodological Approaches in Designery Thinking</i>	
Reflective Practice Reflection in action and reflection on action (process reflection).	Framing Reflecting and challenging both solution and problem through rephrasing.
Co-Development of Problem and Solution An iterative process whereby the understanding of the problem and the solution is co-developed.	Dialogue with the Situation Visual and physical creations drive the process on more levels and between people.
<i>Examples of Tools and Techniques in Designery Thinking</i>	
<ul style="list-style-type: none"> • Tools for inquiring: interviews, focus groups, observation, ethnography, etc. • Tools for identifying a direction: narratives of ideal futures, future scenarios, character space, analogy/metaphors etc. • Tools for creating a solution: combination/combinatorics, mutation, first principles, emergence etc. 	

Paradigms of Designery Thinking

Wicked Problems

Complex, indeterminate and ill-defined problems.

Abductive Reasoning

Propositions of potential futures, which are tested empirically.

Contextual Meaning

Evaluating whether a design makes sense in the context.

Methodological Approaches in Designery Thinking

Reflective Practice

Reflection in action and reflection on action (process reflection).

Co-Development of Problem and Solution

An iterative process whereby the understanding of the problem and the solution is co-developed.

Framing

Reflecting and challenging both solution and problem through rephrasing.

Dialogue with the Situation

Visual and physical creations drive the process on more levels and between people.

Solution-Led Goal Analysis

Focus on creating the right solution rather than qualifying the goal.

Modal Shifts

Rapid shifts between different aspects of the task and different modes of activity.

Examples of Tools and Techniques in Designery Thinking

- **Tools for inquiring:** interviews, focus groups, observation, ethnography, etc.
- **Tools for identifying a direction:** narratives of ideal futures, future scenarios, character space, analogy/metaphors etc.
- **Tools for creating a solution:** combination/combinatorics, mutation, first principles, emergence etc.

Table 3. Overview of the theoretical structure of design thinking. The paradigms, methodological approaches and tools/techniques associated with design thinking.

<i>Paradigms of Design Thinking</i>	
Wicked Problems Complex, indeterminate and ill-defined problems.	Abductive Propositions of potential futures, which are tested empirically.
	Contextual Meaning Evaluating whether a design makes sense in the context.
<i>Methodological Approaches in Design Thinking</i>	
	Explorative Learning An iterative learning process wherein the proposed problem and solution are tested through feedback.
<i>Suggestions for actions in Design Thinking</i>	
Phase models Inspiration, ideation and implementation (Brown 2008). Listening, interpreting and addressing (Verganti 2009). Observation, frameworks, imperatives and solutions (Beckman and Barry 2007). What is? What if? What wows? What works? (Liedtka and Oglivie 2011).	Perspectives User, technology and business (Kelly 2001). Cultural interpreters and technology interpreters (Verganti 2009). The customer wants it, the firm can produce it, economics can sustain it (Liedtka and Oglivie 2011).
Organization Multidisciplinary Teamwork, Co-Creation, Human-Centred	
<i>Tools and Techniques in Design Thinking</i>	
Focus groups, shadowing, five whys, mock-ups, usability testing, prototyping, card sort, cultural probes, storytelling, card sort, brainstorming, extreme user interviews, scenarios, mind maps, clustering, sketch, insights, creative frameworks, rapid experimentation, prototyping, user camera study, analogous empathy, story share-and-capture, saturate and group, empathy map, journey map, composite character profile, 2 x 2 matrix, why-how laddering, point-of-view analogy, body storming, Wizard of Oz, feedback capture grid, reframing, sensibility notebooks, generative session, one day in the life, insight cards, affinity diagrams, conceptual maps, personas, blueprint, ideas menu, positioning matrix, paper mock-ups, models, staging, storyboards.	

characterized by incomplete, changing, contradictory and inter-dependent information, which is difficult to gather (Buchanan 1992).

Second, we found that the form of reasoning associated with designerly thinking is widely accepted to be abductive reasoning (Lawson 2006; Cross 2006). The reliance on abductive reasoning leads back to the works of Peirce (1903), who described it as involving propositions or qualified 'guesses' that need to be empirically tested. The use of abductive reasoning can be traced back to the character of the problems being described as 'wicked' (Dorst 2011; Rittel and Webber 1973).

Finally, we found that the major truth criterion or value associated with designerly thinking is *contextual meaning making* (Cross 2006; Krippendorff 2006). Design is a meaning-making activity, wherein the primary goal is to create new artefacts that make sense in the context for which they are intended. In the end, the solution is measured based on the value it contributes to the context (e.g. human, situation) for which it was intended (Krippendorff 2006).

Methodological approaches within designerly thinking

From the key literature concerning designerly thinking, we were able to identify several methodological approaches. Not all of them are included in Table 2. Rather, we chose to include only those approaches that were identified by several authors. This means that we have excluded those methodological approaches that were mentioned by only a single author or that were not ultimately recognized as being fully successful or productive (see, for example, Cross 2006, 105 *on attachment to concepts*). Further, we combined those approaches that were found to fully or partly overlap, albeit with different names. This resulted in a list of six methodological approaches that are key to designerly thinking:

1. Reflective practice.
2. Co-development of problem and solution.
3. Framing.
4. Dialogue with the situation.
5. Solution-led goal analysis.
6. Modal shift.

The first methodological approach we identified within the literature concerning designerly thinking was reflective practice. In particular, the extensive work of Schön (1983) and, later, the work of Lawson (2006), Cross (2006) and Buchanan (1992) pointed to reflective practice being a widely used approach in relation to designerly thinking, since it allows competent practitioners to utilize their tacit knowledge through a 'conversation' with the situation, during which they shift between reflection in action (while doing) and reflection on action (process reflection).

The second methodological approach we identified was the co-development of problem and solution (Cross 2006). In relation to

designerly thinking, this approach means that, rather than trying to first understand the problem and then to solve it (which is the standard process involved in most problem-solving methodologies), designers engage in an iterative process of suggesting and evaluating proposals. Whereof a greater understanding of both the problem and the solution emerges (Dorst and Cross 2001)

The third methodological approach we identified was framing. During the process of reflective practice, the practitioner frames or reframes the design situation (Schön 1983). Framing serves as a working hypothesis or as a direction for the project, which is then tested. Buchanan (1992) described framing as a source for new ideas and opportunities. Reframing allows for the rephrasing of the problem or the situation, which is thereby extended beyond the obvious to determine whether the problem is actually a symptom of another problem and, eventually, to identify the core of both the problem and the solution (Dorst 2011).

The fourth approach we identified within the key literature concerning designerly thinking involved engaging in a dialogue with the situation. The creation of models, sketches and prototypes is a key approach for capturing the tacit knowledge relevant to the design situation and transforming it into testable proposals or solutions (Cross 2006). In this regard, the creation of physical artefacts becomes a central aspect of making '*intuitive knowing in the midst of action*' apparent (reflection in action) as well as a means of making decisions about the next step (reflection on action) (Schön 1983).

The fifth methodological approach we identified was solution-led goal analysis. Designerly thinkers do not spend much time qualifying their goal. Instead, they focus on identifying the right solution (Cross 2006) and ensuring that the identified solution is meaningful to both the users and the context (Krippendorff 2006). This approach involves searching for a deeper understanding of users' aspirational values and priorities as well as identifying a path towards the most desirable future (Dorst 2011; Krippendorff 2006). It also means that the goal may be subject to changes along the way (Cross 2006).

The final methodological approach we identified within the key literature concerning designerly thinking was modal shift (Cross 2006). Designerly thinkers rapidly switch their attention between different tasks and different types of activities (Akin and Lin 1995). For instance, they might focus on the overall project and then on a smaller detail of the project, or they might rapidly shift between analysis, synthesis and evaluation. This modal shift has been found to heighten the quality of the eventual solution (Cross 2006).

The tools and techniques associated with designerly thinking

The majority of the key literature concerning designerly thinking focused on the paradigms and methodological approaches

associated with the concept. However, we were able to identify some key tools and techniques, which can be divided into tools/techniques for inquiring, tools/techniques for identifying a direction (or framing) and tools/techniques for creating a solution. Examples of various tools and techniques are provided in [Table 2](#).

The Theoretical Structure of Design Thinking

The paradigms of design thinking

During the analysis, we determined that the central paradigms of design thinking are surprisingly similar to the central paradigms of designerly thinking. In both cases, wicked or ill-defined problems represent a significant topic within the problem-solving discourse (Johansson-Sköldberg, Woodilla, and Çetinkaya 2013) as well as a key conception of reality. In terms of design thinking, the notion of wicked problems has been adopted from the work of key authors in the field of designerly thinking, and it has been extended by, for example, Boland and Collopy (2004), Brown (2008) and Martin (2004).

Similarly, the reasoning most commonly applied in design thinking was identified as abductive reasoning. Both Boland and Collopy (2004) and Martin (2009) adopted the notion of abductive reasoning from key works concerning designerly thinking and then extended it by describing abduction as the logic of possibility. Martin (2009) described deduction as moving from the general to the specific and induction as moving from the specific to the general, whereas abduction permits reasoning between data-driven analytical thinking and knowing-without-reason intuitive thinking through the consideration of propositions.

Finally, in relation to design thinking, the truth criterion was also identified as contextual meaning making (see, for example, Brown 2008; Liedtka and Ogilvie 2011). In addition to the constant use of words such as empathy, human-centred, co-creation and participatory design in the design thinking literature, authors such as Verganti (2009) described design as a meaning-making activity. In the end, design is measured based on the value it offers to the context (e.g. human, situation) for which it is intended.

The methodological approach (and suggestions for actions) in design thinking

In the literature concerning design thinking, we identified one core approach. Explorative learning has been recognized as a key methodological approach in relation to design thinking by several authors (Brown 2008; Kelley 2001; Beckman and Barry 2007). As design thinking deals with wicked problems, the knowledge needed to develop appropriate solutions is not defined at the beginning of the process, nor is it ever complete, which renders design a learning process. Beckman and Barry (2007) even suggested that the design

thinking process resembles Kolb's (1984) experimental learning cycles. Many variations of the iterative learning process exist, being typically exemplified by continuous steps of inspiration, ideation and implementation (Brown 2008).

In the key literature concerning design thinking, we further identified a significant number of process models, perspective models and ways to organize the work in design thinking projects. Initially, we considered these to be methodological approaches; however, following a more thorough review, it became apparent that these normative guidelines or 'suggestions for action' were not really methodological approaches. According to Arbnor and Bjerke (1997), a methodological approach secures situated actions. However, the majority of the process models or action models did not focus on situating the action in relation to the problem situation – that is, they did not help the design thinker to adapt or align different tools to the specific problem situation at hand or to ensure that the use of different tools and techniques was aligned with the design thinking paradigm. Hence, these action models cannot be categorized as methodological approaches. Yet, since the models were found to be fairly dominant in the design thinking literature, it was necessary to position them in a category of their own. We named this category 'suggestions for actions', and within it we identified three categories of 'suggested actions', namely *phase models*, *perspectives* and *organization*.

The phase models mentioned in the design thinking literature typically consist of three to five steps with an iterative or circular setup. For instance, *inspiration*, *ideation* and *implementation* (Brown 2008). In a 2016 literature review concerning design thinking, it was concluded that most phase models feature immersion, ideation and prototyping phases (Fleury, Stabile, and Carvalho 2016), and it was further determined that the number of phase models is continuously growing.

In addition to the phase models, there are a variety of models associated with design thinking that focus on the different perspectives that need to be taken into consideration throughout the design thinking process. For instance, *user*, *technology* and *business* (Kelley 2001), *cultural interpreters* and *technology interpreters* (Verganti 2009) or *the customer wants it, the firm can produce it and economics can sustain it* (Liedtka and Ogilvie 2011).

Finally, the design thinking literature included suggestions for how best to organize people, interactions and focuses during the design thinking process in terms of multidisciplinary teamwork, co-creation and human-centred design.

The tools and techniques associated with design thinking

When searching for tools and techniques within the key literature on design thinking, we identified a relatively high number when

compared to those featured in the literature on designerly thinking. When we considered the secondary literature, the number increased. This shows that, in relation to the design thinking concept, significant attention has been paid to the development of practical tools and techniques. We did not consider it relevant to identify all the tools and techniques associated with design thinking. Rather, in [Table 3](#), we have included those tools and techniques that a literature review from 2016 identified as being significant within the body of knowledge concerning design thinking (Fleury, Stabile, and Carvalho 2016).

Comparing Designerly Thinking and Design Thinking

When comparing the theoretical structures of designerly thinking and design thinking, two major differences stand out. The first major difference is that designerly thinking is very much focused on the paradigms and the methodological approaches, as well as on the interrelationships between these factors, whereas design thinking mainly focuses on ‘suggested actions’, tools and techniques.

In both the designerly thinking and the design thinking literature, the paradigms are quite well defined and clearly unfolded. However, while in designerly thinking the paradigms are often unfolded with clear links to the methodological approaches, design thinking mainly focuses on comparing the design thinking paradigms to other paradigms (e.g. business paradigms). When considering designerly thinking, we identified six key methodological approaches, whereas we only identified one in relation to design thinking. Instead, design thinking was found to involve a large number of ‘suggestions for actions’. Finally, designerly thinking has very little focus on tools and techniques when compared to design thinking, which involves a vast amount of tools and techniques.

The second major difference that we identified when comparing the theoretical structures of designerly thinking and design thinking concerns the mode of communication. In terms of designerly thinking, the methodological approaches are described as ways of working or ways of practicing design, which are often based on research by professional designers. More specifically, the methodological approaches are described as handles that help designers to adapt to different problem situations and to ensure that the actions taken are situated actions. This is quite different from the way in which ‘suggestions for actions’ are typically communicated in relation to design thinking. Here, ‘suggested actions’ are often described in a ‘cookbook’ format featuring significant phases and tools selected for each phase.

Discussion

If we consider the histories of both designerly thinking and design thinking, it may be unsurprising to note that designerly thinking has focused on the paradigms and methodological approaches of design, whereas design thinking has focused on the ‘suggestions for

action' as well as on the tools and techniques. The aim of designerly thinking is to establish itself as a discipline in its own right and, in order to do so, identifying the key paradigms and methodological approaches is key. However, the aim of design thinking is to export designers' ways of thinking to non-designers, with the most straightforward way of doing so being the use of tools and techniques (which, by the way, is very similar to how the teaching of design students is generally conducted during the early years). Since design thinking is currently subject to a significant amount of criticism, it is only reasonable to explore the impact that these differences in focus may have on design thinking in practice. This involves the consideration of various questions: *What are the disadvantages of design thinking's focus on 'suggested actions' and 'tools and techniques'? What are the disadvantages of applying 'suggested actions' rather than methodological approaches?*

Disadvantages of Focusing on Suggested Actions, Tools and Techniques

If we consider the theoretical structure of design thinking from a practice perspective, it provides a good overview of the design thinking paradigms as well as of the 'suggestions for actions', tools and techniques. Now, let us imagine a situation in which a non-designer seeks to apply design thinking to a practice situation. He or she may have an understanding of the design thinking paradigms, but can we be sure that the paradigms are translated into situated actions when only *one* methodological approach is available?

Our best guess is that if a non-designer starts to apply the 'suggestions for actions', tools and techniques associated with design thinking, there exists a significant likelihood that he or she will apply the methodological approaches from his or her own community (e.g. business). This also suggests that he or she (whether consciously or otherwise) will apply the paradigms from that initial community, which in turn means that the applied actions will not be situated and, therefore, that there will be no guarantee as to the success of the result(s).

Design thinking offers no link, no methodological approach, between the design thinking paradigm and the design thinking 'suggestions for actions'. To accommodate this, a non-designer will most likely apply his habitual methodological approach (which is built on his habitual paradigms), when deploying the design thinking 'suggestions for actions'. This creates challenges in situating action and an unpredictability in outcome.

Let us consider the example of making a prototype. According to designerly thinking, prototypes are used as tools to support abductive reasoning and to explore whether a product makes sense in the given context. The use of prototypes is guided by methodological approaches such as 'reflective practice' and 'dialogue with the situation'. Hence, any designerly thinker will unconsciously adjust the process according to these methodological approaches. For instance, a prototype may be used to engage in dialogue with the

material; thus, if the making itself has provided sufficient reflection or insight, a designerly thinker may in the process choose not to finish the prototype.

Yet, when prototyping is used as a tool by non-designers and without such methodological approaches, there is a risk that it will not be applied as described above. Let us say an engineer, is asked to construct a prototype and that the only guide he has available is explorative learning. What will he do? Since explorative learning is in itself quite general, he will probably also attempt to apply some of the methodological approaches from his own community. In the field of engineering, prototypes are understood as models used to either test functionality or choose between proposals. These are based on the rational paradigm, which focuses on obtaining facts necessary to make a rational objective decision in order to determine, for example, which function works most optimally. Could this be understood as explorative learning? Probably, something was learned. Yet, if you asked a designer, defining the test, may already limit the explorative learning. This example is somewhat exaggerated to make a point. However, the lack of methodological approaches in design thinking does represent a shortcoming that renders the result of the design thinking process highly dependent on the people who use it.

Disadvantages of Applying ‘Suggestions for Actions’ Rather than Methodological Approaches

Another interesting ‘practice scenario’ concerning the theoretical structure of design thinking involves what occurs when non-designers apply ‘suggestions for actions’ rather than methodological approaches. While ‘suggestions for actions’ might serve as helpful ‘cookbooks’ for novices and non-designers seeking to develop an understanding of the field, using them as the basis for the application for design thinking may prove rather tricky. The reason for this is that ‘suggestions for actions’ are examples of actions that are not fitted to any specific problem situation, that is, they are not situated actions. This also means that when a non-designer applies a ‘cookbook’ recipe to a problem situation, the recipe will not necessarily fit that problem situation. In fact, it is likely that it will not fit. Again, this may explain why scholars outside the field of design complain that ‘design thinking’ does not work. They probably applied ‘suggestions for actions’ that were not really situated and fitted to the problem at hand. This represents a significant challenge, since the ‘suggestions for actions’ gave them the confidence that they could tackle the problem, whereas in reality they missed one of the key aspects of design expertise, namely the ability to fit tools and techniques to a specific problem area.

Conclusion and Implications for Further Research

In this paper, we have taken steps towards naming the unspoken, that is, the shortcomings of design thinking. Design thinking has

previously been subject to a fair amount of criticism; therefore, we have tried to qualify this criticism and to identify the shortcomings of design thinking as a concept. We did so by comparing the theoretical structure of design thinking to the theoretical structure of designerly thinking, and we found that the present conceptualization of design thinking has a dominant focus on ‘suggestions for actions’, tools and techniques. Furthermore, we found that the design thinking concept lacks the methodological approaches needed to ensure that the design thinking paradigm is embedded within any actions taken as well as to ensure that any actions taken in relation to a design thinking project are situated and fitted to the specific problems of that project.

The identified theoretical shortcomings of design thinking caused us to realize that design thinking as a concept does not provide non-designers with sufficient guidance when it comes to selecting, adapting and using design tools and techniques in a designerly way, which is in accordance with the design thinking paradigm. It also fails to provide guidance on how to engage in situated actions that are fitted to the specific design challenge at hand. It also raises questions on whether design thinking can in fact be applied by a non-designer, or whether a designer is needed to guide the process.

The aim of this study has been to add nuance to the discussion concerning design thinking. It is too easy to simply say that design thinking is nonsense. For many outsiders, design thinking represents an access point into the design field, and we cannot continue to ignore the fact that the access does not always work as it should. This study contributes to the literature by clearly identifying the shortcoming of design thinking as well as pinpointing where to begin in terms of achieving a more solid conceptualization of the concept. It is clear that we need to identify and unfold methodological approaches for design thinking. Through this study, we hope to initiate further discussions between the design thinking and the design research community to advance coherent theory building.

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