

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

## Design Thinking as an Enabler of Innovation:

Exploring the concept and its relation to building innovation capabilities

LISA CARLGREN

Division of Innovation Engineering and Management  
Department of Technology Management and Economics

CHALMERS UNIVERSITY OF TECHNOLOGY

Gothenburg, Sweden 2013

Design Thinking as an Enabler of Innovation:  
Exploring the concept and its relation to building innovation capabilities  
LISA CARLGREN  
ISBN 978-91-7385-918-9

© LISA CARLGREN, 2013.

Doktorsavhandlingar vid Chalmers tekniska högskola  
Ny serie nr 3599  
ISSN 0346-718X

Division of Innovation Engineering and Management  
Department of Technology Management and Economics  
Chalmers University of Technology  
SE-412 96 Gothenburg  
Sweden  
Telephone + 46 (0)31-772 1000

Printed by Chalmers Reproservice  
Gothenburg, Sweden 2013

Design thinking as an enabler of innovation:  
Exploring the concept and its relation to building innovation capabilities

Lisa Carlgren  
Technology Management and Economics  
Chalmers University of Technology

## ABSTRACT

This thesis deals with the concept of Design thinking (DT) and the building of innovation capabilities. DT has emerged as a management concept promising innovation inspired by design. However, the concept is poorly conceptualized and scarcely investigated in organizational settings, especially in relation to its potential role as an enabler of innovation. Building on empirical studies of companies claiming to use DT, the thesis aims at providing a better understanding of the concept, how it is used in innovation work, and its role in building innovation capabilities in large firms.

The studies show large variety in the understanding and use of the concept, and its integration in and adaptation to existing practices. The concept of DT seem to be somewhat stuck in between the fields of innovation and design. On the one hand the concept can be seen as (over)simplifying the complexity of design practice; on the other hand, the results of this thesis show that use of DT is aligned with several practices highlighted by innovation scholars.

The thesis makes two main theoretical contributions. First it argues for a performative perspective on DT that does not focus on what DT *is* or what value it *has*, but rather what it *becomes* and what it *can do* in various settings; thus putting focus on context. A conceptual model for how to understand DT as a boundary object is proposed, consisting of five core principles associated with a set of principles, practices, and techniques. It takes account of the fact that DT takes different shapes in different contexts, and accommodates to a variety of ways of applying and using DT.

Second it argues that DT can play a role in building innovation capability in large firms. The studies show how a range of perceived values and effects of using DT are connected to elements presented in innovation capability theory; resources, processes, mindset and a strategic intent to innovate. It is argued also that the current status of the innovation capability of a firm can hinder or enable use of DT and the competences built, thereby influencing potential value resulting from its use. There are few previous examples in the literature of how innovation capabilities are built, and this thesis adds a new approach; building innovation capability through the long-term use of DT, and in interplay with the current capability of the organization.

The thesis shows that the perceived effects of using DT go beyond practical innovation work, and argues that when managers consider using DT, it is critical to not consider the concept in isolation, or demand results too fast, but rather to take a systemic perspective, considering all aspects of resources, process and mindset. The thesis also paves the way for more research, both on the use of DT and on how innovation capability can be built.



## LIST OF APPENDED PAPERS

This thesis is based on the work contained in the following papers, referred to by Roman numerals in the text:

### **Paper I**

Carlgren, L. (2013): Identifying latent needs: towards a competence perspective on attractive quality creation, *Total Quality Management & Business Excellence*, DOI:10.1080/14783363.2013.776762

### **Paper II**

Carlgren L., Elmquist M. and Rauth I. (2012) Implementing design thinking in large organizations, *paper presented at the International Product Development Management Conference*, Manchester, UK, June 17-19.

### **Paper III**

Carlgren L., Elmquist M. and Rauth I. Demystifying design thinking: Exploring design thinking in practice, *submitted to an international journal*.

### **Paper IV**

Carlgren L., Elmquist M. and Rauth I. Design thinking: exploring values and effects from an innovation capability perspective, *submitted to an international journal*.

An earlier version of this paper was presented at the *European Academy of Design Conference*, in Göteborg, Sweden, April 2013.

### **Paper V**

Carlgren, L. Design thinking in innovation work: revisiting Kaiser Permanente, *submitted to an international journal*.

## ACKNOWLEDGEMENTS

Writing this thesis has been a long, exciting and difficult journey, which of course would not have been possible without the tremendous support I have received from colleagues, family, friends and fellow PhD students.

First and foremost I would like to thank the persons that I have worked the closest with: my supervisor Maria Elmquist for being the most amazing, inspiring person on earth, who through harsh critique, firm dead-lines and never-ending encouragement helped me realize this thesis and become a better researcher. I will never forget how you have helped during late nights and not the least, understanding the challenges of writing a PhD thesis with two small children. It has been incredibly fun to do research with you and write papers together.

My assistant supervisors for the last three years Anna Rylander and Sverker Alänge have also been invaluable to me through questioning what I have taken for granted, adding insights from other theoretical fields, helping me develop my thoughts and through being very encouraging and helpful. Thank you for being so kind, sharp and inspiring.

Ingo Rauth – what a man, what a designer, what a friend, what a colleague. Doing this research together has been a wonderful journey, and within our project, you, Maria and I have complemented each other in a fantastic way, through our different backgrounds, personalities, ways of thinking and writing. I have really appreciated working with you, being smitten with your energy, arguing over how to interpret data, building models, and not the least collecting data together over endless hours of Skype calls, and in and outside of San Francisco during the summer of 2011.

From 2006-2009, I belonged to the Division of Quality Science. I would like to thank all my colleagues there for inspiring conversations, support and friendly atmosphere. I especially enjoyed the company and support of Ida Gremyr, Andreas Hellström, Bo Bergman and later also Marcus Assarlind, Marco Santos, Henry Raharjo and Svante Lifvergren.

In 2010, I moved to the Division of Innovation Engineering and Management. From the first day, I felt very welcome and I am glad to be part of this inspiring group of researchers; for this I want to thank all my colleagues at the division. Sofia Börjesson, my examiner and the head of the Center for Business Innovation (CBI) merits special attention. Thank you for supporting me when other supervisors were absent, and coaching me whenever I needed support. I have especially enjoyed the relaxed and friendly atmosphere among the PhD students at the division, and I thank you all for helping me get through long working days: Anne Elerud-Tryde, Sarah Fallahi, Marcus Linder and Yash Mansoor.

I also want to thank Magnus Holmén for always taking interest and offering help (not the least for providing me with some very bizarre music), Jonas Hjerpe for assisting me when Maria was on parental leave, and Angelica Linnehav for fantastic administrative support and for being so caring.

As a PhD student I have also belonged to a larger group of PhD students at the department, and I have much appreciated your company and support: Lise Aaboen, Ulrika Badenfelt, Lars Bankvall, Nina Edh, Anna Fredriksson, Anna Grzelec, Ludvig Lindlöf, Christina Mauléon, Anna Moses, Åsa Rönnbäck and Björn Söderberg.

Further, I want to express my gratitude to the Center for Business Innovation at Chalmers for supporting our research financially, and indirectly, the Swedish Governmental Agency for Innovation Systems (VINNOVA). I would also like to thank all the company representatives who have participated in the studies, in particular Scott, Chris, and Christi. I have been fortunate in receiving help from other research colleagues that shared their contacts and enabled some of my interviews, especially during my stay in California – thank you Larry Leifer, Martin Steinert, Uli Weinberg, Claudia Nicolai; Bettina Maisch and Sara Beckman.

In the final 24 hours of writing this thesis I had tremendous last-minute support from Anne Elerud-Tryde, Sara Fallahi, Ingo Rauth, Ludvig Lindlöf, Nina Edh, Lise Aaboen and Anna Grzelec. I will be forever grateful for this, and for those of you who are still not done with your thesis writing: I definitely owe you one. I would also like to thank Ylva Carlgren for your help with transcribing interviews, Marcus Jahnke for providing feedback, as well as Cynthia Little who has done a tremendous work in language editing this thesis, at late and early hours.

I would not have been able to do all this work without the support of some dear friends, in Majorna and other parts of the world. I thank all of you, but in particular I would like to express my deep gratitude to Johanna Malcus, Gustav Martner, Bodil Alvarsdotter and Thomas Johansson for letting me spend time to write in your houses at Brännö and in Slottskogskolonin. Our favorite babysitter should not be forgotten either – Sabina Hernevik, you have taken a very active part in making this possible.

I would also like to thank my family: my parents, sisters and brother for believing in me, and my son Sigve and daughter Guro for bringing me so much joy. Finally – Nils. Thank you for being so utterly patient, supporting and caring during all this time. You have been a fantastic father, you have cooked for me, taken care of the children, cleaned our house, fixed my bike and not the least, challenged my thinking. I cannot even think of how I could have done this without you. You are also my biggest motivation, and of course the love of my life. This thesis is therefore dedicated to you. I love you.

Lisa Carlgren, Göteborg, October 14h, 2013





## Table of Contents

<b>1</b>	<b>INTRODUCTION</b>	<b>3</b>
1.1	SETTING THE SCENE	3
1.2	THE INNOVATION IMPERATIVE	3
1.3	THE CHANGING ROLE OF DESIGN	4
1.4	ENTER DESIGN THINKING	4
1.5	PURPOSE AND RESEARCH QUESTIONS	5
1.6	A NOTE ON THE TERM DESIGN AND ITS RELATION TO DESIGN THINKING	7
1.7	OUTLINE OF THE THESIS	8
<b>2</b>	<b>THEORETICAL FRAMEWORK</b>	<b>9</b>
2.1	INNOVATION AND NPD	9
2.1.1	<i>The concept of innovation</i>	9
2.1.2	<i>Innovation and NPD - different logics</i>	11
2.1.3	<i>Management of innovation</i>	11
2.2	A CAPABILITY PERSPECTIVE ON INNOVATION	13
2.2.1	<i>Background</i>	13
2.2.2	<i>Innovation capabilities</i>	14
2.2.3	<i>Building innovation capabilities</i>	16
2.2.4	<i>Critiques relating to the capability perspective</i>	18
2.3	DESIGN THINKING	19
2.3.1	<i>An extended role of design in management</i>	19
2.3.2	<i>Designer competences</i>	19
2.3.3	<i>Design in NPD and innovation debates</i>	21
2.3.4	<i>Emergence of design thinking</i>	23
2.3.5	<i>Understanding design thinking as a concept</i>	24
2.3.6	<i>Representations of design thinking</i>	26
2.3.7	<i>The Promise of design thinking</i>	28
2.3.8	<i>Overlap with related fields</i>	29
2.3.9	<i>Critique from a design research perspective</i>	30
2.3.10	<i>Reflections</i>	32
<b>3</b>	<b>METHOD</b>	<b>34</b>
3.1	THE RESEARCH JOURNEY	34
3.2	RESEARCH APPROACH AND DESIGN	35
3.2.1	<i>Research method/approach</i>	35
3.2.2	<i>Research method</i>	36
3.3	THE RESEARCH STUDIES	37
3.3.1	<i>Design of the research studies</i>	37
3.3.2	<i>Selection of cases</i>	38
3.4	DATA COLLECTION AND ANALYSIS	39
3.4.1	<i>Data collection</i>	39
3.4.2	<i>Data analysis</i>	40
3.5	METHODOLOGICAL REFLECTIONS	41
3.5.1	<i>Relationship to the concept of DT</i>	41

3.6	QUALITY OF RESEARCH.....	42
<b>4</b>	<b>SUMMARY OF PAPERS .....</b>	<b>44</b>
4.1	INTRODUCTION TO THE SUMMARY OF PAPERS.....	44
	LICENTIATE THESIS: THE KREAST PROJECT.....	44
	PAPER I: IDENTIFYING LATENT NEEDS: TOWARDS A COMPETENCE PERSPECTIVE ON ATTRACTIVE QUALITY CREATION.....	46
	PAPER II: IMPLEMENTING DESIGN THINKING IN LARGE ORGANIZATIONS.....	47
	PAPER III: DEMYSTIFYING DESIGN THINKING: EXPLORING DESIGN THINKING IN PRACTICE.....	47
	PAPER IV: DESIGN THINKING: EXPLORING VALUES AND EFFECTS FROM AN INNOVATION CAPABILITY PERSPECTIVE.....	48
	PAPER V: DESIGN THINKING IN INNOVATION WORK: REVISITING KAISER PERMANENTE.....	49
	APPENDIX I: INTEGRATING DESIGN THINKING AT KAISER PERMANENTE: REFLECTIONS ON ENABLERS AND EFFECTS.....	50
<b>5</b>	<b>EXPLORING DESIGN THINKING AND INNOVATION CAPABILITIES .....</b>	<b>54</b>
5.1	UNDERSTANDING DESIGN THINKING.....	54
5.1.1	<i>A performative understanding of the concept puts focus on context.....</i>	<i>54</i>
5.1.2	<i>Design thinking as a boundary object.....</i>	<i>55</i>
5.1.3	<i>Mindset is central.....</i>	<i>56</i>
5.2	USING DESIGN THINKING.....	56
5.2.1	<i>Design thinking and innovation – twin concepts?.....</i>	<i>56</i>
5.2.2	<i>The view on innovation affects the use of design thinking.....</i>	<i>57</i>
5.2.3	<i>The myth of design thinking as a promoter of radical innovation.....</i>	<i>58</i>
5.3	DESIGN THINKING AS A WAY OF BUILDING INNOVATION CAPABILITY.....	59
5.3.1	<i>The use of design thinking can influence processes, resources and mindset.....</i>	<i>59</i>
5.3.2	<i>Design thinking as a way of building capabilities for innovation.....</i>	<i>60</i>
<b>6</b>	<b>ENABLING INNOVATION THROUGH DESIGN THINKING .....</b>	<b>61</b>
6.1	INNOVATION CAPABILITIES AND DESIGN THINKING INTERTWINED.....	61
6.2	A COMPETENCE PERSPECTIVE ON THE USE OF DT.....	63
6.2.1	<i>Design thinking – stuck in the middle between design and innovation?.....</i>	<i>63</i>
<b>7</b>	<b>CONCLUSION AND IMPLICATIONS.....</b>	<b>65</b>
7.1	CONCLUSION.....	65
7.2	IMPLICATIONS FOR PRACTITIONERS.....	66
7.3	IMPLICATIONS FOR THEORY.....	67
7.4	FUTURE RESEARCH.....	68
7.5	REFLECTIONS ON THE VALUE OF THE DOCTORAL THESIS.....	69
	<b>REFERENCES .....</b>	<b>70</b>

# 1 Introduction

## 1.1 Setting the scene

*The need for transformation is, if anything, greater now than ever before. No matter where we look, we see problems that can be solved only through innovation: unaffordable or unavailable health care, billions of people trying to live on just a few dollars a day, energy usage that outpaces the planet's ability to support it, education systems that fail many students, companies whose traditional markets are disrupted by new technologies or demographic shifts.*

*These problems all have people at their heart. They require a human-centered, creative, iterative, and practical approach to finding the best ideas and ultimate solutions. Design thinking is just such an approach to innovation”.*

*Tim Brown, Harvard Business Review, 2008*

Around the early 2000s, the concept of design thinking (DT) emerged as an approach to innovation, and within a few years interest had grown exploded among managers striving to transform their business, and business schools wanting to better prepare their students for an increasingly complex and uncertain environment. Proponents of DT suggest that if firms could only learn to think and work more like designers, they would learn how to address problems differently, come up with breakthrough ideas, balance exploration and exploitation better, and transform their business by being more innovative.

Of course such miracle cures can be questioned, and the concept has already been accused of being the latest management fad, a flower of the day. Nevertheless, an increasing number of firms are implementing DT in various ways, and to judge from anecdotal evidence in increasing numbers of books and business press articles, they are doing so with some success. Yet, to date there is very little empirical research on DT in organizational settings, and in particular research investigating DT in relation to innovation. This thesis seeks to fill this gap, by exploring DT as a concept, and as a potential enabler of innovation in the context of large organizations.

## 1.2 The innovation imperative

In an environment of fierce competition and increasingly complex challenges, innovation is becoming widely acknowledged as a source of competitive advantage (Tushman and O'Reilly, 1996; O'Connor, 2008; Crossan and Appaydin, 2010; Govindarajan et al., 2011). Shrinking margins as well as a trend towards shorter time to market are leading organizations to focus on efficiency, often by relying on analytical approaches to management, striving to reduce uncertainty and waste in development processes (Wheelwright and Clark, 1992; Elmquist, 2005). However, it is being argued that this is

counterproductive since innovation is inherently complex and ambiguous (Eisenhardt and Tabrizi, 1995; Benner and Tushman, 2002; O'Connor, 2008). While many organizations recognize the importance of innovation, they find it hard to achieve (O'Connor, 2008). The difficulties of achieving breakthrough innovation in large, established firms is well documented (e.g. Leonard-Barton, 1992; Dougherty and Heller, 1994; Leifer et al., 2001; O'Connor and McDermott, 2004). Innovation efforts traditionally focus on how to exploit known technology in new markets or on how to develop new technology for established markets. There is a growing emphasis on how to develop more innovative offerings as well as more innovative ways of creating value for either the customer or the firm.

### **1.3 The changing role of design**

In the search for alternative approaches to innovation, there is emerging interest in design in management debates, understood in a broader sense than being about form and function (Gemser and Leenders, 2001; Bruce and Bessant, 2002; Beckman and Barry, 2007; Verganti, 2008; Bessant and Maher, 2009; Ward et al., 2009; Filipetti, 2011; Seidel and Fixson, 2013). Design management scholars and practitioners point to the innovation potential of design, arguing that design as a discipline is suited to innovation because it represents a different logic - one that deals with complex and ambiguous matters (Bruce and Bessant, 2002; Borja de Mozota, 2010; von Stamm, 2010). Design is also being described as being human-centered and having a wider and more forward-looking approach to solving problems (Borja de Mozota, 2010; von Stamm, 2010; Hobday et al., 2012, Cruickshank and Evans, 2012). An individual perspective is prevalent when studying, for example, the role, competences, thought process and potential contributions to innovation of professional designers (Cross, 2011; Jahnke, 2013).

While an extended role for designers and the design function has been studied to some extent in relation to new product development (NPD) (e.g. Perks et al., 2005; Chiva and Alegre, 2009; Beverland, 2005), relatively few studies consider design as a critical activity in the field of innovation. (Hobday et al., 2011; Noble, 2010). However, there is growing scholarly interest in the intersection between design and innovation. For example, 'Design-driven Innovation' explores design as an enabler for creating new meaning, as a new form of radical innovation (Verganti, 2008). 'C-K theory' describes innovation as the dual expansions of concepts and knowledge (Hatchuel and Weil, 2009; Masson, Weil, and Hatchuel, 2010). Empirical studies of these conceptualizations are emerging (Öberg, 2012; Verganti and Öberg, 2013; Elmquist and Segrestin, 2007).

### **1.4 Enter design thinking**

In line with the growing interest in design in an innovation context, the concept of DT has emerged as a multidisciplinary, human-centered innovation approach inspired by the ways that designers think and work (Kelley and Littman, 2001; Brown, 2009; Martin, 2009; Kimbell, 2011; Johansson-Sköldberg et al., 2013). The core idea in DT is that any discipline

can take inspiration and learn from the way designers think and work, and apply this to their operations not only in innovation efforts but also in strategy, innovation, NPD or organizational renewal (e.g. Brown and Katz, 2011; Brown, 2009; Holloway, 2009). Since the early 2000s, large firms in a variety of business sectors have begun integrating DT into their operations in various ways (Lafley and Charan, 2008; Holloway, 2009; Martin, 2011; McCreary, 2010).

While the concept is gaining hold among practitioners, surprisingly little academic attention has been devoted to applications of DT in organizational settings and its potential role in relation to innovation (Kimbell, 2011; Cruickshank and Evans, 2012; Johansson-Sköldberg et al., 2013; Carr et al., 2010; Liedtka, 2004). Thus, firms interested in DT as an approach to innovation are relying mainly on how the concept is described and marketed by its proponents – a generic and idealistic view that tells them what DT could be and what ideally it could do for their organizations. Such generic descriptions often take no account of either context or individuals, nor of what happens when the concept is integrated with existing processes, norms and structures (Rylander, 2009). Success stories and anecdotes can provide inspiration for different types of use. However, and as noted by de Waal and Knott (2013), in the literature on innovation tools there is often an implied expectation that implementation is straightforward, which often is not fulfilled (Liedtka, 2004). Studies of DT in organizational settings are needed (Carr et al., 2010). From an academic point of view, lack of an empirical foundation for how DT is used in practice and its potential contribution to innovation, makes it difficult to theorize and to connect the concept to existing theories and models (Kimbell, 2011, Hobday et al., 2012; Johansson-Sköldberg et al., 2013).

To summarize, it has been established that innovation is a driver of organizational competitive advantage. It has also been argued that this is a challenge for firms, in particular large, established firms. DT emerges as a management concept promising innovation; yet the concept is poorly understood, conceptualized and investigated in organizational settings. In particular, more research is needed on the potential role of DT as an enabler of innovation.

## **1.5 Purpose and research questions**

To better understand the relation between DT and the building of innovation capabilities, this thesis aims at investigating the concept of DT as a potential enabler of innovation in large organizations. In order to address the overall aim, this thesis focuses on the concept of DT. Thus the purpose of the thesis is:

*To explore the concept of design thinking in the context of large organizations, in order to create a better understanding of its potential role in building innovation capabilities.*

First, the term design thinking is conceived of as rather broad and there is a lack of common understanding among practitioners and scholars (Hassi and Laakso, 2011; Kimbell, 2011).

The variety of views about DT makes it difficult to study empirically, and difficult for firms to relate to (Kimbell, 2011). In order to address DT, a better understanding of the concept is needed. This leads to the first research question:

*RQ1: How can the concept design thinking be understood?*

Moreover, DT is often presented as a miracle solution whose use will enable ‘innovation’, help firms come up with ‘breakthrough ideas’ (Brown, 2008), and enable firms to find the right balance between exploration and exploitation (Martin, 2009). DT is promoted also through idealistic statements such as “the next competitive advantage” (Martin, 2009) or “a catalyst for innovation and bringing new things into the world (Plattner et al., 2012:xiii). Yet, these accounts are not specific about how to make this happen in practice; for example, how the specific practices linked to DT could be applied, and where DT could be used in relation to existing innovation and NPD processes. More systematic empirical investigations of DT are required (Johansson et al., 2011), in particular regarding its situated use in different contexts. For the purpose of the thesis, it is necessary not only to understand DT as a concept but also to investigate how DT is being used in innovation contexts in practice. This leads to the second research question:

*RQ2: How is design thinking used in innovation work?*

While the claims about DT may have contributed to its rapid spread, statements about its value are mainly based on anecdotal evidence and single success cases from those with a vested interest in the spread of DT (e.g. Brown, 2008). Apart from a lack of understanding of how DT is applied in practice, there is also limited understanding of how DT can support innovation in organizations in the short and longer terms. Innovativeness is often discussed in relation to short-term outputs, for example, measured as numbers of patents or new product introductions to the market. However, an emerging stream of research in innovation that builds on the resource-based view of the firm, argues that some firms are better positioned to exploit new ideas successfully, that is, they have innovation capability (Assink, 2006; Francis and Bessant, 2005; Lawson and Samson, 2001; Christensen, 1997; O’Connor, 2008). Innovation capability is described as being different from performance; as the preparedness of the firm, its ‘muscles for innovation’ (Börjesson and Elmquist, 2011). This thesis adopts an innovation capability perspective that addresses the prerequisites in the organization for being innovative. The reason for adopting this firm-level perspective is that it enables a systemic understanding of how the organization can be innovative, since no element acts in isolation. There is however a distinction between describing the sought-for capabilities, and discussing how to build these. This leads to the third research question:

*RQ3: How does the implementation of design thinking relate to building innovation capabilities in an organization?*

In line with the purpose and research questions in this thesis, this thesis builds on exploratory qualitative case study research in large organizations claiming to have implemented DT. The research includes three studies: The first is a broad exploratory study of 15 firms; the second is a multiple case study in six firms with longer experience of using DT. The focus in these studies is on organizations in various sectors since it is argued that DT can be applied in any type of firm. The third study is an in-depth study in a health care firm that had used DT for 10 years. The thesis also includes results from a study on two Swedish firms where designers were involved in the front end of NPD in order to increase innovation. This study was performed in 2006-2008 and helped to shape an initial understanding of the subject area.

Most of the results are based on accounts from key informants about their understanding of the concept of DT, how they perceived it to be used in their organizations, and what value/effects they experienced in their organizations. This methodology has implications for how the research questions are addressed. Since the thesis research takes a performative (Mouritsen, 2006, Latour, 1986) and interpretative (Easterby-Smith et al., 2012) stance, the idea is not to define what DT “is” or prove what value “it” creates. Instead it explores the phenomenon in different organizational contexts, and builds a nuanced understanding of DT, its use, and its potential relation to innovation.

## 1.6 A note on the term design and its relation to design thinking

Design can be a verb or a noun: the act of designing, and the output of this work – the final design (Von Stamm, 2010). According to Collopy (2009) “Design, as a noun, seems to overshadow design as a verb in the popular press, as well as in the practice of modern management. This results in an emphasis on design as a completed and whole thing, instead of design as the becoming and unfolding process”. Among design researchers, design practice denotes how designers design; for example, the ways they think and act, their attitudes and approaches to problems and solutions (e.g. Jahnke, 2013). In this thesis, a *designer* refers to an individual who has undergone a design education in the artistic tradition, as defined by Cross, 2011. *Design* in this thesis then is linked to the practice of designers, referring to the verb, however it includes both the doing and the thinking, which according to e.g. Kimbell (2011) cannot be separated. This does not imply that only designers can design.

In discussions of design and innovation, design is typically used in a wider sense than a focus on shape and style common in discussions of product design. Sarah Beckman, professor at University of California, made the following remark<sup>1</sup>:

*I distinguish little d design from big D design. I think of little d design as the fundamentals of what we classically talk of as design, so industrial*

---

<sup>1</sup> Sara Beckman, Chief Learning Officer for the Jacobs Institute of Design Innovation, University of California. Personal communication, summer 2011.

*design, graphic design, and the like - the use of color, texture, lines, shapes, and the many other critical aspects of good design. Big D design is the leveraging of the problem finding and solving capabilities that designers are taught to a broader set of people for a broader set of applications.*

Design in this thesis adheres to this wider view, although not limiting the capabilities of designers to how they approach problems, and without excluding the aesthetic knowledge and hands-on practice characteristic to designers (eg. Jahnke, 2013).

In this thesis DT is considered to be a management concept that builds on the idea that firms can learn from designers' practice, without necessarily involving designers. The thesis explores how the concept is appropriated and made use of in large organizations - sometimes involving designers, sometimes not.

## **1.7 Outline of the thesis**

This thesis builds on five appended papers and one appendix, the results of which are discussed in the portfolio text. It is organized as follows: Chapter 2 provides an overview of the theoretical framework and prior research that will be exploited when discussing the results. Chapter 3, the method chapter, describes the three main studies in detail, and discusses some methodological considerations. In Chapter 4 the results are presented in short summaries of the appended papers, followed by a discussion related to each of the research questions and the thesis aim. Chapter 5 and 6 discuss the results of the studies. Chapter 7 concludes the thesis and presents some implications



## 2 Theoretical Framework

### 2.1 Innovation and NPD

#### 2.1.1 *The concept of innovation*

While the practice of innovation is probably as old as human activity, innovation research goes back to Schumpeter's "*Theory of Economic Development*" (1911 in German, 1934 in English), but has gained increasing attention since the 1990s (Cruickshank, 2010). There is also a growing interest in innovation in society, with innovation being a central theme in policy-making and government research funding at national and international levels (Cruickshank, 2010; Fagerberg, 2005).

Innovation is a complex concept, and can have multiple meanings, drawing on theories from a variety of disciplines and studied using a wide range of research methodologies (Crossan and Appaydin, 2010; Cruickshank, 2010). The term innovation can refer to an innovative output or a process or the activities involved in creating the innovative output. Innovation is sometimes understood as invention or suggesting an idea, but Schumpeter (1934) argues that what is novel<sup>2</sup> can only be seen as an innovation if it also succeeds in creating economic value. According to the Oslo Manual (Fagerberg, 2005), "invention is the first occurrence of a new product or idea, while innovation is the first attempt to carry it out in practice". This distinction is commonly acknowledged among innovation researchers (Cruickshank, 2010; Mascitelli, 2000), although there are numerous more specific definitions aligned to various views about types of novelty (e.g. different types of innovation) and how they are put into practice, spread or perceived to create value (e.g. new to the market or new to the context). Tidd et al. (2005:66) define innovation as the "process of turning opportunities into new ideas and of putting these into widely used practice". Le Masson et al. (2006) point to a paradox in this definition since the judgment is *ex post*; it is only after the product (or other type of offer) is realized that whether it is a real innovation can be determined.

This thesis avoids judgments related to what is new or widespread, and considers innovation as the *development of innovative offers*. Thus the focus is only on the *activities* involved in the development of these offers. This means that innovation is seen as more than the invention (the idea) but that if a firm has engaged in implementing an innovative idea which has proved unsuccessful, it is still deemed to have engaged in innovation. Inspired by Tidd et al. (2005) innovation can be seen as turning opportunities into new ideas and *striving for* putting these ideas into wide use. In this thesis, innovation is not limited to product or technological innovation, but includes also services, processes, business models, experience, meaning, and various combinations thereof. There are also other innovation related terms used in this thesis and the appended papers: *Innovation work* is used to refer to the tangible activities, efforts and processes carried out by individuals in the process of innovation. The key concept of *innovation capability* is seen as the preparedness or 'muscles' of an

---

<sup>2</sup> According to Schumpeter (1934) this might be an invention but might also be based on new combinations of existing knowledge,

organization to be able to continuously create innovative offers (Börjesson and Elmquist, 2011) while *innovativeness* is the measurable outcome of innovation in a firm (Pallas et al., 2013). *Innovations* (with a plural s) refer to the output of innovation.

Similar to the way that novelty is referred to in the very definition of innovation, innovation is often discussed in terms of the degree of novelty. According to Mascitelli (2000), scholars have tried to characterize innovation using pairs of adjectives, such as evolutionary/revolutionary, incremental/radical, continuous/discontinuous, sustaining/disruptive and mainstream/newstream. The first adjective typically refers to some sort of improvement, providing new features, benefits or improvements to existing technology and in an existing market. Norman and Verganti (2012) describes it as “doing better what we already do” within a given frame of solutions, while radical innovation is described as “doing what we did not do before”, requiring a change of frame (ibid).

While contesting the bimodality often implied by the adjectives, Mascitelli (2000) acknowledges a fundamental distinction: “Innovations that are unique, original, and unexpected are far more valuable from a competitive standpoint than innovations that are predictable, incremental and mundane” (ibid:181). However, Norman and Verganti (2012:6) point out that incremental innovation is “by far the dominant form of innovation and even though it is not as exciting as radical innovation, it is just as important”. In line with Lawson and Samson (2001), Norman and Verganti (2012:6) state that “without radical innovation, incremental innovation reaches a limit. Without incremental innovation, the potential enabled by radical change is not captured”. Other researchers stress that the dichotomy is not relevant since innovation can be seen as a continuum of incremental improvement, learning processes and innovation (Cole, 2002; Lynn et al., 1996; Steiber and Alänge, 2013). Garcia and Calantone (2002) accuse innovation researchers of spreading unnecessary ambiguity by the plethora of definitions proposed. They suggest a three-level typology based on market/technology discontinuities and the level of impact at the firm/industry level, proposing the categories of “incremental”, ‘really new’ and ‘radically new’.

O’Connor (2008:315) states that “what is clear is that both really new and radical innovations share a characteristic that incremental innovation does not: high levels of uncertainty on multiple dimensions”. This is an important distinction compared to other attempts to characterize the degree of novelty: instead of focusing on the innovation output, O’Connor looks at the context in which innovation occurs. While grouping ‘really new and ‘radically new’ into ‘major innovation’, she makes the point that “managing for innovation in which uncertainty levels are high requires approaches that differ from those used to manage incremental innovation” (ibid:315).

### **2.1.2 Innovation and NPD<sup>3</sup> - different logics**

Since the late 1980s most large organizations have organized their development processes using a waterfall logic and often stage-gate systems (Cooper, 1988), to make product development more efficient by reducing uncertainties as early as possible (Wheelwright and Clark, 1992). While these models have helped firms shorten lead times, research shows that too much formalization may be disadvantageous to innovation (Benner and Tushman, 2002, ref), and it has been argued that established NPD<sup>4</sup> processes do not result in innovative products (Veryzer, 1998; Leifer et al., 2001; McDermott and O'Connor, 2002). Typically, in complex development processes, there is little room for experimentation and learning (Engvall, 2003), and the ability to absorb new knowledge decreases (Christensen, 1997). It has been argued that this type of uncertainty-reducing processes may be good for developing pre-defined products, but not products or solutions that are radically different (Veryzer, 1998; Eisenhart and Tabrizi, 1995; McDermott and O'Connor, 2002; Engvall, 2003). Engvall (2003) points out that when the ideas for what to develop exist from the start there is little room for truly innovative concepts. Ideas and required knowledge are seen as inputs, not as evolving throughout the project, and as a consequence, very little learning takes place during execution of the project (ibid). Yet, despite the apparent flaws in structured NPD processes to handle innovation, the terms innovation and NPD are often used interchangeably, especially by practitioners (Elmqvist, 2005).

It has been argued that insights about user needs are a superior starting point to technological development or visions within the firm (Veryzer and Borja deMozota, 2005; Jansen and Dankbaar, 2008). On the other hand, some researchers have raised concerns that addressing user needs inescapably leads to incremental innovation (Hamel and Prahalad, 1994; Verganti, 2008; Christensen 1997; Govindarajan et al., 2011). A variety of methods for incorporating user knowledge have been proposed, in particular those that stress the importance of addressing tacit and future needs of current and future customers rather than relying on what users actually say (e.g. Von Hippel, 2009; Leonard and Rayport, 1997; Goffin et al., 2010; Kristensson et al., 2004; Narver et al., 2004). For example, ethnographic and empathic approaches have been used to study customers in their contexts (e.g. Burchill and Fine, 1997, Leonard and Rayport, 1997), and a variety of co-creation approaches have been discussed involving users in, for example idea generation and selection (Öberg, 2010), or a “probe and learn” approach where users are exposed to and provide feedback on immature prototypes (such as beta testing) (Lynn et al., 1996; Cole, 2002).

### **2.1.3 Management of innovation**

What sets innovation apart from traditional NPD is that innovation deals with what is unknown, complex, and uncertain (Lester and Piore, 2004; O'Connor, 2008; Schreyögg and Kliesch and Eberl, 2007, Eisenhardt and Tabrizi, 1995). Lester and Piore (2004:6) argue that

---

<sup>3</sup> NPD – New Product Development. In this thesis this refers also to the development of other offers that may not be products.

the most important capability to innovate depends on two processes; interpretation and analysis:

Analytical processes work best when alternative outcomes are well understood and can be clearly defined and distinguished from one another. Interpretative processes are more appropriate when the possible outcomes are unknown, when the task is to create those outcomes and determine what their properties actually are. These two ways of proceeding involve very different kinds of skills, different ways of working together, different forms of managerial control and authority, and ultimately, different ways of thinking about the economy [...] the two processes are actually in fundamental opposition to each other.

As Anderssen et al. (2004) point out there is a large body of research on the innovation process, proposing different models at several different levels (e.g. Eisenhardt and Tabrizi, 1995; Damanpour and Gopalakrishnan, 2001; Reid and de Brentani, 2004). According to Andersen et al. (2004) a common understanding in this literature is that innovation processes is non-linear and iterative, and require a balancing act between planning and chaos. According to Eisenhardt and Tabrizi (1995), in uncertain conditions, an 'experimental model' can be a good fit, allowing for improvisation and flexibility, and where learning is accelerated through iterations and testing, in combination with strong motivation and leadership. The innovation culture has received attention from innovation researchers (eg. Brown and Eisenhardt, 1995; Amabile, 1998, Cohen and Levinthal, 1990; Leonard-Barton, 1992; Steiber and Alänge, 2013). Miron et al. (2004) note that dimensions such as high autonomy, risk-taking, tolerance of mistakes, low bureaucracy and learning orientation are the most prevalent characteristics of a culture of innovation. Further, according to Buschkens et al. (2013), different cultures may be appropriate at different stages in the innovation process.

Since many organizations struggle with increasing their innovativeness, they often see innovation as synonymous with creativity and "coming up with great ideas" (O'Connor and Ayers, 2005). Hence, they turn to solutions such as new ideation methods, idea jams, and involving users in ideation or web-based crowd-sourcing (ibid). However, a single focus on idea and concept generation is disputed, and it is argued that more attention is needed to idea implementation (O'Connor and Ayers, 2005; Govindarajan and Trimble, 2010; Birkinshaw et al., 2012). In addressing this problem, O'Connor and Ayers (2005) suggest a more complete description of innovation work that takes account of other aspects necessary for realizing innovations and the appropriate accompanying competences. They refer to these competences as discovery (exploration), incubation (experimentation) and acceleration (exploitation). In describing them as 'competences' rather than process steps they claim that they are not a linear chain; activities can overlap, and the skills needed for each competence may not be held by the same individuals or teams.

However, maintaining a balance between future opportunities and current needs is a challenge for firms; (Tushman and O'Reilly, 1996; Boer and Gertsen, 2003). Mainstream

activities (e.g. manufacturing and marketing) contribute to the firm's current success, with processes building on stability, efficiency and profitability. However, innovation is unstable, and often requires long-term vision and commitment in order to yield results (Lawson and Samson, 2001). Those organizations that can manage both exploration and exploitation are described as ambidextrous (March, 1991; Tushman and O'Reilly, 1996). Boer and Gertsen (2003) called for research on these types of organizations. Some authors argue that when more radical innovation is in focus, there is a need for separate structures for innovation that will provide the freedom for the necessary experimentation (eg. O'Connor, 2008; Benner and Tushman, 2003; O'Reilly and Tushman, 2004). On the other hand it has been argued that a separation between mainstream and newstream work can lead to isolation and resistance to new ideas (Birkinshaw and Gibson, 2004; Moss-Kanter, 2006), and may not take account of the serendipitous ideas that emerge from mainstream work. According to Birkinshaw et al. (2012:1), innovation increasingly is seen as the responsibility of the entire organization, as an "all the time, everywhere" capability. Alänge and Steiber (2013) argue that ultimately the different views about whether to have a separate function for major innovation depends on how innovation is viewed; if it is a continuous or a 'punctuated equilibrium'. It depends also on whether innovation is focused on how to come up with new ideas, or whether focus is on nurturing and implementing the ideas, especially if the organizational structure is not open to what is outside of the ordinary, as discussed by O'Connor (2008).

## 2.2 A capability perspective on innovation

### 2.2.1 Background

While most studies in the innovation field focus on innovation as a process or outcome (Crossan and Appaydin, 2010), some researchers argue that adopting a *capability perspective* is more fruitful for how firms understand innovation (O'Connor et al., 2008; Hatchuel et al., 2003, Lawson and Samson, 2001). It is argued that instead of a narrow focus on isolated innovation activities or processes, these firms need a systemic understanding of innovation that also includes organizational and cultural aspects.

The capability perspective is based on the resource-based view of a firm (e.g. Prahalad and Hamel, 1990), which considers the firm as a collection of resources and capabilities. Prahalad and Hamel (1990) define organizational capabilities as the firm's abilities to deploy its available resources. As such, organizational capabilities describe what a firm is able to do (or not). It has been argued that these capabilities cannot be easily imitated or substituted; hence firms do not compete on new products but on their capacity to develop new products (e.g. Prahalad and Hamel, 1990; Helfat and Peteraf, 2003; Lawson and Samson, 2001; Schreyögg and Kliesch- Eberl, 2007).

In a review of the literature on organizational capabilities, Schreyögg and Kliesch-Eberl (2007) note that their essential features are rather vague; however, depending on how they are conceptualized – for example including the NPD process - they have also been

In a review of the literature on organizational capabilities, Schreyögg and Kliesch-Eberl (2007) note that their essential features are rather vague; however, depending on how they are conceptualized – for example including the NPD process - they have also been described as distinct (Eisenhardt and Tabrizi, 1995). According to Schreyögg and Kliesch-Eberl (2007), organizational capabilities are close to action and cannot be separated from acting and practicing, they can be conceived of as collective and socially embedded in nature. “They are brought about by social interaction and represent a collectively shared ‘way of problem-solving’ [and] can be built in different fields and on different levels of organizational activity, for instance at departmental, divisional, or corporate level” (ibid:916). Being shaped by building on the firm’s own experiences, Schreyögg and Kliesch-Eberl (2007) note also that organizational capabilities are the result of a learning process within the firm.

Organizational capabilities have been conceptualized in various ways. Leonard-Barton (1992) describes a set of core capabilities that differentiate a firm strategically in terms of: 1) employee knowledge and skills, 2) technical systems, 3) managerial systems that guide knowledge creation and control processes, and 4) the values and norms associated with these processes and the embedded knowledge. Leonard-Barton (1992) underlines that the fourth dimension, referring to values and norms, is typically treated in isolation or ignored, although she conceives of it as central and infusing all the other three. Christensen (1997) describes the capabilities of an organization as 1) available resources (people, equipment, technology, product designs, brands, information, cash, and relationships with external partners), 2) organizational processes (methods used to transform inputs to output of higher value), and 3) values (criteria used for decision making in organizations).

However, with time and changes in the environment, what was once the strength of an organization can become a burden; ‘core capabilities’ can become ‘core rigidities’ that inhibit innovation and become counter-productive. (Leonard-Barton, 1992). According to Schreyögg and Kliesch-Eberl (2007), this is an inherent paradox of organizational capabilities - a fixation with existing capabilities at which the firm excels can prevent the development of other capabilities. To avoid this, and to cope with changes in the environment, Teece et al. (1997) argue that firms need systematically to change their organizational capabilities. Teece et al. (1997:516) propose *dynamic capabilities* as “the firm’s ability to integrate, build and reconfigure internal and external competences to address rapidly changing environments”. These capabilities are dynamic in the sense that they have the ability to influence static capabilities, and as such, have been described as second-order capabilities (Daneels, 2010; Ellonen et al., 2011).

### **2.2.2 Innovation capabilities**

While organizational and dynamic capabilities are described at a rather general level, targeting all areas of the organization, it has been argued that innovation or innovation management can be viewed as an organizational capability on its own (Christensen, 1997;

Lawson and Samson, 2001; O'Connor et al., 2008). It has been suggested that some firms are better positioned to successfully exploit new ideas, or that they have innovation capability (Assink, 2006; Francis and Bessant, 2005, O'Connor et al., 2008; Hatchuel et al., 2003, Lawson and Samson, 2001). Innovation capability is differentiated from innovation performance and described as the preparedness of the firm, or its “muscles for innovation” (Börjesson and Elmquist, 2011).

As noted by Börjesson et al. (2012), innovation capabilities have been conceptualized from various standpoints and defined in different ways. Burgelman et al. (1988) define innovation capability as “the comprehensive set of characteristics of an organization that facilitate and support its innovation strategies”, and Francis and Bessant (2005:172) conceive of innovation capability as “the underlying capacity to gain advantage by implementing more and better ideas than rivals”. Lawson and Samson (2001) describe innovation capability as “the ability to continuously transform knowledge and ideas into new products, processes, and systems for the benefit of the firm and its stakeholders”. Assink (2006:219) defines the capability to innovate as: “the internal driving energy to generate and explore radical, new ideas and concepts, to experiment with solutions for potential opportunity patterns detected in the market’s white space and to develop them into marketable and effective innovations”.

In reaction to an often single-sided process-perspective prevalent in both firms and innovation research, Christensen (1997) conceives of innovation capabilities as the firm’s ability to conduct systemic innovation, building on processes, resources, and values (influencing how decisions are taken in the organization). While innovation capabilities often are described on an overall level, Lawson and Samson (2001) as well as O’Connor (2008) take a holistic perspective and discuss what makes a firm innovative in more detail. Drawing on the idea of ambidextrous organizations, Lawson and Samson (2001:384) propose innovation capability as a link between a firm’s newstream and mainstream activities, “bringing together the efficiency of the mainstream with the creativity of the new stream”. O’Connor (2008) takes a systemic perspective to describing major innovation (MI) capability as a system of seven elements that all need to be addressed in order for the firm to become more innovative, including organizational structure, organizational culture and decision-making processes. She argues also that they are interdependent – their change requires changes to systems linked to the firm’s strategic plan.

In synthesizing previous research on innovation capability, and inspired by Christensen (1997), Börjesson and Elmquist (2012) conceptualize innovation capability as the firm’s ability to be competitive through systematic innovation, including reconfiguration of the firm’s resources and processes as well as the values that influence how decisions are taken in the organization (referred to as ‘mindset’). They stress also that the development of this ability is governed by the strategic intent of the firm. Table 1 presents an overview of the innovation capabilities in Lawson and Samson (2001) and O’Connor (2008), following the structure proposed by Börjesson et al. (2012). Related research uses different terminology. For example, while ‘innovativeness’ in this thesis refers to the measurable outcome of

innovation in a firm (e.g. Pallas et al., 2013), some researchers use the term innovativeness (Alänge and Steiber, 2013) to refer to similar abilities described in innovation capability frameworks.

### **2.2.3 Building innovation capabilities**

The literature on innovation (and organizational) capabilities is mostly conceptual, and there is little discussion about how capabilities can be built and developed in practice (Schreyögg and Kliesch-Eberl, 2007; Van de Ven, 2007). Empirical studies are scarce and often general (Schreyögg and Kliesch-Eberl, 2007) with a few exceptions (e.g. Börjesson and Elmquist, 2011; Ellonen et al., 2011; Börjesson et al., 2013).

Schreyögg and Kliesch-Eberl (2007:915) state that “capability development comes close to a chain of reactions triggered by an initial event, thereby establishing a capability trajectory. Capability development takes time and the specific way in which time has been taken (i.e., the intensity, frequency, and the duration of social interactions) is relevant for the gestalt of a capability”. Ellonen et al. (2011) note that capabilities often evolve over time through learning by doing and routinization of new activities. As such, the development of capabilities is often incremental (Zollo and Winter, 2002), and it is argued that this change or adaptation to capabilities does not necessarily need the active involvement of dynamic capabilities (Helfat and Peteraf, 2003).

Further, as organizational capabilities have been described as the result of a learning process, organizational learning is seen as key to building the capabilities for innovation ((Schreyögg and Kliesch-Eberl, 2007; Lynn et al., 1996). Börjesson and Elmquist (2011) note that this has put the focus on effective sharing and transfer of knowledge internally, collaboration with external firms, and the need for a management system that encourages learning and experimentation (Eisenhardt and Tabrizi, 1995). This leads to the idea that developing capabilities should be considered a process that can be managed, designed, and guided (Schreyögg and Kliesch-Eberl, 2007; Börjesson and Elmquist, 2011).

O’Connor (2008) suggests reward systems, dedicated funding and participation in innovation networks, as well as the creation of a specific function dedicated to major innovation, and Daneels (2011) stresses the importance of managers being aware of the firm’s current resources and capabilities and what they need to develop for the future. Ellonen et al. (2011:475) claim that managers should “pay attention to that seemingly structural changes in the firm’s internal operations (e.g. incentive systems, decision-making protocols, organizational responsibilities) have an impact on the capabilities needed for innovation activities and can indeed foster their development”.

The systems perspective on innovation adopted by O’Connor (2008) implies that developing innovation capabilities requires changes to the whole system, something that poses several challenges. Assink (2006) identifies five typical barriers to innovation: adoption barriers



(based on rigidity and not wanting to let go of a previously successful concept or way of working); mindset barriers (towards leaving known areas of expertise and fear of cannibalizing existing products at both the individual and organizational levels); risk barriers, nascent barriers (lack of internal skills and motivation for innovation), and infrastructure barriers. In fact, building innovation capabilities can be seen as equivalent to overcoming these barriers to innovation, although some may be very difficult to overcome.

Table 1. Innovation capability framework (based on Börjesson and Elmquist (2012), Lawson and Samson (2001); O'Connor (2008).

Börjesson and Elmquist (2012)	Lawson and Samson, 2001	O'Connor et al., 2008
<b>Strategic intent</b>	<i>Vision and strategy:</i> Linked to innovation; seek to be best	Goal and objectives aligned with firm's strategic intent
<b>Resources:</b> Knowledge and competence base, technology, networks and relations.	<i>Harnessing the competence base:</i> Resource management; variety of funding channels; innovation champions <i>Management of technology:</i> shift toward external networks; link technology strategies with innovation	<i>Attention to identification and nurturing of requisite skills:</i> Broadly skilled employees; reflecting on progress, reconfigure practices. Coaching and apprenticeship; articulating knowledge <i>External linkages</i> with knowledge sources outside informal relationships, conferences, interactions with potential customers
<b>Processes:</b> Organizational structures, managerial systems, generative processes, ways of working	<i>Organizational structures and systems:</i> Formal business structure and processes; reward systems, permeable and organic organization structures. Stretch goals for innovation. <i>Reward systems:</i> fostering creative behavior <i>Creativity and idea management:</i> Requires divergent thinking of what may be unrealized, unproven or untested. Knowledge-driven or vision-driven <i>Organizational intelligence:</i> learning about customers hidden needs and competitors	<i>Separate organization structure:</i> group responsible for MI; decoupled from mainstream org; interface mechanisms (not full separation), clear reporting relationships, Appropriate metrics for high-risk, high uncertainty objectives (activity and performance-based) <i>Governance and decision-making:</i> project portfolio, MI system (constant reflection and reconfiguration) <i>Learning-oriented exploratory processes:</i> experimental action (not analytical) and fast iterations; cross-functional networking; rough prototyping <i>Market sensing:</i> "feeling" of evolving market place, rather than quantifiable knowledge;
<b>Mindset:</b> Values, norms Culture, how decisions are taken	<i>Culture and climate:</i> tolerance of ambiguity; learn from mistakes; empower employees; expect creative time; communication facilitating knowledge sharing; reward cross-functionality	<i>Appropriate culture and leadership context:</i> recognize the importance of an MI system; investment in strategic thinking of the future health of the system; needs to be deeply rooted to withstand change of CEO etc.

Christensen (1997) states that organizational processes aimed at reliability and repetition are a potential hindrance to change, and suggests that the most difficult elements to change are those linked to values and processes. In a rare empirical study, Börjesson and Elmquist (2011, 2013) examine how innovation capabilities are developed in a large firm based on the case of Volvo Cars, which created a team to work explicitly on developing its innovation capability in order to break away from the previously incremental approach to innovation. In line with Christensen (1997) and Francis and Bessant, (2005), the main barriers to innovation were perceived to be norms and values prevailing in the organization and the lack of strategic direction.

Accordingly, management awareness or the need for insightful strategic top management is described as a crucial tenet of capability development in large firms (Börjesson and Elmquist, 2011; Börjesson et al., 2013). Schreyögg and Kliesch-Eberl (2007) suggest that firms need to develop a “capability monitoring” function in order to monitor and assess their capabilities in relation to current and new activities, taking into account path dependency, structural inertia, and financial commitment. Börjesson and Elmquist (2011) identify the need for a management capability to realize needs and take the initiative for action, thus addressing the necessity for insightful strategic top management. In a later study of the car producers Volvo Cars and Renault, Börjesson et al. (2013) find support for a new managerial role– an innovation capability builder – with responsibility for building the capabilities for innovation within the organization, one that supports the organization in learning how to learn. Steiber and Alänge (2013) suggest that one of Google Inc.’s strengths in building their innovation capability<sup>6</sup> was a focus on human resources strategies; explicitly focusing on hiring and training employees to foster innovative behavior.

#### ***2.2.4 Critiques relating to the capability perspective***

While the capability perspective contributes by providing a systems perspective and stressing the importance of taking all elements of innovation capabilities into account since they are interdependent (O’Connor, 2008); these theories have been criticized for being at too high a level, or being too abstract to study empirically (Schreyögg and Kliesch-Eberl, 2007). According to Felin and Foss (2009), “to fully explicate organizational anything – whether identity, learning, knowledge, or capabilities – one must fundamentally begin with and understand the individuals that compose the whole, specifically their underlying nature, choices, abilities, propensities, heterogeneity, purposes, expectations and motivations”. Lawson and Samson (2001:380) also point to the difficulty to both study and evaluate innovation capabilities:

Despite the strong application to innovation, resource-based view and dynamic capabilities theory have a number of weaknesses. First, it is often difficult to identify within a firm which of the many resources, individually or collectively, account for effective performance. The identification process may also have an ex post quality

---

<sup>6</sup> although discussed as ‘innovativeness’

—as the firm is recognized as successful; the resources behind the success are labeled as valuable. Similarly, the failure of a firm can invariably be attributed to the absence of a specific capability or capabilities.

In summary, there is a growing interest in innovation capabilities theories, but the field of research could still be considered immature. There are numerous perceptions of what constitutes innovation capabilities, since they have been described as both static (Börjesson and Elmquist, 2012) and dynamic (Lawson and Samson, 2001; O'Connor, 2008). Many authors also equate innovation capabilities with innovativeness or even innovation performance (Börjesson and Elmquist, 2011). Innovation performance, for example, can be measured in various ways, but that say little about the future. Despite the growing interest for innovation capabilities, there is a lack of empirical research on *how* to actually build them. (Börjesson and Elmquist, 2011; Börjesson and Elmquist, 2013; Schreyögg and Kliesch-Eberl, 2007).

## 2.3 Design Thinking

### 2.3.1 *An extended role of design in management*

In search of new strategies for addressing the complex challenges currently faced by many organizations, there is an increased interest in design in innovation and management debates (e.g. Walsh, 1996; von Stamm, 2010; Veryzer and Borja de Mozota, 2005; Perks et al., 2005; Borja de Mozota, 2010; Luchs and Swan, 2011; Noble, 2011; Verganti, 2008; Jahnke, 2013). Within the field of design management, efforts are being made to define the potential strategic role of design – in particular the role of professionally trained designers - in business contexts (von Stamm, 2010; Borja de Mozota 2010), and to show evidence of the value of design in various ways. Organizations such as the Design Management Institute and the British Design Council are promoting a bigger role for design, which is attracting increased policy attention in the EU (Whicher et al., 2011). There are links to a broader view of design with a smaller focus on product design, function, or style (Von Stamm, 2010; Borja de Mozota, 2010). One commonly held view in Design Management is that firms and management researchers may take a more or less ‘mature’ view on design, ranging viewing design merely as aesthetics and styling (the lowest degree of maturity), to being a strategic resource that can benefit all areas in an organization (a higher degree of maturity) (Whicher et al., 2011).

### 2.3.2 *Designer competences*

The increased interest in design and designers makes it important in this thesis to have an overview of how professional designers and their competences are described. As Johansson-Sköldberg et al. (2013) note, understanding the practice of professional designers has been part of the academic discourse on architecture and design for more than 30 years. The focus has varied between studying the design process (Cross, 1990) to how designers think (Lawson, 2006; Schön, 1983), know (Cross, 1990), address problems (Buchanan, 1992) and

create meaning (Jahnke, 2013). Despite the range of specializations, such as graphic designers, industrial designers and user interface designers, designers are often treated as a collective (Kimbell, 2011). According to Cross (1990), design competences are likely to vary with personal inclination, education and experience. Design educations at universities and schools pursue different traditions that are more or less biased towards art, management, or engineering (Kimbell, 2011).

The design process has been described as iteration between the detail and the whole (Cross, 2011; Edeholt, 2004; Rowe, 1987), and as a “co-evolution of solution and problem space (Cross, 2011). In descriptions of how designers relate to problems, focus is on problem setting rather than problem solving. Schön (1983) refers to the ability to continuously frame and reframe a problem or situation in different ways - ‘problem setting’ rather than problem solving. According to Lawson (2006), the typical designer questions every problem and tries to get to the core of what is taken for granted and has been institutionalized, leading to wider problem definition and a larger solution space. Design problems are often described as “wicked”, open-ended, and ambiguous (Buchanan, 1992). According to Cross (2010:127): “design ability is summarized as comprising resolving ill-defined problems, adopting solution-focused cognitive strategies, employing abductive or appositional thinking, and using non-verbal modeling media”. Cross (2011) talks about “designerly ways of knowing”, where “design cognition” refers to problem formulation, solution generation, and process strategy. In comparing how expert and novice designers work, the findings of Cross (2004) contradict certain “truths” in design research showing that expert designers seem to spend less time on problem scoping and formulation, and generating alternative solutions.

Utterback et al. (2006, p.177) refer to an interpretative mind-set and describe the competence to understand “the subtle dynamics of values and meanings in society”. According to Verganti (2008) and Jahnke (2012), such interpretative ability lays the foundations not only for creating new features but also for the ability to create new meanings for customers as an alternative way of creating delight and surprise. Sketching and visualizing are described as key to developing an idea (Schön, 1983), making an idea tangible (e.g. Cross, 1990; Lawson, 2006; Michlewski, 2008; Cross, 2009), and communicating with other disciplines during an evolving design project.

In the more recent design literature (and especially works on user-centered design), the user occupies a central position, and the focus is on the ways in which designers manage to understand and find solutions to latent needs (e.g. Utterback et al., 2006; Michlewski, 2008). In order to develop an understanding of latent needs, many authors point at the importance of studying users in their contexts, and on the activities they perform regularly (e.g. Bruce and Cooper, 2000; Hanington, 2003; Johansson and Svengren-Holm, 2008). Contextual understanding and foresight are other aspects often highlighted in works on latent needs. However, in classical works on how designers think and work - for example Schön, (1983), Lawson (2006), and Cross (2011) – a user focus is seldom mentioned. Other design and innovation scholars challenge the user-centred view, arguing that designers should not be

close to users, and instead stressing the designer's interpretative and propositional role (e.g. Verganti, 2008).

Among these accounts of what makes design (and designers) special, Kimbell (2012) questions whether design knowledge differs from other kinds of professional knowledge, and whether all designers exhibit it. She argues that a practice-perspective in design research is suitable for studying the situated practice (praxis) of designers, in line with the 'practice turn' in organization strategy research (Whittington, 2006). Cross (2009) also states that "[the] abilities are highly developed in skilled designers, but are also possessed in some degree by everyone. A case is therefore made for design ability as a fundamental form of human intelligence".

### **2.3.3 Design in NPD and innovation debates**

Turning back to the wider interest for design in management research, and focusing on the areas of innovation and NPD, in NPD research focus is traditionally on product design. Studies typically concern the role of designers (Perks et al., 2005), enablers and barriers for using design (Beverland, 2005; Micheli et al., 2012), or the links between the use of design or design spending with financial performance (Gemser and Leenders, 2001; Hertenstein et al., 2005; Chiva and Allegre, 2009). Studies of design and NPD often use examples from design-intensive firms known for their stylish brands and this often, but not always, reflects a view of design as the shape and function of products.

As noted by Noble (2011), a common problem is lack of consensus on what is meant by the term 'design'. In a review of the literature on design related to innovation and NPD, only 20% of publications define design and product design (ibid). Design can be seen as embodied by professional designers, as a separate or integrated in house or outsourced function, and as part of NPD or marketing or sometimes both. Design is also referred to as all activities related to NPD. The degree to which design is linked to an artistic tradition also varies, and the vagueness over what is meant by design makes it difficult to compare studies and obtain an overview of the potential contributions of design to NPD (Luchs and Swan, 2011; Noble, 2011).

While research on design and NPD is often linked to measuring the value of design, in innovation research the interest is in how design is linked to radical, game-changing and breakthrough innovation (Verganti 2008; Bruce and Cooper 2003, Bruce and Bessant 2002). According to Hobday et al. (2012), design has been poorly conceptualized, researched and taught in the innovation field, and one possible reason is that

[The] dominant approach to innovation conceptualization is based on Herbert Simon's idea of human problem-solving within "bounded rationality," which treats innovation in general and design in particular as processes for solving problems. As a result, design as a creative, generating, change-inducing activity has been "left on the sidelines." (ibid:15).

Similarly, Cruickshank (2010:25) suggests that “the clear picture here, with regard both to innovation and to innovation and design, is that there is no clear picture and that the relationships involved are emerging and chaotic, and although the bodies of knowledge are highly overlapping, there is limited dialogue”.

Among innovation researchers, emerging interest in design is mostly theoretical, with design and its relation to innovation discussed mainly at a conceptual level. For example, C-K theory proposed by Hatchuel and Weil, (2009), describes how firms need to expand both concepts and knowledge to become more innovative. Lester and Piore (2004) focus on interpretation as a missing dimension in current innovation theory. Using design as an example, they suggest that innovation builds on the parallel processes of analysis and interpretation, alternating between postponed judgment and early closure. Sarasvathy (2001) introduced the concept of effectuation, which describes how the generation of alternatives is distinctly different from making decisions based on existing alternatives. She bases her ideas on studies of how entrepreneurs think, and compares these thought processes to those of designers.

Research on design and innovation also emphasizes the significance of professionally trained designers (Jahnke, 2013; Kimbell, 2011) and their impact on product innovation (e.g. Lawson, 2006; Verganti, 2008). For example, Verganti (2008) proposes the idea that design-driven innovation results in radical innovations to product meanings and languages, by designers taking on the roles of “interpreters of society” or “language brokers”.

This gap is addressed by Jahnke (2013) who performed an experimental study of professional designers intervening in product development in five Swedish ‘non-designerly’ firms over two years, to investigate the influence of the designers on the ‘fuzzy’ front end of innovation in these firms. Adopting a hermeneutic perspective, Jahnke (ibid) shows that the designers helped the firms’ representatives to reflect critically upon their preconceptions of their products, users and the firms. According to Jahnke (ibid), this contributed to expanding their horizons of understanding, which provided new meaning-spaces for innovation. He found also that the process was facilitated by collective engagement in the activities of ‘aesthetic deliberation’, in which designers and firm representatives use visual tools such as sketches or simple models built from for example foam and paper, not to create concepts but to explore and learn together. Öberg (2012) and Verganti and Öberg (2013) also explore the role of design in innovation from a hermeneutic perspective, suggesting that the creation of meaning can be seen as a special form of radical innovation. In an extensive ethnographic study, Stigliani and Ravasi (2012) examine designers in a design firm, and find that visualization methods are crucial when designers engage in future-oriented group processes. They conclude that this use of material practices in prospective sense making could be applied to all kinds of generative work in firms, particularly innovation and strategy.

### **2.3.4 Emergence of design thinking**

In line with this increased interest in design in managerial debates, the concept design thinking (DT) in management emerged in the early 2000s, originating in the practical experience of managers in the design firm IDEO (Kelley and Littman, 2001; Brown, 2009), and management scholars who had collaborated with or observed the work of designers (Martin, 2009; Boland and Collopy, 2004). DT is described as a multidisciplinary human-centered innovation approach inspired by the ways designers think and work (Brown, 2008; Johansson-Sköldberg et al., 2013; Kimbell, 2011). While the significance of the professional designer is emphasized by both innovation and design researchers, the core idea of DT is that any firm can be inspired by designers, thus stepping away from the active role of professional designer in innovation work (Brown and Katz, 2011; Brown, 2009). DT is now practiced in many large organizations, including SAP, P&G, Intuit and Kaiser Permanente (Martin, 2011; Holloway, 2009; Lafley and Charan, 2008; McCreary, 2003). It is applied also to many areas such as products, services, or social innovation (Brown, 2009).

DT has been described as “one of the hottest trends in business (Liedtka and Ogilvie, 2011), and is advocated in practitioner books, business press (e.g. Kelley and Littman, 2001; Brown, 2008; Brown, 2009, Martin, 2011; McCreary, 2010; Liedtka and Ogilvie, 2011) and Design Management Institute events and conferences on the topic (Lockwood, 2009) and published journal articles. Due to its lack of a theoretical foundation, the concept of DT is dismissed by some as a fad (Johansson-Sköldberg et al., 2013; Jahnke, 2013, Rylander 2009).

In tracing the roots of design thinking, Johansson-Sköldberg et al. (2013) suggest three principal origins: 1) IDEO - focusing on the way in which the design firm works with clients, often with a hands-on approach (Brown, 2009; Kelley, 2008), 2) Roger Martin<sup>7</sup> - focusing on innovative ways of thinking and the skills necessary for managerial success (Dunne and Martin, 2006; Martin, 2009), and 3) Management theory (Boland and Collopy, 2004). The latter two focus on DT as more of a cognitive process or resource. DT is often being described as a creative, subjective and emotional alternative to the analytical logic characterizing many large firms (Brown, 2008; Brown, 2009; Rylander, 2009), although Martin (2009) refers to DT as supplying the balance between analytical and intuitive thinking, stressing that neither logic is sufficient on its own. Most proponents of DT describe how it is influenced by how designers think and work, but focus on how it takes account also of aspects such as feasibility and viability, and that one of its core aspects is the creativity that emerges from the tensions among these various constraints (Brown, 2008).

The label of DT is causing some confusion since the study of how professional designers and architects work and what though processes are going on, goes under the same name. Johansson-Sköldberg et al. (2013), argue that research on DT can be categorized as: (1) ‘designerly thinking’ which pertains to the design research tradition of studying designers

---

<sup>7</sup> Consultant and former Dean of the Rotman School of Management

that goes be traced back to the 1960s, and (2) “design thinking” which is related to the emerging managerial concept. According to Johansson-Sköldberg et al. (2013), the academic stream and the recent hyped discourse are different in nature, with the first focusing on professionally educated designers and teams, while the second often discusses multidisciplinary teams of industry trained ‘design thinkers’, performing outside of the realm of traditionally trained designers. They further describe that these two discourses are totally disconnected and that there are few, if any, cross-references between the fields (ibid). It is, however, common for researchers to not make this distinction; for example Hobday et al. (2011) who also refer to Verganti and Hatchuel as design thinkers. In this thesis, the distinction made by Johansson-Sköldberg et al. (2013) is adopted and DT refers to current managerial discourse.

In recent years, DT has started to generate interest among scholars, both in innovation and management research (Seidel and Fixson, 2013; Ward, et al., 2009; Wyman, Holland, and Yates, 2012; Plattner et al., 2012; Chang et al., 2012), as well as in design research (Johansson-Sköldberg et al., 2013; Kimbell, 2011). However, there are still a paucity of peer-reviewed articles on this topic, and attempts to review the literature of design thinking mainly relies on books and articles in the business press (e.g. Brown, 2008; Dunne and Martin, 2006; Kelley and Littman, 2001), as well as conference papers written by scholars (Hassi and Laakso, 2011).

### ***2.3.5 Understanding design thinking as a concept***

A hotly debated topic is how to understand the concept of DT in theory and in practice. As Johansson-Sköldberg et al. (2013) and Kimbell (2011) note, DT is a rather loose term that can have several different meanings. Descriptions of DT range from a prescriptive process where multidisciplinary teams use a user-oriented approach to come up with relevant solutions to ‘wicked problems’ (to use the vocabulary of design research) to a set of cognitive characteristics that managers can learn from designers (Kimbell, 2011, 2012; Johansson-Sköldberg et al., 2013). Summarizing the various practitioner-based descriptions of DT, Jahnke (2013) states that DT is often understood as a problem-solving approach to innovation, in line with Herbert Simon’s perception of design.

Roger Martin (2009) conceives DT as the ability of professional designers to switch between abductive, inductive and deductive ways of reasoning. He states that if managers were to adhere to this viewpoint, they would not only choose between given alternatives, but also come up with entirely new solutions. According to Martin (Dunne and Martin, 2006), DT in practice could help managers to cope with classical challenges such as balancing between exploration and exploitation. Tim Brown of IDEO defines DT as a discipline that uses “the designer’s sensibility and methods to match people’s needs with what is technologically feasible and what a viable business strategy can convert into customer value and market opportunity” (Brown, 2008:86). Similarly, IDEO defines DT as “a human-centered approach



to innovation that draws from the designer's toolkit to integrate the needs of people, the possibilities of technology, and the requirements for business success” (www.ideo.com).

Thus, there is no single common perspective on or definition of DT. Researchers have called for an ‘epistemological attention to the discourses’, strongly rejecting the idea of a single definition of DT (Kimbell, 2011; Johansson-Sköldberg et al., 2013; Hassi and Laakso, 2011). Johansson-Sköldberg et al. (2013:3) claim that:

As social constructionists we regard an approach that begins with the question, ‘What is design thinking?’ as an essentialist trap. We do not believe that there is a unique meaning of ‘design thinking’, and accordingly we should not look for such a one. Instead, we look for where and how the concept is used in different situations, both theoretical and practical, and what meaning is given into the concept.

Some researchers conceptualize the content of DT. Based on a critical review of the literature on DT (designerly and managerial), Kimbell (2011) characterizes DT as: 1) a cognitive style of individual designers involved in problem solving, 2) a general theory of design as a field or discipline focused on solving wicked problems, 3) an organizational resource for businesses and other organizations. One approach is to depict common elements from the DT literature. Based on a literature review of DT in the managerial literature, Hassi and Laakso (2011) describe DT within a three-dimensional framework of practices (ways of working), thinking styles (cognitive styles and ways of processing information), and mentalities (the mental attitudes of individuals and the organizational culture). Another attempt to identify common elements of DT is provided in the literature-based study by Seidel and Fixson (2013) who propose three broad methods: 1) need finding, encompassing the definition of a problem or opportunity through observation; 2) brainstorming, a formal framework for ideation; 3) prototyping, building models as a source of ideation and the testing of ideas. DT has been linked also to different theories; for example the resource-based view (Borja de Mozota and Kim, 2009; Rosensweig, 2011), organizational learning (Beckman and Barry, 2007) and practice-theory (Kimbell, 2012).

One of the major differences between DT in the managerial and designerly discourses is the role of the professional designer. In DT, Brown (2008) and Martin (2009) disconnect design from the designer professions, and Brown (2008) refers to ‘design thinkers’ whose professional background can vary, stating that people outside of professional design can also have a natural aptitude for design thinking. More recently, the use of DT has been proposed as a way for individuals to release their ‘creative confidence’ (Kelley and Kelley, 2013). On the other hand, it has been suggested also that professional designers should play a central role in using and spreading DT, since they have a natural ability for DT, and could take a more strategic role in the organization (Brown, 2009; Liedtka and Ogilvie, 2011). Brown (2009) claims that the outsourcing of the design function to external agencies which has become common practice makes it more difficult for firms to engage in DT because they will have fewer professional designers in-house.

### 2.3.6 Representations of design thinking

Descriptions of DT vary but mostly refer to user-centeredness and a focus on extensive user research in the early stages of projects to gain a thorough contextual understanding of user needs; iterative working, prototyping, a fun mind-set, and learning from failure, etc. (e.g. d.school Stanford, 2013). More detailed descriptions depend on how DT is perceived as a concept (Hassi and Laakso, 2011).

#### A prescriptive process

The most tangible representations of DT are linked to IDEO (e.g. Kelley and Littman, 2001, Brown, 2008, 2009; IDEO, 2009), as well as the d.Schools; academic institutions offering DT education for masters students and executives (Stanford d.School, 2013). These organizations propose DT as a process involving a multidisciplinary team applying a set of design practices to an innovation challenge - an approach that became widespread after ABC Nightline featured the video “The Deep Dive” in 1999<sup>8</sup>. Following these descriptions, DT can be seen as an innovation process consisting of a number of steps (e.g. Kelley, 2001; Stanford d.School, 2009) or a set of “overlapping innovation spaces” (Brown, 2008, Brown, 2009; Brown and Wyatt, 2009). Despite some differences in its representation, a generic DT process typically consists of the following steps (figure 1): *Understand* the prerequisites of the problem (the market, the client, technology, perceived constraints); *Observe* users in real life situations using a variety of ethnography techniques to develop empathy for the users; *Define* insights (create a point of view for reframing the problem); *Ideate and prototype* multiple alternatives in short iterations; *Test* by getting feedback, then modify and reiterate solutions, and if necessary, also problem formulation (Kelley and Littman, 2001; Brown, 2009; Brown and Wyatt, 2009; IDEO, 2009; Stanford d.school, 2009).

It has been stressed that DT should not be considered a linear process since a project can move back and forth between different phases, and since ideation, creation of prototypes, and testing and adapting prototypes are described as highly intertwined activities (e.g. Brown, 2008; 2009; Liedtka and Ogilvie, 2011). Best practice includes a dedicated space for creativity and visualization (Brown, 2009; IDEO, 2009; Stanford d.school, 2013).

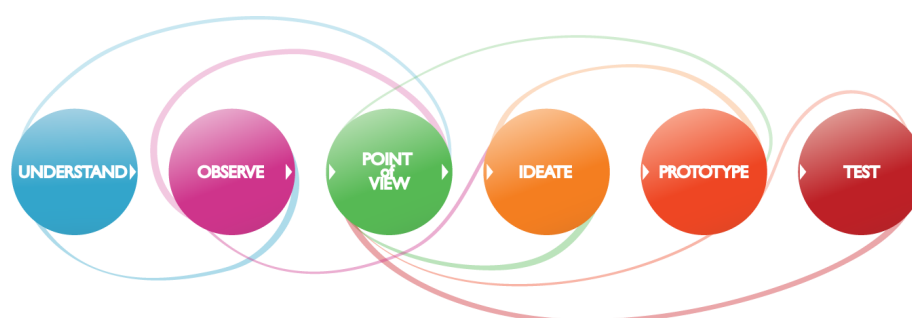


Figure 1: Description of a DT process (source Stanford d.School, 2009).

<sup>8</sup> A short video showing how an IDEO team reinvented a shopping cart.

### Design methods and practice

Common visualization and prototyping methods described in relation to DT include techniques such as sketching, building scrap models, acting, role-play, storyboarding, storytelling, personas, metaphors and analogies (Stanford d.school, 2013; Liedtka and Ogilvie, 2011). Using the walls of a project room, or a “creative space” to make sense of large amounts of data is described as common practice (ibid). A recurring theme in the DT literature is co-creation with users. In the context of DT, practices such as iterating concepts and unfinished prototypes with users in short loops are described, and involving users actively in an empathy-building phase, for example by inviting them to communicate visually in various ways (Brown, 2008; McCreary, 2010; Lin et al., 2011; Liedtka and Ogilvie, 2011; Stanford d.school, 2013).

### A specific mindset

Linked to ideas of DT as a cognitive matter (Martin, 2009; Boland and Collopy, 2004), a specific DT mindset is central to descriptions of DT linked to IDEO and Stanford. Brown (2008:87) describes a design thinker as someone who has empathy – and “can imagine the world from multiple perspectives – those of colleagues, clients, end users, and customers”. He argues “great design thinkers observe the world in minute detail. They notice things that others do not and use their insights to inspire innovation”. Brown argues further that design thinkers are characterized by integrative thinking – not only relying on analytical processes “those that produce either/or choices” – and are able to see all aspects of a problem. Design thinkers are said to be optimistic – any constraints are seen as positive, leading to better solutions – and experimental by posing questions and exploring constraints “in creative ways that proceed in entirely new directions” (Brown, 2008:87). Finally, design thinkers are described as enthusiastic about collaboration with individuals from other disciplines and interdisciplinarity.

### Areas of application

DT is often being described as a generic approach to problem solving that can be applied to any situation that any organization or community might face such as formulating business strategy (Holloway, 2009), organizational renewal (Sato et al., 2010) and other “areas of life” (Stanford d.School, 2013). It has been described as a culture or set of principles to guide employees in everyday work (Martin, 2011). When DT is described in relation to NPD or innovation work, it often focuses on the front end of innovation (e.g. Martin, 2009; Lockwood, 2009; Stanford.dSchool, 2013). There are other descriptions that include ‘implementation’ or ‘delivery’ as the final stage in an ‘action plan’ (e.g. Kelley, 2001 and Littman; Brown, 2009; IDEO, 2009) or a learning launch (Liedtka and Ogilvie, 2011) signaling its use also in later stages of innovation work. However it is not always clear what is implied by such an action plan or learning launch. Innovation scholars, who study use of design methods or DT in an innovation context, often examine the front end of innovation (e.g. Seidel and Fixson, 2013; Bessant and Maher, 2009).

### **2.3.7 The Promise of design thinking**

There is no shortage of idealistic descriptions of or claims about the benefits of using DT. While scholars have only recently started to explore the influence of DT on innovation, practitioners have long advocated its benefits. However, the variety of views about how to describe the concept, inevitably will affect how value is perceived, and whether DT is described as part of an innovation system, a process, a collection of tools, a mindset or a mix of these (Hassi and Laakso, 2011).

#### **A miracle cure**

DT is advocated as an all-purpose problem-solving approach (Brown, 2008; Lockwood, 2009; Liedtka and Ogilvie, 2011), a creativity booster for organizations and their employees (Kelley and Littman, 2001; Kelley and Kelley, 2013), and a mindset that will help organizations better balance analytical and creative thinking and exploration/exploitation (Martin, 2009; Dunne and martin, 2006). Firms using DT can expect greater innovation output: more desirable solutions that offer creative alternatives which go beyond aesthetics and are “emotionally satisfying and meaningful” (Brown 2008). It is argued also that implementing DT will improve aspects of the innovation and NPD processes, for example by improving collaboration and motivation through empathy and knowledge sharing through prototyping (Martin 2006, Brown 2008). Organizations can also expect a more efficient development process that will bring innovations to the market more quickly by “converting learning from the user into viable business outcomes” (Martin, 2006).

DT has been described also as an enabler for personal development and building individual skills, such as developing the ability to think abductively and to deal with conflicting constraints (Martin, 2009). Based on their experience at the Stanford d.school, Kelley and Kelley (2013) claim that design thinking fosters personal confidence in creative ability. Specific tools and practices are proposed as contributing to innovation in various ways, in particular tools for user research (Bessant and Maher, 2009; McCreary, 2010), ideation, idea selection and prototyping (McCreary, 2010; Stanford d.School, 2013; Brown, 2009). However, the empirical foundations for these claims are often personal experience and single anecdotal cases with a low levels of detail (e.g. Brown, 2009; Martin, 2010; McCreary, 2010; Sato et al., 2010).

#### **A fragmented view on design thinking and innovation in academia**

One of the most prominent values proposed is the ability of DT to help firms become innovative (e.g. Brown, 2008). What is meant by innovation however, is often not problematized in this literature (Wylant, 2008; Cruickshank, 2010). Typically, innovation is not separated from invention, and often focuses on invention: “innovation here is not defined or explicitly addressed but instead is used as an umbrella description for creative practices, such as brainstorming, ‘unfocus groups’, and ethnographic approaches” (Cruickshank, 2010:23).

Scholarly contributions on the role of DT in relation to innovation are scarce, and the few that exist are mostly conceptual (Chang et al., 2012). The reasons for this lack of research

may be the emerging nature of the phenomenon, poor academic conceptualization of the approach and hyped discussion (Johansson-Sköldberg et al., 2013). The few empirical studies highlighted previously show an emerging trend to investigation of these questions (e.g. Carr et al., 2010; Seidel and Fixson, 2013). It is argued that DT enhances firm competitiveness generally, contributes to strategy formulation, improves design capability (e.g. Leavy, 2010; Sato, et al., 2010; Ward et al., 2009) and increases development speed (Simons et al., 2011). In addition, scholars such as Beckman and Barry (2007) argue that DT as a generic innovation process enables teams and organizations to learn and develop, and that an understanding of meaning-based user needs may lead to more radical innovation. Roberts and Palmer (2012) study managers and suggest that DT enables visceral learning, informing individual's "gut feelings" which they argue may lead to better decision making.

In terms of empirical research on the value of using DT, the focus is mainly on understanding parts of the concept such as tools (Seidel and Fixson, 2011), multi-disciplinary teams (Beckman and Barry, 2007), prototyping (Dow and Klemmer, 2011), physical environments and IT tools for collaboration (e.g. Plattner et al., 2012). Most of these studies are in experimental settings, often involving students. Seidel and Fixson (2013) find some support for needs identification, brainstorming and prototyping in student teams enhancing innovation/development work and leading to better concepts. However, results are mixed; students who exaggerated brainstorming without parallel use of prototyping, performed worse.

Researchers linked to Stanford's d.School and Center for Design Research, as well as the Hasso Plattner Institute in Potsdam (e.g. Plattner et al., 2012) discuss how to validate practices linked to DT, for example measuring the performance of teams that are co-located, distributed or embedded in businesses. However, this type of measures say little about the potential benefits from a particular context, or how the use of DT might affect the organization in the long-term, or in ways other than directly related to innovation work or innovation outcomes.

Several publications on DT discuss benefits in terms of *capabilities* (e.g. Hobday et al., 2012) but few spell out what is meant by capabilities, and few cases link DT to capabilities as discussed in innovation theory. Rosensweig (2011:24) argues for DT as a dynamic capability that enables an organization to "exceed the expectations of its stakeholders and advance its assets". The focus is on individuals, and specifically professional designers, since DT is seen as enabling individuals to collaborate better and to support the development of design capabilities.

### **2.3.8 Overlap with related fields**

Similar to any emerging management concept, the ideas held forward are seldom completely new. In isolation, many of these processes and mindsets have been discussed in other research fields, for example innovation and NPD. Some examples are creativity in multidisciplinary teams (e.g. West 2002), ethnographic user research (Leonard and Rayport,

1997), co-creation with users (e.g. Von Hippel, 2009; Jansen and Dankbaar, 2008; Öberg, 2010), market learning in terms of prototyping and user feedback (e.g. O'Connor, 2008), and use of analogies (Kalogerakis et al., 2010).

Brown (2009) refers to prototyping as 'building to think', and according to Liedtka and Ogilvie (2011:49), "visualization is the mother of all design tools" – not just for visualizing concepts, but also for making an idea tangible. Hargadon and Sutton (1997) as well as Mascitelli (2000) find that drawings, models, and prototypes are useful to product developers as they evaluate and refine new ideas in early phases of innovation work. They note that in early work, it is less about validation of ideas and more about sparking imagination or facilitating understanding between individuals from different functions or professional backgrounds.

According to Mascitelli (2000), breakthrough innovation results from making use of the tacit knowledge and creative energy of individuals/project teams. The goal should be to "establish a generative atmosphere for breakthrough innovation, in which divergent thinking, improvisation, and artistic creativity merge with the practical demands of the product development process." (ibid:179). Hobday et al. (2012) find a resemblance between descriptions of DT and previously proposed practices and concepts; for example Lindblom's (1959) "science of muddling through" as an alternative to a rational approach under conditions of uncertainty and incomplete information.

### **2.3.9 Critique from a design research perspective**

The concept of DT has some critics in the design research community (e.g. Tonkinwise, 2011; Johansson-Sköldberg et al., 2013; Jahnke, 2013). First, the managerial discourse on DT has been accused of presenting the concept as something that will create value in any setting, and is straightforward to implement. The ease of implementation is contradicted by studies on the integration of design in for example NPD and marketing (Persson, 2005; Perks et al., 2005; Persson et al., 2007), which is often linked to a clash of logics (analytical, rational vs. interpretative, intuitive), as argued by e.g. Rylander (2009) and Edeholt (2007).

According to Johansson-Sköldberg et al. (2013) there are some dimensions that are missing when designerly thinking is translated into DT. First, they argue, design methods are often taken out of context, and do not consider the "embodied knowledge" that is important to designers. Presenting various design tools as a toolbox from which one can pick and choose, regardless of skill, leaves out the knowledge needed to use these tools, competence which, according to Johansson-Sköldberg et al. (2013), requires years of training, and is embodied in designers. Kimbell (2012) also criticizes managerial discussion on DT for claiming to take inspiration from how designers think and work, generalizing the competences of *all* designers.

Another critique is that DT as a concept claims to be inspired by the way designers think and work, yet according to design researchers, fails to take into account what are perceived to be crucial tenets of design practice or a designer's competence (e.g. Johansson-Sköldberg et al., 2013; Jahnke, 2013). For example, Johansson-Sköldberg et al. (2013) refer to an overly strong focus on creativity in managerial debates, and Jahnke (2013) criticizes proponents of DT for adopting a problem solving perspective when design takes a solution-oriented perspective. Further, the artistic and aesthetic dimensions of design knowledge are often repressed in DT discourse (Tonkinwise, 2011; Jahnke, 2013, Kimbell, 2012). This is illustrated for example in Sara Beckman's distinction between 'little d and Big D design' (cf. introduction chapter), and the statement in Liedtka and Ogilvie (2011:5) that

Gifted designers combine an aesthetic sensibility with deep capabilities for visualization, ethnography and pattern recognition that are well beyond the grasp of most of us – managers included. But when it comes to fostering business growth, the talent that we are interested in is not rooted in either natural gifts or studio training – it lies with having a systematic approach to problem solving. That, to us, defines DT and it can be taught to managers.

Yet it is argued that leaving out the aesthetic or artistic dimension of design, as in recent discussions of DT, undermines the potential contribution of design to innovation (Jahnke, 2013). Aesthetic knowledge as a driver of innovation is proposed by design researchers (e.g. Kimbell, 2011; Tonkinwise, 2011), and observed in their practice (Jahnke, 2013).

Further, some researchers argue that descriptions of DT as a set of cognitive practices, attitudes, and mental processes, fail to take into account another core aspect of design work, namely hands-on practices such as sketching and creating models as a way of advancing thinking (Jahnke, 2013; Stigliani and Ravasi, 2012). Conceiving of DT as a 'different way of thinking' takes away some of the "doing" of design. Yet, it is argued that the material and visual practices of design must be central if design is to contribute to innovation (Kimbell, 2011; Stigliani and Ravasi, 2012; Jahnke, 2013). Kimbell (2011) sees a paradox in the duality between thinking/knowing and acting, in many descriptions of DT, and states that DT cannot be conceived as either or, since it is impossible in practice to separate thinking from action, and vice versa. According to Schön (1983), in reality there is no separation between thinking and action since most individuals engage in a constant flow of thinking, action and reflection-on-action.

To summarize, linked to the scarcity of empirical studies, the essence of this critique is that it targets conceptualizations of DT in managerial discourse. As stated by Jahnke (2013, p 286), *"the contribution of design is more complex than what is typically represented in design thinking rhetoric, even though what goes on in the name of design thinking is probably also more complex than its representations"*. Since one of the premises of DT is that managers could learn from designers (Rylander, 2011), this raises the question of the role of designers in DT, and also what it is that managers could learn. According to Liedtka

and Ogilvie (2011), there is also a need to differentiate between DT and design in order to clarify their different roles in the organization.

### **2.3.10 Reflections**

To summarize, this review of the literature on DT shows that the field is young, with most work relating to book chapters or business press. Nevertheless, there is an emerging scholarly interest in the phenomenon, and both innovation and design researchers have started to investigate DT in theory. However, empirical studies are scarce. The poor academic conceptualization of DT leads to various interpretations of the notion, in which authors refer sometimes to classical design research, to the more recent managerial debate, to what goes on in the name of design in innovation, or a mix of these. The current hype about DT may result in researchers' hesitating about whether to use this label or not; consequently, it is possible that interesting research in the area is categorized in different ways. There is also a tension linked to design research, where the distinction between design and DT is not clear, which has led to some reluctance towards the concept and how it is marketed. Due to the lack of empirical research, firms and researchers interested in DT as an approach to innovation have to rely mainly on how the concept is described and marketed by its proponents – typically presenting generic or idealistic views. Such generic descriptions often do not take context neither individuals into account, nor what happens when the concept is integrated with existing processes, norms, and structures.

A few points merit specific attention. First, there seems to be a need for a better understanding of DT in order to enable studies of the concept in organizational contexts. One problem is that DT is often described as something that “is”, and researchers and practitioners often lament the lack of a unified definition. Further, while DT is discussed in separate discourses in practitioner-based managerial debate and in design research, there are many commonalities to be found. The former claims to take inspiration from the competence of designers, and the latter builds on academic studies of designers in action or designers reflecting on their practice. The lack of cross-reference between the fields is paradoxical: DT takes inspiration from the competence of designers, then cuts it loose from the design discipline by saying that anyone with the right personality can become a design thinker but does not discuss how this competence can be built.

Turning to the potential value of DT, the concept is described in very positive terms. Although there are limited empirical investigations, the values proposed often build on the experience or observations of its proponents, such as Tim Brown and David Kelley linked to IDEO/Stanford, or Roger Martin. A consequence of the plethora of interpretations of DT is that the aggregate promise of value is rather large; ranging from better communication amongst team members to organizational renewal. The problem is that these values are assumed to be general, implying that any firm, manager, or employee could use DT in any context, and benefit from the stated values.



Further, while DT is promoted as the road to salvation for organizations keen to come up with breakthrough ideas or to be more innovative, a common denominator of many publications on DT is that ‘innovation’ is not defined or problematized. Linked to this is the question of what type of innovative output DT might give rise to. DT is often discussed in terms of breakthrough or radical ideas, explained by its inherent user focus and the idea that all development should take as a starting point a deep understanding of user needs. However, several scholars who are interested in design’s potential contribution to radical innovation dismiss the idea of involving users in the process, stating that this will lead only to incremental innovation. The paradox lies in the rhetoric around DT that implies that radical innovation is based on an understanding of current needs, and that users should be actively involved in idea and concept selection.

Finally, most of the literature on DT assumes a positive influence on innovation, NPD, organizations, or individuals. However, this positive attitude raises the question of challenges or negative effects which have been ignored by the literature so far. Another question concerns who should be engaged in using DT. This is related also to how innovation is organized: is the ambition to improve a separate innovation team or process, or to make all employees in an organization more creative and innovative beings?

## 3 Method

### 3.1 The research journey

The premise for the research presented in this thesis is the growing interest in design, in innovation and NPD debates in research, practice, and at the policy level. Sweden has seen increased interest in design in many areas. The Swedish government designated 2005 as the “year of design”. Subsequently, several research projects were funded that focused on a wider role of design in NPD, and in 2006 I was recruited as a PhD student to participate in a two-year research project, the KREAST project (study 1). The KREAST project was a collaboration between Chalmers University, three Swedish manufacturing firms, and the Swedish Industrial Design Council; a major proponent of design in Sweden. The goal was to find a structured approach to efficient NPD that would still allow creativity at the front end of NPD. The idea was to support the firms to experiment with design methods in workshop settings and to involve designers in concept development projects to be studied by the group of researchers. Three case studies were performed within the project, of which I took part in two.

The project was based on the assumption that design represents a value that that firms can tap into by including designers in new ways. In the case firms, designers typically were involved late in the NPD process, to add style; so the idea of them contributing to the front end was new for the firms. During the course of the project, it became clear that although the firms wanted to learn how to generate better ideas and to develop successful products faster, they were reluctant to let designers take an active role. Due to the limited time frame allowed to designers, it was difficult to foresee their potential contribution to front end work, or to use the studies as inspiration for creating the structured yet flexible approach being sought for. On the other hand, the project revealed several issues related to how innovation and innovation work were perceived, as well as some complexities regarding the integration of design in ‘non-designerly’ firms.

Around the time that I finished writing up my licentiate thesis based on this study, I realized that in the research project we had not questioned the assumption that there are benefits in involving designers early in NPD, and that a more critical stance was needed towards the competence of designers in relation to NPD. One issue that had surfaced as complex in the case firms, was how to take account of the latent needs of users; this was an area where the designers involved felt that they could contribute but were at cross purposes with the firms. I decided to explore the question theoretically, leading to paper 1. While this paper finds theoretical support that links designer competences to understanding latent user needs, they also seemed useful in a wider range of applications. However, I questioned whether incorporating these competences in NPD necessarily had to involve professional designers, or whether this competence could be built or harnessed in other ways. Hence, a new research topic emerged: the role of design in a wider sense; in innovation. At this point I had become superficially acquainted with DT as an emerging management concept, promising increased innovation based on the premise that firms can learn from the way designers think and work.

In the second phase of my PhD studies, I was invited to join a small research group interested in the interface between design and innovation, and together we decided to examine the concept of DT more closely.

An initial review of the DT literature revealed growing interest in the concept among practitioners, with a few success cases ‘demonstrating’ its usefulness. However, there is a near dearth of academic studies of firms that have implemented the concept in some way. This excited our curiosity, and we designed a study to explore the concept of DT empirically; in order to see what the buzz was about and how DT could potentially be related to innovation. We decided to design a study based on the ‘label’ DT (firms stating that they used DT, and investigating what they say they do).

The launch of this new research project coincided with a three-month stay in the San Francisco Bay area, where the concept of DT initially emerged, and where a number of large firms claimed to be using it. Together with a colleague, I was able to get access to some of these firms, and these initial contacts formed part of our first empirical study of DT; two multiple-case studies of firms claiming to use DT, carried out in 2011-2012 (studies 2 and 3). The knowledge gained from these studies was intriguing and inspired a more in-depth study of how the concept was used in one of the organizations. In the sample set, the American health care firm Kaiser Permanente stood out; it had been using DT for approximately ten years, which led to a deeper case study on their use of DT (study 4). The following part of this chapter will treat study 2, 3 and 4 since study 1 mainly served as inspiration to the subsequent studies.

## **3.2 Research approach and design**

### ***3.2.1 Research method/approach***

#### **An exploratory, qualitative approach**

The aim of the research project was to explore different ways large firms relate to the concept of DT, and its potential links to innovation. Since the phenomenon of applying DT to organizations has received scant research attention, the area can be considered a nascent theory field (Edmondson and McManus, 2007), where an exploratory, qualitative approach would be recommended (Bryman and Bell, 2007; Edmondson and McManus, 2007; Easterby-Smith et al., 2012). Accordingly, since the investigation focused on identifying emerging patterns and potentially interesting avenues for future research, the study was designed based on a qualitative, exploratory approach to data collection.

The choice of a qualitative approach is rooted also in my (emerging) beliefs regarding knowledge and knowledge creation. Within research in innovation and NPD most research builds on a realist view, although alternative standpoints are emerging. Gephart (2004) argues that within management research, it is common for researchers to try to fit qualitative research into a quantitative frame. Given the consequences in terms of validity claims, he

stresses the importance of matching the chosen method with the type of knowledge one aims to produce (ibid). A related question, and perhaps one reason for the forced fitting, is what type of knowledge the field expects, and what is considered publishable in the main journals in the area (Alvesson, 2011). As noted in the theory section, a majority of the publications on design in relation to NPD/innovation focus on different kinds of performance measures. Engwall et al. (2005) criticizes the often essentialist views on management concepts, that often are described as normative guides for action, and as tools decoupled from action. This thesis is written from an interpretative perspective (Easterby-Smith et al., 2012; Sandberg, 2005), which influenced my choice of research design.

### **3.2.2 Research method**

#### **Case study research**

In our research project, a case study approach was adopted, in line with several researchers who argue that if the ambition is to explore a field, and if context is deemed important, a case study approach is suitable (e.g. Eisenhardt, 1989; Leonard-Barton, 1990; Voss et al., 2002; Flyvbjerg, 2006). Siggelkow (2007) argues that the key advantage of case study research is that it allows illustration of causal relationships more directly and gets closer to theoretical constructs than large-sample empirical work. When theory is built from cases, Eisenhardt (1989) emphasizes the need for clarity and describes the case-oriented process as “highly iterative and closely linked to data” (ibid: 532). She points also points to the importance of a priori specification or definition of the research question, which however should be regarded as tentative. Halvorsen (1992) stresses that the initial research question need not be overly specified since the objective is to develop a holistic and meaningful understanding. In our case, we started with a broad inquiry to get an initial overview, and then developed the themes and research questions in an iterative approach, following the insights that emerged from the studies and theory.

In exploring the concept of DT, we wanted to both get both a broad understanding for its application across a range of different settings, and to gain insights into specific, individual contexts. Multiple case studies are often suggested when the aim is to understand a phenomenon in various contexts (Bryman and Bell, 2007). The use of a single case can be seen as a strength since it allows the possibility of gaining in-depth information about the phenomenon in context (Flyvbjerg, 2006), and the opportunity to study several contexts within the case (Voss et al., 2002). Since we also wanted to obtain deeper insights into the long-term perspective of using DT, the resulting research design was a combination of multiple-case studies (studies 2 and 3) and a single-case study (study 4). The term ‘case’ is often taken for granted, but not easily defined (Ragin and Becker, 1992). For example, a case can be a single organization, location, person or event (Bryman and Bell, 2007; Voss et al., 2002) In these studies, each firm was considered a case since we wanted to be able to gain preliminary insights into similarities and differences across settings; how the organizational context might influence the role of DT, and how the use of DT might be able to influence the firm.

### Use of interviews and observations

For exploratory research, ethnographic studies (observations), qualitative interviews, or a mix thereof are recommended (Edmondson and McManus, 2007). Since our initial purpose was to get an overview of the area, we chose interviews as the primary data collection method. The choice of qualitative interviews was in line also with the interest in perceptions; how do individuals in organizations that claim to be using DT perceive the concept and how it is used.

Alvesson (2011) points to some of the dilemmas involved in using interviews to collect data, especially the paradox of what the interviewees know, want or can say compared to what they actually say during the interview; how the interviewer affects the interview through the choice of which leads to follow up on or not, often colored by the interviewer's position; and issues linked to the interview as a social situation where the interviewee may try to deliver what he/she thinks is expected. In our studies, we followed Alvesson's suggestions to reflect upon these issues and adapt the research research questions accordingly. It also influenced us to develop and propose a less instrumentalist view on DT.

It has been argued that in exploratory research, combining methods may allow more depth, for example combining ethnographic observations with qualitative interviews (Edmondson and McManus, 2007; Bryman and Bell, 2007; Easterby-Smith et al., 2012). The single-case study (study 4) offered the opportunity to complement interviews with observations and information from internal documentation.

## 3.3 The research studies.

### 3.3.1 *Design of the research studies*

To facilitate initial access to a large number of firms, in study 2 the decision was made to include firms with various levels of experience, and to perform only one or a few interviews in each firm. It was important that these individuals should be deeply involved in DT in their firms, and had had insights into how the initiatives had started. In total, fourteen firms were selected for this study. Therefore, interviewees were mainly individuals with central roles in the introduction or implementation of DT in their firms. Whenever possible, we performed additional interviews with employees with different responsibilities in order to obtain complementary perspectives, as suggested by Eisenhardt and Graebner (2007). After the first broad study, a second multiple-case study (study 3) was designed in order to get more diverse perspectives, since the interviewees in study 2 were often in positions that led to a positive bias to DT. We wanted also to study firms with more extensive experience of using DT, in order to gain insights into how it is integrated in existing processes and structures, and to better understand the long-term effects of its use. This reduced the number of potential candidates, but with the initial contacts gained through the first study, it also opened up the possibility of including a larger number of interviewees and obtaining the desired variety of perspectives. Six firms were included in this study. Finally, in order to get

insights into the adaptation of DT in an organizational context, as well as a long-term perspective on the use of DT, a single case study was designed.

Here the focus was on studying a specific unit using DT, but with the ambition to understand how its use of DT potentially might affect the organization as a whole.

### Summary of the studies and related papers

The research presented in this study builds on four studies, resulting in five appended papers and two appendices. The studies are summarized in Table 2 below.

*Table 2: a summary of the studies and related papers*

<b>Study</b>	<b>Year</b>	<b>Approach</b>	<b>Papers</b>
1 (Kreast)	2006-2008	Multiple-case study	1
2	2011-2012	Multiple-case study	2
3	2012	Multiple-case study	3, 4
4	2012	Single-case study	5, appendix 1

### **3.3.2 Selection of cases**

According to Eisenhardt (1989) and Siggelkow (2007), it is neither necessary nor preferable to choose cases randomly. Cases should be selected so that the problem under investigation is highlighted; cases that provide insights that could perhaps not be gained in another organization. One important issue was how to find relevant firms for the study. Due to the nascent nature of the concept, the number of potential cases was limited, especially since the initial intent was to study firms with some experience of using DT. The concept has been strongly linked to the Silicon Valley-based design firm IDEO, and early implementation in firms started in the US in the early 2000's. The concept also attracted the interest of the German investor Hasso Plattner who, in 2006, founded two schools of design thinking (d-Schools), one in Potsdam, Germany, and one at Stanford University, US. As a starting point we decided to focus on firms in Germany and the US. Since many of the firms that publically claim to use DT are large (e.g. Brown, 2009; Holloway, 2009; Martin, 2009), focusing on large organizations increased the chances for finding enough cases for a coherent sample set. With the limited number of potential cases, and with DT being promoted as a concept that is useful in any type of context, we decided to include firms from a variety of industrial sectors, such as products, services (finance, health care), software, and retail.

In Germany, we collaborated with the Hasso-Plattner Institute - School of Design Thinking in Potsdam (d-School) which helped us to identify a number of firms that had taken executive courses or had been involved in student projects applying their approach to DT. The selected firms had continued to work with DT in their home organizations for up to three years after their first involvement with the d-School. In the US we identified a number of large firms that stated that they applied DT in their organization in the business press or in

the literature (e.g. Martin, 2009; Brown, 2009). Since the concept of DT was so recent, the few firms using DT were often linked in formal or informal networks in order to learn from each other's respective successes and mistakes. Therefore, once we gained access to one firm, we were able to use snowball sampling (Flick, 2009) to identify other firms that fitted our criteria. In the US, firms had between one and nine years of experience of applying DT, and included some of the most cited examples in the literature.

In study 3, we selected four of these fourteen firms with extensive experience of using DT. Two additional firms identified through snowballing sampling were added to obtain three pairs of firms: two with a product focus, two with a service focus, and two software firms. These six firms all had between four and ten years of experience of applying DT. For study 4, the single case study, Kaiser was selected since the firm has long experience (10 years) of using DT, and has integrated DT into its structured innovation work. Since the firm has been exemplified anecdotally as a success case in the business press (McCreary, 2010) and in books (Brown, 2009; Kelley and Littman, 2001; Liedtka and Ogilvie, 2011), gaining an in-depth understanding of such a case was important. The firm is a California-based, non-profit healthcare organization providing care to approximately nine million members.

### **3.4 Data collection and analysis**

#### **3.4.1 Data collection**

The data collection and analysis are described at the aggregate level since the method was similar in all studies. The appended papers and appendices provide more detailed information on data collection and analysis. Studies 2, 3 and 4 were conducted during 2011-2012 and most of the interviews were conducted by two researchers. There is some overlap between the studies since four of the six firms in study 2 were also included in study 3; and hence the initial interviews are included. Accordingly, study 4 (the single case of Kaiser Permanente) also includes a number of interviews performed during studies 2 and 3.

The interviews were semi-structured and focused on topics such as interviewees' views of DT, their motivation for wanting to apply it, how it was currently used, the value they perceived that it had created, and the challenges they encountered during its implementation. Interviews lasted between 45 minutes and 2 hours, and were all tape-recorded and transcribed. In the multiple-case studies most interviews were face-to-face, with a few conducted over the telephone. The approach was iterative and the data collection dynamic in the sense that new knowledge was immediately applied in further data collection. One benefit with this type of open-ended inquiry is that it allows for following up interesting tracks, and changing the direction of data collection with increasing insights into the area (Edmondson and McManus, 2007), something that occurred in these studies. Whenever possible, documentation was used (internal documentation as well as articles in the business press and YouTube clips) to obtain further insights into how DT efforts were communicated internally and externally, as suggested by Halvorsen (1992).

Study 2 included a total of 23 interviews in 14 firms. As suggested by Eisenhardt and Graebner (2007), in study 3 we gathered multiple perspectives by interviewing individuals from different functions, such as innovation and R&D managers, DT practitioners, and employees involved in innovation and NPD. We conducted between five and seven interviews per firm; 36 interviews in total.

Study 4 was the single case study of Kaiser Permanente, where the focus was on the Innovation Consultancy, which was the first internal group to explicitly work with innovation at Kaiser using an approach building partly on DT. During a two week period in August 2012, I spent eight days, seven to ten hours per day, with the team, attending project meetings at their headquarters and observing their fieldwork at a hospital unit. As suggested by Åhlström and Karlsson (2009), in addition to informal and impromptu conversations, formal interviews were conducted with well-informed individuals: all members of the Innovation Consultancy, their manager, frontline staff who had participated in innovation projects, and an executive manager not linked to the team to gain an outsider perspective. One of the early members of the Innovation Consultancy was designated the contact person, and he acted as a key informant, as suggested by Voss et al. (2002). He commented on events that took place during the fieldwork in the hospital unit, adding explanations or providing background information. In total, 18 semi-structured interviews (30-90 minutes; total of 16 hours recorded), and a number of open interviews of varying length (total of 10 hours recorded and 8 hours non-recorded) were held. The open interviews typically touched upon one or a few topics of interest, and often built on insights gathered during previous interviews and observations.

### **3.4.2 Data analysis**

Exploratory research is often characterized by an iterative, abductive approach to collecting and analyzing data, allowing researchers to be open to emerging themes and issues in their data, and allowing them to follow up on some leads and abandon others (Eisenhardt, 1989; Edmondson and McManus, 2007). Dubois and Gadde (2002) describe systematic combining as an abductive approach to the interpretation of data, where the understanding develops as the empirical data are viewed against intermediate conceptual models. In our case, the analyses related to each paper helped shape these intermediate models, and the process was informed also by revisiting the literature. We discussed emerging results with a group of design researchers which allowed us to test our ideas, and followed up through discussions with some of the case firms.

In the multiple case studies we conducted both within-case analyses and cross-case analyses, as suggested by Eisenhardt and Graebner (2007). Data were analyzed on the basis of open and axial coding (Strauss and Corbin, 1998), where excerpts from interview transcripts were given keywords and then thematically sorted. The analysis was iterative and the emerging themes were compared with the available previous research, in line with the systematic combining approach (Dubois and Gadde, 2002). After study 3, and when writing



papers 3 and 4, using the same approach we gathered material to collect relevant categories across all cases. Depending on each paper, the categories varied. Finally, we used different frameworks to analyze the content of the categories, or to use as an initial structure for building the model in paper 3. In order to complement this aggregated data and to get a better understanding of each case, we wrote case summaries of each firm, to get insights into contextual factors and to build a cross-case understanding.

Study 4 was different and involved a very intense period of data collection, and rapid iterations of data analysis and collection in order to make the most out of the stay in the firm. The analysis of data is described in detail in paper 5. Immediately after each data collection phase, I took notes regarding ‘facts’ and ‘reflections’, in a field diary, as suggested by Eisenhardt (1989). These notes were updated daily, with detailed narratives of what happened while the memory was fresh, as suggested by Emerson et al. (1995). Every night during the two weeks of data collection, reflections were recorded in relation to the data collection thus far, to guide and adjust the topics for the next day’s data collection (Eisenhardt, 1989). In total, this amounted to 189 double-spaced pages of field notes. The recorded interviews were listened to and critical parts were transcribed, yielding a further 401 double-spaced pages. Observation notes added another 129 double-spaced pages of text. Directly after the study, a detailed narrative was written outlining the story of DT at Kaiser to create a rich picture (Voss et al., 2002; Åhlström and Karlsson, 2009; Guba and Lincoln, 1994). This narrative was complemented by data related to certain themes from recorded interviews, interview transcripts, observation notes and the research diary in order to write paper 5 and appendix 1.

### **3.5 Methodological reflections**

#### ***3.5.1 Relationship to the concept of DT***

When we began this research, in many publications on DT the concept was often not defined, or there were complaints about its lack of definition, and calls for a ‘proper definition’. When discussing our research topic or preliminary results with other researchers we were often asked to define what DT *was*. Our standpoint was not to accept the definitions proposed by its main proponents but instead to build an understanding of the concept based on our empirical data. As the studies reveal a broad variety of perceptions of the concept and its use, we realized that any attempt to create an essentialist, normative definition of the concept would be impossible, and more importantly, would be of limited value for a constructive discussion of DT. Eventually we came to conceive DT as a loose concept that is given new meaning and becomes something different in each context, but that still needs to be articulated. As a way of conceptualizing our findings, and inspired by Mouritsen (2006), we created a model describing DT that built on the notion of a boundary object (Star and Griesemer, 1989).

During the single-case study I experienced a paradox when studying how a concept is integrated in an organization: typically one would choose a firm with some experience of use

in order to not only study early implementation issues. On the other hand, since any concept that is integrated will adapt to the context of that particular organization, and eventually disappear when it is naturalized, it may be hard to discern what is and what is not part of that concept. Taking the single-case study of Kaiser Permanente as an example, the starting point of the study was to investigate the application of DT, with a specific focus on its innovation team. However, trying to ask interviewees about DT was often difficult since it was so integrated in their ways of working, and they mostly used the term DT in external communication. Within their teams they talked about human-centered design, which was their own process built on the approach that they learnt from IDEO as well as methods from continuous improvement, and other sources of inspiration. My key informant used the metaphor of trickling water where their way of working could be seen as a lake, fed by water from rivers and brooks, trickling down from the surrounding mountains. “How far up in these little rivers do you want to go in terms of finding the source”, he asked rhetorically, “and can you ever separate out the DT component from the lake?” Trying to find out what is and what is not DT thus depends on whether the goal is to find some sort of “uncontaminated source” of DT or whether the innovation team’s way of working is interesting as an example of what the concept of DT became in that specific context.

### **3.6 Quality of research**

Lincoln and Guba (1994) contend that the concept of generalizability is impossible to combine with studies of anything that involves human activity. Still, they agree that there may be an intermediate position between the view that the only true goal of science is to establish generalizable knowledge, and the view that all knowledge is considered unique in each specific setting. They suggest the notion of a ‘working hypothesis’, and transferability where the knowledge created in one setting may serve as an input to knowledge creation in a different setting.

Due to the exploratory nature of this work, and in line with an interpretative perspective (Easterby-Smith et al., 2012; Sandberg, 2005), the ambition of this exploratory study is not to provide any kind of generalization, but to present insights into how firms perceive the concept, and perceive to be using it in practice. These propositions are intended as an input to and directions for future research. This contribution is necessary when there is little or no prior knowledge of an area (Edmondson and McManus, 2007). To increase the trustworthiness (the extent to which the findings address the initial concern of the research) of the study (Guba and Lincoln, 1994), each step of the research was carefully documented, and feedback was solicited from interviewees in all firms in studies 2 and 3, thereby also addressing pragmatic validity, as suggested by Sandberg (2005). To ensure transparency, the thesis includes rich descriptions of the concept of DT, both within each firm and at an aggregated level.

The case selection in the multiple case studies could be questioned, since several of the firms held forward as success cases in the DT literature are also part of these studies. This to some

extent was inevitable since the ambition was to find firms with as extensive experience as possible, and the firms in question are known for being early adopters. While several of these firms have been in close contact with the main proponents of the concept (IDEO, Roger Martin, Stanford d.School), they have also had time to adapt the use of DT to their own settings.

Regarding study 4, it has been suggested that a limitation of single case study research is the risk of misjudging singular events or exaggerating easily accessible data (Leonard-Barton, 1990). In order to limit this risk, and to add depth, data were collected from multiple sources whenever possible, and multiple informed respondents were interviewed, as suggested by Voss et al. (2002). A longer period of field study, and more interviews with additional employees might have provided more nuanced results, or produced data pointing in a different direction. During the interviews and observations, attempts were made to identify opposing views and contradictions (Eisenhardt, 1989; Sandberg, 2005; Kvale, 1997), and to incorporate these insights into the growing understanding of the empirical setting, thus improving the communicative validity of the study (Sandberg, 2005; Kvale, 1997). Communicative validity was increased also by awareness of problems related to qualitative interviews, (as suggested by Alvesson, 2011), by writing several descriptions of the case from various angles, in an internal, ongoing dialogue; and by discussing the empirical results with other researchers. Pragmatic validity (Sandberg, 2005; Kvale, 1997) was addressed by complementing interviews with observations, and in follow-up discussions with one of the main informants in the firm.

The single case study relates to the specific setting of a health care provider with a focus on service and process innovation, and one where a small team of specialists was using DT. This could be seen as limiting the applicability of the findings, for example to a product or technology innovation setting. However, building on Lincoln and Guba (1994) and the notion of transferability, the ambition here is to create insights that enable valuable reflections in other contexts. Lincoln and Guba (1994) suggest that for the transferability of knowledge created in one setting to another, sufficient information is needed about the context in which the inquiry was carried out, typically provided by 'thick description' (ibid). The detailed accounts of the use of DT in the case of Kaiser in paper 5 and appendix 1, are part of the objective of providing a thick description.

## 4 Summary of Papers

### 4.1 Introduction to the summary of papers.

This chapter contains a summary of the five appended papers and two appendices included in the thesis. First the Kreast project for the Licentiate Thesis presented in 2009, will be described. Paper I is a conceptual paper building on the insights gained from this study. Paper II builds on study 2, an exploratory study of 15 firms claiming to use DT in various industrial sectors. Papers III and IV build on study 3, a multiple-case study of six large firms with more extensive experience of using DT. Paper V and appendix I build on study 4, an in-depth case study of a health care firm, Kaiser Permanente that has been using DT for ten years. Table 3 shows how the studies and papers/appendices are related. By the end of the chapter, table 4 provides an overview of the main findings related to the three research questions.

*Table 3: Summary of studies and appended papers and appendices (numbers in brackets refer to the number of firms participating in each study).*

<b>Study and research design</b>	<b>Resulting papers/publications – main content</b>
S1: Multiple case study (2)	<i>Licentiate thesis</i> – on the early involvement of designers in product development in two Swedish manufacturing firms. <i>Paper I</i> (conceptual, building on insights from study 1) – An analysis of how design competences can contribute to understanding latent user needs.
S2: Multiple case study (15)	<i>Paper II</i> - Exploring the use of DT in 15 large firms.
S3: Multiple case study (6)	<i>Paper III</i> – An empirically derived model of DT. <i>Paper IV</i> – Perceived values and effects of using DT, linked to innovation capability theory.
S4: Single case study (1)	<i>Paper V</i> – An analysis of how DT is integrated in innovation work at a large firm. <i>Appendix I</i> - Case study description - reflections on effects and enablers related to use of DT for ten years in a large firm.

### Licentiate Thesis: the Kreast project

My Licentiate Thesis, presented in 2009, was built on the Kreast project. The results of this study are not directly connected to the research questions of this thesis, but the insights gained from this project have been important as a pre- understanding for undertaking studies 2, 3 and 4, and resulted in paper I.

The Kreast<sup>9</sup> project was a collaborative research project, including Chalmers University, SVID<sup>10</sup> and IVF Swerea<sup>11</sup> and three Swedish manufacturing companies during 2005-2008.

<sup>9</sup> Kreast stands for “Creativity-promoting structured work model for concept development” (In Swedish: Kreativitetsbefrämjande Strukturerad Arbetsmodell för Konceptutveckling)

The project was funded by Vinnova<sup>12</sup> as a part of their research program “Efficient Product Realization”, Inspired by methods used by industrial designers, the Krest project aimed at finding ways of working with product development that were structured yet promoting creativity. The idea was to support the firms to experiment with design methods in workshop settings and to involve designers in concept development projects to be studied by the group of researchers.

The Licentiate thesis, entitled “Early Involvement of Industrial Designers in Product Development” (Carlgren, 2009) investigated the role of industrial designers in the early phases of product development, taking its point of departure in the empirical study of two of the participating companies, as well as their external design partners. It explored the role of industrial designers in the front end of product development by looking specifically at what motives companies might have for this early involvement and at factors affecting collaboration on an individual and inter-organizational level. This was done in the specific circumstance of two Swedish manufacturing companies, each with their own way of organizing design, their own type of customers and company context.

The collaboration between industrial designers and development engineers has often been studied in the context of large companies with substantial in-house design departments. This study instead offered an understanding of the use of industrial designers in a context that has been scarcely studied: the combination of industrial designers in the front end of product development in “non-designerly” companies.

The results showed three principal motives for companies to involve industrial designers in the front end: involving for innovativeness, involving for customer understanding, and involving for process facilitation through visualization. While the design literature promotes the broader use of industrial designers, this study showed how in both cases there was a gap between what design firms believe they can offer, and what companies expect to get; something which in the two cases came to characterize the type of collaboration they engaged in, the extent to which they were involved, the character of their tasks, as well as how they collaborated. One example was the latent needs of users; an area where the designers involved felt that they could contribute, but that the companies were not interested in.

The study also showed many challenges for a company setting out to include design in the front end. Key factors that were found to affect collaboration were generally of two types: related to the different professional cultures involved, and related to the position of design in the company. In the first category, important factors were mutual understanding of the task upfront, and the existence of interface persons spanning the boundaries between the different professions/organizations. In the second category, factors such as attitude to design in the

---

<sup>10</sup> Swedish Industrial Design Foundation

<sup>11</sup> Research institute owned by the Swedish state and Swedish industrial companies

<sup>12</sup> The Swedish Governmental Agency for Innovation Systems

company, design strategy and cost consciousness had an influence. Many of these factors are not isolated to the front end, but seem to be reinforced by the fact that industrial designers enter a new role, creating a yet bigger need for awareness of potential traps.

### **Paper I: Identifying latent needs: towards a competence perspective on attractive quality creation**

This paper builds on insights from study 1: the difficulties large firms may experience in understanding hidden user needs, exploiting this understanding as inputs to NPD or innovation projects, and professional designers' claims of their capabilities for such tasks. The tradition in design research is to study professional designers focusing on the individual, and more specifically, their ways of working, thinking and relating. This research focus and the arguments of design practitioners about their particular competences are interpreted as the 'competence perspective', which includes mind-sets and methods typical of designers.

In the quality discipline achieving customer delight is central; however, the process involved in identifying latent needs is seldom addressed. Paper I investigates conceptually how a competence perspective can bring value to discussion of attractive quality creation, and how specific design competences can contribute to understanding latent needs. Building on the Theory of Attractive Quality<sup>13</sup>, an analytical framework is proposed for describing various aspects of understanding latent needs. The analysis supports the idea that several design competences correspond to the task, and while the competences related to mindset play important roles for understanding latent needs, the quality literature tends to overlook this aspect and focus on methods.

*Paper I contributes by* showing conceptually that design competences can contribute to a deep understanding and incorporation of latent user needs; in particular competences related to mindset. It indicates also that the methods and mindsets typical of designers might be useful for other innovation tasks, thus suggesting the potential of design for innovation work more broadly. The competence perspective shifts the focus from methods and practices, to the individuals involved in innovation work. Although the analysis reveals that several design competences seem useful for understanding latent needs, the paper raises questions about whether these competences are necessarily linked to a specific profession. While design researchers see their education and training as endowing design competences, it is proposed that these may not be exclusive to designers, which leads to how these competences can be built.

---

<sup>13</sup> The paper uses the Theory of Attractive Quality proposed by Kano et al. (1984). Attractive quality refers to user satisfaction and delight, and creation of attractive quality can be compared to innovation work.

## **Paper II: Implementing design thinking in large organizations**

In response to the lack of research on the emerging management concept of DT, this paper provides empirical insights into its integration in 15 large organizations claiming to use DT, in various sectors in the US and Germany. The paper explores how the concept DT is understood, why firms choose to engage in DT, what it is used for, and who is using it.

The paper shows the range of perceptions surrounding the concept DT, which is defined as methods, tools, process, mindset, principles, culture or a mix thereof. All interviewees found it difficult to describe the concept of DT, and often reformulated it to fit their organizational context. The main reasons for firms to engage in using DT were to become more innovative, and/or to become more user-focused. In many firms there was a desire to ‘get back to the roots’, to the way they used to work before they had grown.

Most of the firms have formal NPD processes, and DT is generally connected to these formal processes in some way; often at the front end in user research, ideation and concept generation, and sometimes throughout the whole development process.

In some firms DT is exploited for a few selected strategic innovation projects, for solving complex problems, or to achieve maximum exposure of DT methods internally. In other firms, DT is used for internal purposes, such as improving HR or financial processes or building internal networks, unrelated to NPD or innovation work. The emerging picture is one of adaption of DT to firm needs and processes as an essential part of integration, and a reason for differences in use of DT among the firms in the study. It was found that individuals engaged in DT have a variety of backgrounds ranging from traditional design disciplines, to marketing, health care staff, management, and software engineering.

*The paper contributes by providing* a broad overview of how a large number of firms understand and use DT. It is argued that the difficulties of articulating the meaning of DT can have consequences for researchers studying the concept. The lack of consensus on the concept also might lead to managers to implement it without taking account of the particular context, and relying on generic and idealistic descriptions of what DT means and the value it can provide.

## **Paper III: Demystifying design thinking: Exploring design thinking in practice**

Building on the insights from Paper II about the range of definitions of DT, Paper III seeks to define DT based on the findings in the literature and study 2, an empirical study of six firms with between five and ten years of experience of using DT. Here DT is considered as a management concept which, when integrated in different organizational contexts takes different forms. The paper argues that to a complete discussion of DT, there is a need to identify some boundaries to the concept. This paper takes as a starting point how key informants in firms using DT perceive and use the concept.

The paper proposes a model of core elements characterizing the concept of DT. While the study provides descriptions of various courses of action, five key principles were found to be common to a range of corporate conditions: Human-Centeredness, Problem Framing, Diversity, Experimentation and Prototyping (see Paper III). Although identified separately in the model, these principles are described as mutually reinforcing and overlapping and it is proposed that they should form the conceptual boundaries to DT. It is suggested also that these principles are enacted through a set of practices embodied in mindsets and supported by a variety of techniques all of which inevitably will vary depending on the context. It also describes how DT is integrated in innovation work in the six firms, and provides examples of how the different elements play out in the different contexts - as an innovation process, as methods to use in teamwork or for facilitation, or as a way of encouraging employees to think differently. Mindset is found to be central to DT. This focus on specific ways of thinking, of attitudes and of cognitive styles puts the emphasis on the individual and their interaction with other stakeholders.

*The paper contributes by proposing a language to describe DT that builds on the empirical data. While academic descriptions of DT are based on literature reviews, framing DT according to how it is exploited in practice gives a more detailed and nuanced view of the concept. In describing DT as a set of elements, the model represents an alternative to either process-based or cognitive-focused representations of DT. This makes the model applicable regardless of how DT is put into practice in a particular context (as a process, as a set of methods, etc).*

## **Paper IV: Design thinking: exploring values and effects from an innovation capability perspective**

There is a lack of empirical support for increased innovativeness linked to DT. Based on study 3, this paper investigates how firms that claim to use DT in practice perceive the value it creates in their organizations. It adopts the systemic perspective on innovation capability theory<sup>14</sup> to discuss how DT can contribute to innovation within a longer-term perspective.

The results reveal that the perceived value of using DT is highly context-dependent, but includes more than the commonly-cited performance parameters (such as innovativeness and creativity); it includes perceived effects that are long-term in nature. *In terms of resources*, various aspects of individual development were held forward, as well as employees becoming more motivated and empowered. A tendency to embrace diversity, an increased feeling of democratization, as well as the ability to attract talent was also held forward. *In terms of processes*, a new customer-oriented approach was appreciated, as well as speeding

---

<sup>14</sup> The firm's innovation capability is its ability to be competitive through systematic innovation, including reconfiguration of the firm's resources and processes as well as the values that influence how decisions are taken in the organization (mindset).



up the development process by targeting the right users, learning to fail soon and being able to weed out bad concepts at an early stage through rapid iterations and user feedback. Several values related to visualization and prototyping: for enhancing communication and creative teamwork, as a way of frame breaking to learn and expand ideas, and also for communicating with decision-makers or new members of a team. *In terms of mindsets*, the use of DT was perceived to contribute to changing values and norms in the firm, which had previously been seen as barriers to innovation. Raised innovation awareness among top leaders had also been perceived, in terms of becoming less short-term and output oriented. Some of these leaders had also started to reflect upon what values were guiding development and innovation in the organization. *Perceived downsides* related mostly to applying DT within the time frames of innovation projects, and DT activities conflicting with other tasks. DT was perceived by some to be difficult to master, and not everyone was “in love” with the concept or able to apply it. Some questioned whether using DT would result in more than incremental innovation due to its focus on user-feedback for selecting and developing ideas.

This paper argues also that the value and effects of using DT are likely to depend on how DT is understood and put into practice in the organization, something that is subject to a large spread (see Papers II and III). A list of generic values of DT is therefor considered impossible. The values and effects perceived by the firm might for example be linked to the space and support given to innovation work generally and DT in particular, and the barriers to these aspects. Some interviewees suggested that depending on the attitudes to innovation among upper and middle management, DT might not be used “as intended”.

*Paper IV makes three main contributions.* First, it provides some empirical insights into the perception of the values, effects and disadvantages of using DT in firms with long experience of using it. Second, it proposes that if there is a strategic intent in the firm to be more innovative, use of DT can contribute to developing long-term innovation by contributing to the three dimensions of resources, processes and mindset. Third, it argues that an innovation capability framework enables a more systemic understanding of the values and effects of using DT.

## **Paper V: Design thinking in innovation work: revisiting Kaiser**

### **Permanente**

Responding to a call for empirical research on the use of DT in innovation, this paper investigates the integration of DT in innovation work in a large organization. In 2003 the American health care provider, Kaiser Permanente, engaged in a collaboration with the design firm IDEO, with the ambition to internalize its approach and learn its skills. Paper V is based on the single case of Kaiser Permanente (study 4) and showcases two examples of use of DT in innovation work.

The paper reveals that DT was being used as a naturalized part of innovation work at Kaiser. Using the DIA (discovery, incubation and acceleration) framework (O’Connor and Ayers,

2005), it was shown that DT is used not only in discovery, but also in incubation and acceleration; in other words from the front end and all the way to the back end. In particular, different visualization methods were found useful for many aspects of innovation work. However, in late stage innovation, Kaiser found that DT was not sufficient and needed to be complemented with improvement science methods. As a result, the innovation team developed an innovation process that merged DT with continuous improvement methods.

*This paper makes several contributions.* The paper provides a rich empirical example of use of DT in a particular context and in structured innovation work. Demonstrating its use in all phases of innovation work provides detail and contrasts with the view of DT as being mostly linked to the front end of innovation. Knowledge about the overlap between DT and improvement science is interesting per se since it has been argued that incorporating design in a managerial setting can be difficult due to the clash between different logics. The study also highlights the difficulty of distinguishing between the contribution of a method or approach and the individuals and teams actually using it.

## **Appendix I: Integrating design thinking at Kaiser Permanente: reflections on enablers and effects**

This case study description outlines perceptions of ten years of using DT at Kaiser Permanente (study 4). The text builds on interviewees' reflections, with a focus on how DT is used today, how the use of DT has affected the organization, and what enabled the integration of DT in the particular context of Kaiser.

Based on the interviews, it was found that collaboration with the design firm IDEO was inspiration for a new way of working with innovation in care delivery, with the formation of a new innovation team and a design-inspired innovation process, Human-Centered Design. Its work has resulted in a number of innovations related to the delivery of care that are being implemented in all Kaiser hospitals. Interviewees considered that the "IDEO injection" brought a new outlook (user focus), design methods, and a design-inspired innovation process. User focus, synthesizing insights and prototyping/visualizing in various ways were described as a IDEO legacy that was central to their current way of working.

Interviewees suggested that partly related to their work, the firm culture is becoming more open to innovation. With top managers gaining a more nuanced view on innovation that is less output-focused, it was perceived that the organization is becoming more ready for breakthrough innovation. Members of the innovation team in perceived their role as catalyzing and breaking down the barriers to innovation among employees by showing that things can be done differently and failure is acceptable.

In terms of enablers for integrating DT and establishing their role as an innovation team, innovation team members as well as their manager stressed four main reasons. First, a small internal team of experts was necessary for an approach that was difficult to implement

without experience, and requires competence that take time to accumulate. Second, the approach needs to be aligned with and adapted to the corporate culture. As the firm has a strong union presence, union partners were involved early. In order to adapt to a number-driven and evidence-based culture, they integrated performance improvement methods into their process. To adapt the initially product-focused approach, the organization incorporated methods from services and process design.

Third, the new way of working was built up in small steps. The innovation team started its work ‘below the radar’, and had been able to build skills by tackling increasingly complex challenges. Through a number of successful projects, first in collaboration with IDEO and later alone, it had managed to build trust and awareness with top managers. This guaranteed more reliable funding for its work, and increased openness to radical ideas. Fourth, the implementation of solutions was taken into account early in the innovation project. The team realized that if the solutions it proposed were not adopted, their projects would be considered unsuccessful regardless of the solution. Therefore the team incorporated aspects related to the implementation of solutions throughout the project through early involvement of numerous stakeholders and inclusion of metrics showing that solutions worked.

Appendix I contributes by providing the foundations for the study in Paper IV and contributing insights into the long-term effects of using DT and detailed examples of use of DT in innovation and facilitation of change processes. It provides insights into the intricate balance between how the firm’s view of innovation can affect use of DT, and how this use in turns can open the way to a more reflective view of innovation.

Table 4: Exploring the phenomenon of DT – results of the papers related to research questions (appendix I is referred to as paper 6).

RQ	Main results	Paper
1. Understanding design thinking	<i>Large variety among firms claiming to use DT:</i> DT perceived as a process, a set of principles, a way of thinking, a set of methods to use in various situations, or a mix of these.	2,3
	<i>Performative view useful for understanding DT:</i> One that does not try to describe what DT “is” but what it might become. Some boundaries to the concept remain to be defined.	3, 4
	<i>Creation of a conceptual model – language for describing DT:</i> A proposed model to describe the content of and boundaries to DT, based on key informants’ views on how it is understood and applied in their organizations (table x). Examples of how the elements are manifested in practice in various ways	3
	<b>Reflection:</b> <i>Focus on mindset:</i> When discussing how DT is understood, applied, or creates value, there was a notable focus on mindset, which was expressed as central and something actively to aim for. This focus emerges in Paper I, which discusses designer competences in terms of methods/mindset in relation to early innovation work.	1,2,3,6
2. Using design thinking	<i>Large spread in how DT is applied:</i> process, methods, principles to guide employees supported by tools, mindsets to strive for	2,3
	<i>Large spread in relation to its use in innovation work:</i> Inside formal NPD/innovation process: as a process on its own, or elements of DT incorporated in existing processes (structured, ad-hoc use, facilitation). Often used in the front-end of innovation projects, but throughout the whole innovation process in Kaiser Permanente. Sometimes used only in chosen innovation projects that are of strategic importance, or for creating an awareness of DT or innovation in the firm. Various methods used for facilitation.	2,3,5,6
	<i>Outside of innovation work:</i> Used in areas such as strategy, finance, HR and change management. Employees exposed to DT using methods for individual problem solving, in medical practice, etc.	2,3,5,6
	<i>Focus on visual practices:</i> Visualization in terms of enhancing communication and creative teamwork, as a way of frame breaking to learn from and to expand ideas, for communicating with decision-makers or new team members.	(2),3, 4, 5, 6
	<i>Adaptation to context:</i> Variety of use seems linked to adaptation of DT to each specific context and the needs of that organization. In the single case of Kaiser, DT on its own was not sufficient in later stages, and was combined with improvement science. Methods from other fields were incorporated (service design, behavior design, additional design tools).	2,3,5,6
	<b>Reflections:</b> <i>Focus on individuals and competence:</i> In firms, a variety of professions use DT, some involve designers, others not. Some	1,2,5,6

	<p>perceived it as difficult to master, expertise needed. Also, in the case of Kaiser, it was difficult to distinguish the contribution of the team/individuals and the methods they were using. A focus on individuals and how to build competence is suggested.</p> <p><i>Radical or incremental output:</i> Mixed messages in terms of whether DT leads to breakthrough or incremental innovation, linked to the user-focused approach that seem essential to DT.</p>	
3. Relating the use of design thinking to building innovation capabilities	<p><i>A variety of perceptions</i> of value and effects of using DT. Several of the idealistic values proposed by DT proponents had been experienced, as well as some unexpected effects.</p>	4
	<p><i>Contribution to resources, processes and mindset:</i> Perceived values and effects may contribute to more than what can be described by a short-term and output-oriented view on innovation. Perceived values and effects could be related to all three aspects of innovation capabilities: resources, processes and mindset</p>	4,6
	<p><i>Implementing DT as a way of building innovation capabilities:</i> By contributing to resources, processes and mindset, it is proposed that the use of DT could contribute to building long-term innovation capabilities in an organization</p>	4
	<p><i>Detailed accounts of perceived changes in the organization from the single case study of Kaiser, as well as enablers for making it work.</i> New innovation function, design-inspired innovation process, new outlook (user focus), new design methods. Firm culture slowly more open to innovation and ready for breakthrough innovation, breaking barriers to innovation among employees.</p>	6
	<p><b>Reflection:</b> <i>Innovation capability theory a suitable framework:</i> for understanding and evaluating the short-term and long-term value of using DT in a particular setting.</p> <p><i>Intricate balance:</i> between capabilities hindering/enabling the use of DT, and DT enabling the building of IC. Enablers for implementing DT (and allowing for its contribution to IC): use of small internal team of experts, approach aligned with corporate culture, gradual implementing the new way of working to allow for competence building within the team and trust building in the organization.</p>	4, 6

## 5 Exploring Design Thinking And Innovation Capabilities

This chapter addresses the three research questions by linking the results of the appended papers to both literatures on DT and innovation.

### 5.1 Understanding design thinking

#### 5.1.1 A performative understanding of the concept puts focus on context

The first research question considers how to understand the concept of design thinking in the context of large organizations. Many representations of DT in the literature are general, are described at an overall level, and depict the concept as an approach to creative problem solving (Liedtka et al., 2013) or as an abductive way of thinking (Leavy, 2011; Martin, 2009). Other representations are precise and normative, describing a prescriptive process that can be applied to multidisciplinary settings (Brown, 2008; Kelley and Littman, 2001; Stanford d.school, 2010). Academic discussions on the concept of DT are based on literature reviews (Johansson-Sköldberg et al., 2013; Kimbell, 2011; Hassi and Laakso, 2011). In contrast, this thesis tries to understand the concept DT by investigating empirically how it is perceived when appropriated by practitioners in large organizations.

The variety in perceptions of DT found in studies 2 and 3 suggests a *performative understanding of the concept* (Latour, 1986; Mouritsen, 2006), since current discourse and emerging academic research on DT shows some similarities with the emergence of work on intellectual capital in the early 1990s. Following lengthy academic debate over what intellectual capital is and what is its value, in order to make research on the concept more fruitful, Mouritsen (2006) argued for a performative rather than an ostensive definition (Latour, 1986) of intellectual capital. In other words, a definition focusing on what intellectual capital *does* in an organization, and what value it *may create* in a particular context, rather than a definition of what it *is* and what is its general inherent value. Similar reasoning was proposed by for example Dumay (2013).

Accordingly, this thesis argues that descriptions of what DT “is” are of limited value, since tools, practices, and cognitive processes are not used in a vacuum. The context and individual/team skills and experience are crucial for what DT becomes in a particular context. What is missing from current discussion of DT is research on *how* organizations have appropriated the concept and exploited it in their respective contexts. This is in line with Johansson-Sköldberg et al., (2013) who argue that seeking to define what DT ‘is’ is to step into an ‘essentialist trap’. Collopy (2009), considered one of the fathers of the concept of DT (Johansson-Sköldberg et al., 2013) also contests normative descriptions of the concept (Boland, 2012). Comparing DT with systems thinking, he argues that the two concepts have many similarities but that discussion about DT would not be needed were system thinking to have secured a foothold among managers; this did not happen because of the “extremely normative” way it was presented (ibid). Engwall et al. (2005), who studied middle

managers' perception and use of the Stage Gate Model (Cooper, 1988), also questioned the essentialist view of models that is common in management literature today (ibid).

### **5.1.2 Design thinking as a boundary object**

As suggested by Mouritsen (2006), a more informed discussion and further academic research on a concept calls for some kind of boundaries to the concept; he found the notion of boundary object useful for this purpose. According to Bowker and Starr, 1999:296), a boundary object is “plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use and become strongly structured in individual site-use”. By defining intellectual capital as a boundary object “it has an appearance that allows us to see it, but it is impossible to predict its effects from these properties since they are weakly structured. In contrast, IC is strongly structured in individual site-use where it gains its particular identity or role and thus has the ability to make a difference” (Mouritsen, 2006:826). Engwall et al. (2005) stress the communicative role of management concepts, and suggested they should be seen as boundary objects, enabling coordination and communication about different conceptions of a task.

Thus, the model proposed in this thesis should be seen not as a representation of what DT is, but rather as outlining the boundaries and content of DT while still allowing for contextual variations in the way that DT is interpreted and put into use. The construction of the model accommodates a variety of ways of applying and using DT, not only to develop products or services but on a more strategic level to include strategy development and HR. The results of study 3 suggest that the principles identified constitute key characteristics of DT across contexts, even though they may be more or less pronounced, and applied in a variety of ways. It is suggested that over time the core principles will remain the same, although they will be manifested or labeled in different ways in organizations. In some cases they will become completely absorbed within the organization's norms, values and ways of doing, with the result that there is no longer any value in the label per se.

The elements of the model are close to those described in current discourse on DT in the literature (Brown, 2008; Hassi and Laakso, 2011; Seidel and Fixson, 2013), at least on the level of principles, practice, and mindset. For instance, the model has some similarities and overlaps with the elements proposed by Hassi and Lakso (2011); their term “Mentality” is similar to “Mindset” in this model. Due to the nascent nature of the concept, many early adopters implemented DT in collaboration with one or a few of its best-known proponents (IDEO, the d.Schools, Roger Martin). Therefore, it could be expected that their descriptions of what constitutes DT are similar to the view of DT proposed in the practitioner-based literature. Several of the firms in studies 2 and 3 had been collaborating or been in contact with these actors. However, over the course of a few years, these firms had appropriated and made sense of the concept in their own particular contexts. It is argued here that building an

understanding of the concept of DT based on how it has been received in organizations provides a richer and more nuanced view than descriptions based on an idealistic view.

### **5.1.3 Mindset is central**

One aspect that stands out from both the studies and how DT is presented in the literature, is that the dimension of *mindset* holds a central place in DT (e.g. Hassi and Laakso, 2011). This focus on specific ways of thinking, attitudes, and cognitive styles emphasizes individuals and the ways they interact with other stakeholders. When the firms in study 2-3 implemented DT, many expressed a desire to develop a different mindset. Concepts, such as Lean and Total Quality Management, also bring change to mindsets as an outcome, but DT seems to involve purposeful work to change mindset. This distinction influences how DT should be addressed in organizations, what actions should be planned, and how the use of DT should be evaluated.

## **5.2 Using design thinking**

### **5.2.1 Design thinking and innovation – twin concepts?**

The second research question addresses how DT is used in large organizations. So far, accounts of use of DT in organizational settings are mainly anecdotal descriptions in the business press (Brown, 2009; Martin, 2009; McCreary, 2010). There are very few empirical studies of DT (Johansson-Sköldberg et al., 2013) and those that exist mostly focus on evaluating the effects of certain tools or ways of working related to DT, and often in experimental settings (e.g. Seidel and Fixson, 2011). Structured investigations of use of DT in organizations are scarce (e.g. Lindberg et al., 2012). Studies 2 and 3 reveal that the variety of understandings of the concept are mirrored by similar variety in the way it is put into practice. DT is perceived as a process or a new approach to innovation, as a collection of tools and methods, as a way of reorganizing the organizational environments, or as a way to foster an innovation culture. Depending on the organization, emphasis on these aspects varies.

The concept of DT has been criticized as being a prescriptive process, although many proponents of DT stress that the approach should not be seen as linear since some of its main traits refer to experimentation and iteration (Brown, 2009). Among the firms in studies 2 and 3 that were using DT as a process (or as part of a process), the same aspects of non-linearity, iterations and experimentation were highlighted, although there was also discussion that these elements made it difficult to introduce DT into existing NPD/innovation processes and structures. Study 4 demonstrated how one firm had built a structured innovation process, with well-defined steps and time frames, that combined DT and continuous improvement. Interviewees felt that although structured, each stage was sufficiently lengthy to allow learning and experimentation, and that the constraints were seen as helpful for narrowing down, and moving forward in a project. Several mindset elements, such as learning from failure, and openness to the unexpected, were seen as something to be striven for by many of



the firms in studies 2 and 3, as suggested by innovation scholars (Cole, 2002; Steiber and Alänge, 2013). In some cases, this culture was built within the innovation team; although some interviewees suggested that this different way of thinking was difficult to accommodate in the wider organization. In one case top management had decided to make a change to the whole corporate culture, inspired by DT, and had made explicit and structured efforts in this direction.

The extensive use of prototyping (e.g. sketches, building rough models, role-playing) was something that most interviewees considered new, initially difficult, and then surprisingly useful. Several benefits related to visualization and prototyping were suggested, such as enhancing communication and creative teamwork, as a way of frame breaking to learn and expand ideas, and communicating with decision-makers or new team members. This supports Mascitelli's (2000) ideas of prototyping as a way of explicating tacit knowledge in innovation work. In an early study of IDEO, Hargadon and Sutton (1997) find that using drawings, models, and prototypes in early product development work is less about validation of ideas and more about sparking imagination and facilitating understanding among individuals from different functions or with different professional backgrounds. The building of prototypes resonates with what Jahnke (2013) refers to as aesthetic deliberation, and Stigliani and Ravasi's (2012) descriptions of prospective sense-making.

There is an interesting overlap between how DT is described in literature, and how innovation scholars portray innovation, both in terms of how to innovate and the culture that is appropriate for innovation. Both areas focus on how to deal with uncertainty and complexity, a more solution-oriented approach to problem solving, the importance of learning through failures and mistakes. In terms of process, both describe a non-linear, iterative, and experimental way of moving forward. In fact, in several firms in studies 2, 3 and 4, DT, design and innovation were perceived as and used synonymously. On the one hand it seems that use of DT as described in studies 2, 3 and 4 and in the literature, are closely aligned to characteristics of innovation held forward by innovation scholars. On the other hand, this means that the claims regarding DT are to a large extent supported in the innovation literature and that aspects described as 'designerly' have been proposed by innovation researchers under a different label.

### ***5.2.2 The view on innovation affects the use of design thinking***

DT has been proposed both as an approach to innovation (eg. Kelley and Littman, 2001, Brown, 2008), and as a universal problem solving approach (Martin, 2009; Liedtka and Ogilvie, 2011; Liedtka et al., 2013). Studies 2, 3 and 4 reveal a variety of uses that correspond to these descriptions, for example in strategy and policy development (Liedtka et al., 2013). In terms of where in innovation work DT is used, descriptions of DT (e.g. Stanford d.School, 2013) and research on DT or design methods (Bessant and Maher, 2009; Seidel and Fixson, 2013) link the concept to the front end of innovation. Among the firms in studies 2 and 3, the majority used DT in the front end although some claimed to use it also in

later stages. Study 4 provided deeper insights into the holistic use of DT along the whole innovation process, in both a structured innovation process and in a facilitating role, throughout most aspects of innovation work. The studies reveal that how DT is used in relation to innovation depends ultimately on how innovation is understood in the particular context.

It has been argued that established and formalized NPD processes typically cannot accommodate the ambiguous and probing nature of innovation (Benner and Tushman, 2002; Veryzer, 1998; Leifer et al., 2001; Eisenhardt and Tabrizi, 1995; Engwall, 2003). Among the firms in studies 2 and 3, few distinguished innovation from NPD work, and many used the terms innovation and NPD interchangeably. They considered everything outside of how they “usually did things” to be innovation, and in striving to become more innovative, they incorporated elements of DT into their NPD process. In some firms in studies 2 and 3 there was an explicit aim to work with more radical innovation; however it was perceived that the organizational culture or structure hindered “full” use of DT, resulting in incremental improvements only.

The approach to “making the whole organization more innovative”, either by trying to change the mindsets of all employees, or by loosening up the front end of existing NPD processes, was quite widespread in the firms in studies 2 and 3. The idea of focusing more on creating an innovation culture and seeing innovation as a continuum is also supported by Birkinshaw et al. (2012). However, it has been argued also that large organizations often find it difficult to manage both exploration and exploitation (Tushman and O’Reilly, 1996; Boer and Gertsen, 2003), and to fit innovation within otherwise rational and productivity-oriented organizational structures (eg. Veryzer 1998; Eisenhardt and Tabrizi, 1995; McDermott and O’Connor, 2002). This is confirmed by the problems that emerged in studies 2 and 3.

### ***5.2.3 The myth of design thinking as a promoter of radical innovation***

Some interesting tensions around DT and innovation were revealed in studies 3 and 4; for example, whether an approach that is that centered on the user can really generate, select, and progress ideas leading to radical innovation. The concept of DT is often marketed in “breakthrough”, “frame breaking” or “transforming” terms, but the studies revealed that the results often were perceived to be incremental. Involving users to obtain feedback to support idea and concept selection was perceived by some to move solutions in the direction of current user needs, thus leading to incremental innovations as pointed out by innovation scholars (Verganti, 2008; Christensen 1997). Yet, insights into real user needs were perceived to help innovation teams go beyond their usual problem and solution frame.

The studies show that DT was used in the area of incremental innovation or continuous improvement. Study 4 identified an overlap between DT and PDCA cycles, and the human-centered approach to DT was found to be helpful for overcoming reluctance among employees to change - a major barrier to organizational renewal. Since the concept of DT is

often presented as leading to breakthrough ideas, the focus is diverted from its potential contribution to incremental innovation or continuous improvement. Yet, as stressed by Verganti and Norman (2012), incremental innovation can be just as important as radical innovation, although less exciting. It has been argued also that innovation should be seen as a continuum along which incremental and major innovations are inseparable, and feed into each other, and where a radical idea may emerge from incremental work (Boer and Gertson, 2003; Steiber and Alänge, 2013). Colarelli O'Connor (2008) points out that what is interesting about more radical innovation is that it deals with the unknown and the uncertain. In study 4, some interviewees pointed to the irrelevance of whether the end result was radical or not as long as the output of the efforts solved an initially complex and unresolved issue.

### **5.3 Design thinking as a way of building innovation capability**

#### ***5.3.1 The use of design thinking can influence processes, resources and mindset***

The main promise in the literature is the contribution of DT to innovation (eg. Brown, 2008; Martin, 2009). However, while the view on innovation ultimately affects how DT is evaluated, innovation as a term is usually not problematized, and is discussed mainly in terms of short-term gains such as a creativity boost or a way to come up with great ideas (i.e. invention rather than innovation) (Cruickshank, 2010). Another dimension is innovativeness, or innovation output, what is actually brought to market. Some firms in studies 2 and 3 seemed biased towards the output perspective, leading to internal struggles to “prove” the value of DT in terms of direct results or successful products, or the value of the DT effort. Others took a more systemic view of innovation, talking about the importance of mindset, changing culture, and improved ways of working. Perceived values and effects were described as going beyond innovation output in terms of better products or better financial numbers, something that also can be difficult to achieve in the short-term.

A third way of addressing innovation is to take a more systemic perspective of it by looking at how firms “build their muscles for innovation” (Christensen, 1997; Lawson and Samson, 2001; Börjesson and Elmquist, 2011; O'Connor, 2008). While innovation capability theory has been criticized for being too abstract to study empirically, (Schreyögg and Kliesh-Eberl, 2007), in this thesis it was found useful to understand the perceived values and effects of using DT.

Using the innovation capability framework, and building on studies 2, 3 and 4, this thesis argues that the use of DT contributes to long-term innovation in a firm through its contributions to the three dimensions of resources, processes, and mindset. The lens of innovation capability enables a more systemic understanding of the potential values and effects related to using DT. Although some effects on the innovation capability side have been considered in discussions of DT, such as the benefits of collectively addressing wicked problems (Hobday et al., 2012), the few works that address long-term effects (e.g. Simons et

al., 2011) discuss the potential benefits without providing empirical evidence. Studies 2, 3 and 4 provide a collection of values and effects that employees in firms claiming to use DT identified after working with DT over a period of time. It is also proposed that the framework of innovation capability may be useful for evaluating DT efforts.

### ***5.3.2 Design thinking as a way of building capabilities for innovation***

Knowledge about how to build the capabilities for innovation is sparse (Börjesson and Elmquist, 2011; Schreyögg and Kliesch-Eberl, 2007). O'Connor (2008) argues that from a system's perspective, developing innovation capabilities requires changes to the whole system, something that poses huge challenges for organizations. Several of the firms in studies 2 and 3 had implemented DT with an ambition to become more innovative; for example, by creating a new process for innovation inspired by or including DT, or working actively with developing individual and team skills. However, in several cases, organizational structures, values, and norms were described as hindering use of DT, despite the best intentions. With a systemic view of innovation, as suggested by O'Connor (2008), understanding the need to address all elements creates the conditions conducive to making it work.

It is argued also that a necessary part of capability development in large firms is management awareness and insightful strategic top management (Börjesson and Elmquist, 2011; Börjesson et al., 2013). Several innovation scholars argue that while certain norms and values in the organization constitute a major barrier to innovation and to building innovation capability, they are among the most difficult aspects to change (Christensen, 1997; Frances and Bessant, 2005; Assink, 2006). Therefore, it is interesting to note that in some cases long-term use of DT was perceived to have contributed to changing norms and values in favor of innovation; although at a slow pace.

Several innovation scholars stress that firms need to work actively with capability development, for example, by developing a specific capability monitoring function (Shreyögg and Kliesch-Eberl, 2007), or a new managerial role with responsibility for building the capabilities for innovation within the organization (Börjesson and Elmquist, 2012; Börjesson et al., 2013). On the other hand, it has been suggested that capabilities build slowly over time and emerge as the result of a learning process where problems are solved in the organizational context (Shreyögg and Kliesch-Eberl, 2007). The studies showed that the latter was the case when long-term use of DT contributed to changed mindsets in the organization.

## 6 Enabling Innovation Through Design Thinking

This thesis set out to explore the concept of design thinking in the context of large organizations, in order to create a better understanding of its potential role in building innovation capabilities.

### 6.1 Innovation Capabilities and Design Thinking intertwined

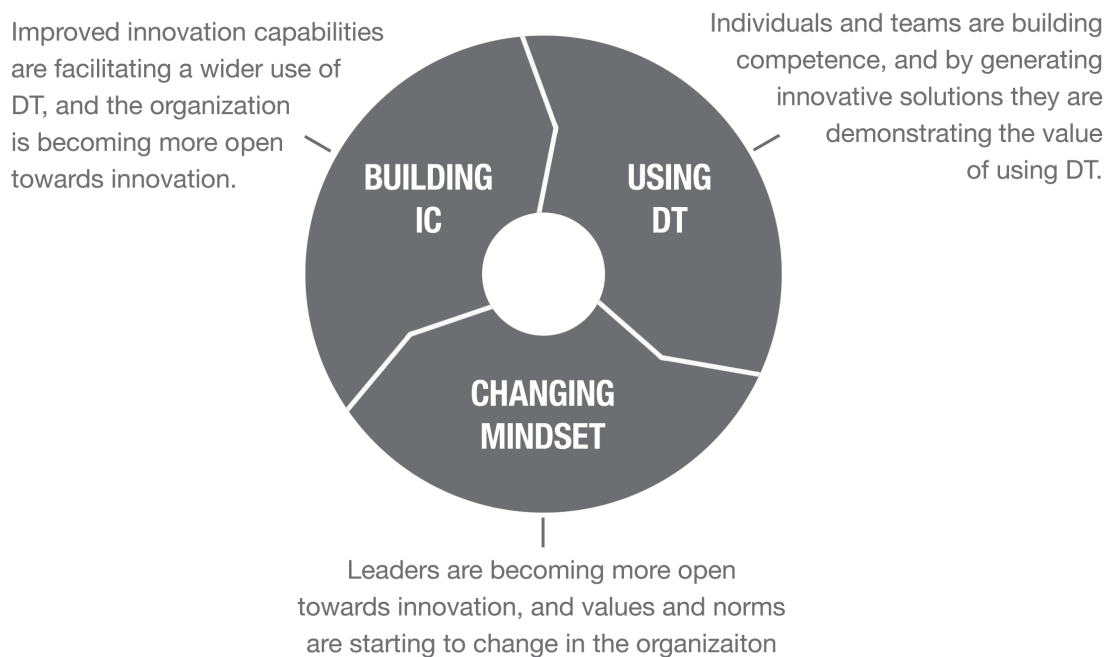
The consequence of a performative view of the concept of DT is that there can be no list of absolute and general values of DT since the benefits from using it depend on how the concept is understood and put into practice in each setting. While this thesis has shown how the perceived values and effects of using DT can be related to the building of innovation capability, it has also given examples of organizational barriers that indirectly affect what the value that the use of DT might bring. It is suggested here that these barriers could be seen as manifestations of the organization's current innovation capability. Hence it seems that not only do the concepts of innovation capability and DT overlap in content; they seem also to mutually affect one another. While previous research focuses on how to build innovation capabilities (e.g. Börjesson and Elmquist, 2012, Shreyögg and Kliesch-Eberl, 2007), this opens up a discussion about how the innovation capability of a firm influences what actually happens in the firm.

In a firm with a 'weak' innovation capability, a systems perspective is lacking, and efforts to increase innovation may be fragmented and hindered by values and organizational structures that work against innovation. In this case the 'muscles for innovation' are there, but the strategic intent needed to guide the development of these muscles is lacking (Börjesson and Elmquist, 2012). Such lack of strategic direction may lead to a downward spiral where weak innovation capability hinders further development. This is similar to Leonard-Barton's (1992) description of the transformation of core capabilities into core rigidities. These challenges are in line also with what Assink (2006) describes as barriers to innovation. On the other hand, better developed innovation capabilities mean that the organization can benefit from the potential of using a concept such as DT, and its use can lead to improved capabilities, in an upward spiral.

Interestingly, study 4 showcases an organization where innovation was not a priority, but where a team of specialists was able slowly to develop their individual and team competences by starting small and taking on increasingly challenging projects. To convince top managers to continue to support the team, project success was considered crucial, and for this purpose, projects were chosen carefully to match the competences built so far, but also to be sufficiently challenging to enable learning and further competence development. Initially this meant working on incremental innovation projects that led to implementable solutions, but as top managers' awareness of the team's potential increased they were able to take on more complex challenges. This was perceived as contributing to a slow change in the mindset of top managers, and to changes in the corporate culture in favor of innovation. In fact, the change in the leaders' mindset enabled extended use of DT, a wider view on

potential problem formulations and solutions, and increasingly complex innovation challenges, which ultimately allowed more radical solutions.

From the studies in this thesis it seems that the interrelation between learning how to use DT, obtaining enough space for its use, and allowing its exploitation to contribute to growing innovation capability is a delicate balance. Building on the insights gained from studies 1,2,3 and 4, a simple model for innovation capability development through the use of DT is proposed (figure 2).



*Figure 2: An illustration of the interplay between innovation capabilities and the use of DT, in relation to building innovation capabilities in an organization.*

The model describes how the interaction between innovation capability and use of DT is part of a learning cycle that under ideal conditions will contribute to increased innovation capabilities. It is an ongoing interplay between thinking and doing, linking the corporate level to what goes on at the individual and team levels.

One interviewee in study 4 reflected on how this type of slow learning is often not allowed today, compared to when they started ten years ago: “*At the time there weren’t other organizations to look at, to say ‘oh this is how they did it’. Design thinking wasn’t out there in the world; they didn’t have the coined terms and things in Fast Company about designers being the new rock stars*”. She told us that currently the attention on design and DT results in high expectations to deliver in the short term, which can kill fledgling initiatives. She pointed to the paradox that few see the parallels between the core of the concept of DT and how to implement it. While the foundations to the approach are experimenting, failing early

and trying again to build the necessary competence, leaders often demand immediate success.

## 6.2 A competence perspective on the use of DT

The use and potential contribution of using DT is often discussed from a firm-level perspective, but the studies and the proposed model indicate that there should be more focus on the individuals and teams involved in DT, and their competences in particular<sup>15</sup>. Study 4 shows that while the DT-inspired approach to innovation was appreciated in the organization, it was difficult to separate the related ways of working/thinking from the individuals using it, their personalities, and the skills they had built.

The competences of individuals and teams have gained attention in innovation research (eg. Leonard and Rayport, 1997; Rosenthal and Capper, 2006; Andersen et al., 2004; Steiber and Alänge, 2013), although not as much as the attention given to the process- or firm level perspective on innovation (Crossan and Appaydin, 2010). In a framework describing innovation capabilities, O'Connor (2008) focuses on identification and nurturing of requisite skills - specifically "broadly skilled employees who can solve problems", while Lawson and Samson (2001) stress the importance of empowered employees. Similar aspects emerge from studies 3 and 4, and it seems that DT competence fits well with the competences described as critical in discussions of innovation capability. However, how to build such competences is rarely discussed in either the innovation or the DT literature.

This reconnects the findings from the studies of DT (2, 3 and 4) to the insights from study 1. Paper 1 suggests that by applying a framework that separates design competences into mind-set and methods, it becomes clear that many competences that may be crucial for innovation are related to a particular mind-set. This underlines that building competences is not just about learning new methods or a new process; it also requires development of a mind-set. In discussions of management concepts, focus is often on methods and processes; thereby decoupling activities from the individuals performing them, while in practice it is impossible to separate the thinking from the doing, or the practice from the practitioner (Kimbell, 2012).

### 6.2.1 *Design thinking – stuck in the middle between design and innovation?*

From an innovation perspective it seems that DT has a lot to offer since it provides a new approach to innovation for those firms implementing it. This approach may not be new compared to the approaches in innovation and management research (e.g. Mascitelli, 2000; Hargadon and Sutton, 1997). Nevertheless, the label DT seems to package these ideas in a

---

<sup>15</sup> *Competence*: There are different ways of describing individual and team knowledge. This thesis draws on the terminology used by Argyris and Schön (1974) and uses the notion of *competence* to denote the skills, abilities, assets, modes of working, cognitive styles and attitudes held by individuals, but also collectively in teams.

way that appeals to many organizations. This thesis shows that in several cases use of DT changed the way the organization works with innovation in a dramatic way. The thesis argues that underlying the hype, and stepping away from the typical essentialist and simplifying descriptions, DT as a concept offers a potential contribution to innovation, and in a long-term perspective, has the potential to strengthen the organization's innovation capability.

From a design research perspective it is argued that some of the core aspects of what designers do and what design is about can be a great contribution to innovation (ref). In line with this research, several design researchers question whether the concept of DT as presented in managerial discourse is able or not to capture the essence of this potential contribution - often concluding that it is not. For example, some point to the lack of focus on aesthetic knowledge or hands-on practice, disregarding the embodied knowledge of designers and focusing on problem solving rather than problem setting (Tonkinwise, 2011; Jahnke, 2013). Yet, descriptions of design are often contrasted with a rational and analytical logic described as being common in many organizations today (Rylander, 2009). However, such an either/or discussion does not seem to take into account that innovation, as discussed by innovation researchers, is also considered difficult to manage in organizations that are focused on efficiency and productivity. Several of the suggestions of these innovation researchers actually resonate with many values proposed in relation to design.

So on the one hand, it could be said that DT as a concept fails to capture a great opportunity from design since it simplifies the complex and yet not fully understood design practice into a set of methods or thinking models. This seems to be a valid standpoint if DT is considered from the perspective of "what can innovation learn from design". On the other hand, this thesis shows that the concept of DT, and its use in organizations, is closely aligned to many practices highlighted by innovation researchers. From this standpoint, even without the "full design-package", the concept of DT presents a potentially interesting contribution to innovation. Also, since professional designers embody several of the competences sought for (although not all, and not by every designer), this opens the possibility to tap into a competency that is not always considered in innovation contexts.

Since use of DT is largely aligned to the characteristics of innovation as described by innovation scholars, the implementation of DT might be just as difficult for an organization as starting to work differently with innovation. In fact, DT, in the sense that it is about being able to explore the uncertain, may be as difficult to grasp and to integrate into an efficiency and productivity-oriented setting, as 'innovation'. On the other hand, adopting DT as a concept may be a more explicit change of course than deciding to 'work differently with innovation', since the concept helps to make an abstract concept concrete. As such, the concept of DT can be seen as a vehicle for change, and may indeed open up for new ways of working with and perceiving innovation in large firms.



## 7 Conclusion and implications

### 7.1 Conclusion

This thesis has explored the concept of design thinking in the context of large organizations, in order to create a better understanding of its potential role in building innovation capabilities. The results are based on three empirical studies of firms claiming to use DT, and a research design aimed at breadth and depth.

First, this thesis proposed understanding DT as a management concept which, when integrated in different organizational contexts can take different forms, and consequently, can lead to different results. Yet, to enable academic discussions on DT, there is a need to identify some boundaries to the concept. Based on the results of three studies, the thesis proposed a model for understanding DT as a set of five core principles (human-centeredness, diversity, problem framing, experimentation, prototyping) that are enacted and embodied through a number of mindsets, practices, and techniques. These are informed by design practice but may play out differently in each particular context. Thus, the model allows for a variety of views of DT, and the performative perspective adopted in the thesis puts focus on what DT *becomes* in different contexts, rather than trying to define what it *is*. One characteristic that stands out is a strong focus on mindset change as something to strive for.

Different ways of putting DT into practice were showcased. While use of DT is often linked to the front end of NPD or innovation, it was used also outside of direct innovation work - for strategic issues and to improve collaboration in general. The single case study offered detailed insights into the situated use of DT in a particular setting, and highlighted its use in all innovation work, and in various ways. While the firms in the multiple-case studies showed that the concept was often adapted to the particular firm context, the single-case study showed how it was effectively merged with continuous improvement methods. Such a merger between the designerly, subjective, and emotional approach and the analytical, evidence-based approach is noteworthy, especially since this is one of the tensions described in the literature. However, this thesis shows also that putting DT into practice is not always straightforward and can require time and patience.

In the literature, DT is presented also as a great promise for organizations, and as embedding a set of general, idealistic values. It is argued here that depending on the context, the use of DT may produce different kinds of values, or none at all. This thesis provides examples of the values and effects experienced by organizations claiming to have experience of use of DT. Several of the identified values correspond to previous descriptions of DT, others were less expected. These values and effects can be seen as helping the firm come up with innovative solutions in the short and potentially the long-term. The lens of innovation capability therefore enables a more systemic understanding of the potential values and effects related to using DT. The thesis suggests that the implementation of DT may be one way of working with the development of innovation capability in firms.

In terms of the role of DT in building innovation capability, this thesis shows that putting DT into use is perceived as a balancing act that can take several years to perfect, but that ultimately can lead to an organization slowly becoming more open to alternative ways of working with innovation. Several factors can affect the use of DT, and hence any potential short-term and long-term values linked to its use, such as the way it is understood or conceptualized, the needs of the organization, the way it is put into practice, the competences of those using it. This thesis suggests that organizational characteristics, such as existing structures and norms (which can be seen as part of the innovation capability of an organization) might hinder or enable its implementation and use. It is proposed that the innovation capability of an organization and its use of DT are intertwined, and under the right circumstances, will strengthen each other, in an upward spiral. The thesis also highlights some paradoxes that may provide avenues for future research, and some nuances in discussions on DT in both the innovation and the design literatures. For example investigating the role of DT in relation to radical and incremental innovation, the role of hands-on material and visual practices, and the role of individual competences and how to build these. Studying the perceived use of DT draws attention to the individuals and teams using DT, and in particular, to the competences that need to be built, opening a competence perspective on DT.

## **7.2 Implications for practitioners**

This thesis argues that since both innovation and DT are vague concepts, putting efforts into articulating what they mean in each organizational context is necessary. Taking a systemic perspective is also inevitable, both for working strategically with innovation and for making use of DT. With regards to if and how an organization should use DT, this depends on the context. It has been suggested that DT does not have to be seen as a complete package; managers (and other employees) can choose to start using a few tools in certain situations, and potentially improve those particular tasks dramatically. In particular, this study provides examples of how the use of visual tools and prototyping were found useful in a range of situations not linked only to concept work. On the other hand, the thesis shows that a more holistic perspective on using DT, and allowing for learning and experimenting before seeking to track evidence that the concept “works”, can contribute to building innovation capability in an organization, long-term.

DT is often described as a different way of *thinking*, and studies show that it can be a motive for engaging in DT. Our model shows that mindset can be addressed and influenced through practices related to DT. For instance, when managers or the CEO have a specific mindset, or understand the importance of certain mindsets, they take actions that allow these mindsets to develop among employees. Previous research on other management concepts, such as Lean and TQM, shows that forgetting the “soft factors” can be detrimental to the implementation and success of a management concept. Our model encourages managers to include this perspective from the beginning.

The thesis suggests also that with the concept of DT comes a focus on the individual that is not always evident in innovation debates. This places the competences of individuals and teams in the limelight, and has consequences for how firms can build the appropriate skills. This could be done for example, by looking for individuals with a specific professional background (such as designers or other professions), individuals with certain personality traits, and/or by letting employees learn and grow skills gradually through doing. Each approach comes with its own challenges.

How to implement DT and build the necessary competences are linked to the ambitions of using DT in the first place, and the place innovation holds in the organization. The thesis has shown that the perceived effects of using DT stretch far beyond practical innovation work. When considering the use of DT, it is critical not to consider the concept in isolation, or to demand fast results, but instead to take all aspects of resources, process, and mindset into account. This will help to obtain the most from a DT effort, and to build and maintain competitive advantage as an innovative organization.

### **7.3 Implications for theory**

The thesis makes two main theoretical contributions: first it suggests a performative view of DT and presents a conceptual model for how to understand DT as a boundary object, and second it shows how DT can play a role in building innovation capability in the organization.

The thesis points to the difficulties involved in researching DT connected to the lack of coherence around the concept, and the difficulties to define it among even individuals central to the implementation of DT in large firms. In innovation research, an essentialist view of management concepts, which describes them as normative guides and tools decoupled from action, is common yet criticized (e.g. Engwall et al., 2005; Mouritsen, 2006). The process of conducting this research led to the emerging understanding that in order to study DT, new perspectives are needed. Inspired by Mouritsen (2006) and Latour (1986), the thesis suggests a performative view that does not focus on what DT is but rather what it becomes and what it does in various settings; thus putting the focus on context. This perspective has implications not only for how to view DT, but also for what type of research questions can be investigated in further studies of DT. By suggesting such a perspective, the thesis contributes to both innovation and DT research. The model of DT as a boundary object (Bowker and Starr, 1999) takes into account that DT takes different shapes in different contexts, and accommodates to a variety of ways of applying and using DT.

The thesis makes a contribution to the innovation literature by showing the potential role of DT in building innovation capabilities. Based on the studies and appended papers, the thesis argues that implementing the concept of DT in a specific setting can contribute to building innovation capabilities, and it shows how a range of perceived values and effects of using DT can be connected to elements presented in innovation capability theory (Börjesson and

Elmquist, 2011, Lawson Samson, 2001, O'Connor, 2008, Christensen, 1997). The thesis thus opens up avenues for research on DT that focus less on output and team/process-based values and take a more systemic perspective on its potential contribution to innovation. Since a capability view has been criticized for being too vague to be really useful (ref Schreyögg and Kliesh-Eberl, 2007), this thesis contributes also to theories of innovation capability by showing how they may be applied to explain the potential value of a concept such as DT.

The thesis also suggests an interplay between the current innovation capability in a firm and use of DT which under the right circumstances can contribute to the building of innovation capabilities. More research is needed into how innovation capabilities are built (Börjesson et al., 2013; Schreyögg and Kliesh-Eberl, 2007). There are a few examples in the literature, and this thesis suggests a new approach; building innovation capability through long-term use of DT.

#### **7.4 Future research**

More research is needed on the role of DT in building innovation capability, in particular empirical research on the use of DT in organizational settings. The results of the thesis open up space for a wide range of research. The model of DT proposed in this thesis presents opportunities to connect previous design research on how designers think and act with current management research on design and innovation.

In studying the use of DT, future studies of DT in innovation work should not only focus on the front end, as typical of previous work, but also on later stages. The finding that DT is suited to contexts of both incremental and radical innovation, can lead to more informed investigations into how firms organize for innovation and in what ways DT can contribute.

The single case study represents a case where DT is implemented mainly as a process and a set of methods. Several organizations claim to have integrated DT as a culture or a set of principles to guide employees, putting the emphasis more on mindset. It would be interesting to compare different approaches to using DT, and to study the implications for innovation long-term. The finding of a successful fit of DT with a number-driven culture opens avenues for more research into different ways of integrating DT in innovation work, and combining DT with other management concepts currently being used in organizations. The single case study in this thesis focused on service innovation in health care. Studying other industrial contexts in more depth, such as manufacturing, software and other types of services would be interesting. For example, is DT useful at the back-end of product innovation?

With a focus on competences, research is also needed on what enables particular competences and how the necessary skills can be built within an organization; it would be interesting for example to study the implementation of DT in relation to the previous role of design and designers in an organization. It also raises questions about whether this

competency can be harnessed or built within individuals outside the design discipline, something suggested in this thesis research. The literature also gives examples of similar competences characterizing individuals outside the design discipline, such as entrepreneurs or skilled managers, suggesting that personal inclination and experience might also be important.

The thesis opens the way to studies that relate the individuals involved in DT with the effects at the organizational level. An interesting avenue for future research might be to look into theories of the micro foundations of dynamic capabilities (e.g. Felin and Foss, 2009), which discuss the interrelation between the individual and firm level aspects of innovation. Another theoretical perspective that might be useful in this context is the practice-based view, which focuses on both practice (espoused theories, concept at firm-level), and on theories in use at a working level (e.g. Whittington, 2006; Crossan and Appaydin, 2010). Since the thesis argues that the use of DT (at the individual and team levels) is intertwined with the firm's existing innovation capability, such multi-level studies would help our understanding of how innovation capabilities can be built.

## **7.5 Reflections on the value of the doctoral thesis**

This thesis is the result of a generative emerging knowledge process, and builds on an understanding of the complexity of DT that has grown with each study and each paper. The portfolio text embodies this development that has led to a performative view on the concept; a perspective that challenges the essentialist views of management concepts that are common in management research. Such a perspective could promote wider ranging research questions than possible if the context is ignored. The portfolio text also takes the empirical findings presented in the papers and appendices, and connects them to innovation capability theory, in order to connect them to a system view of innovation.

The theory of innovation capability was chosen since it provides a systemic perspective on innovation that is lacking in the literature of DT, where the concept of 'innovation' is often not problematized. Other theoretical frameworks that could have provided relevant insights include organizational learning since DT in the most experienced firms contributes to what can be seen as learning at the organizational level. As a result of the performative perspective, theories linked to the diffusion and translation of management concepts become relevant, from a firm-level perspective. The performative perspective is accompanied by a curiosity about the practice-based view and a study of how DT is used in practice. This calls for other research methods, such as ethnographic research.

## References

- Alvesson, M. (2011) *Intervjuer: genomförande, tolkning och reflexivitet*. Liber: Malmö
- Anderson, N., De Dreu, C. K., Nijstad, B. A. (2004) The routinization of innovation research: A constructively critical review of the state-of-the-science. *Journal of Organizational Behavior*, 25(2), 147-173.
- Assink, M. (2006) Inhibitors of disruptive innovation capability: a conceptual model. *European Journal of Innovation Management*, 9(2) 215–233.
- Beckman, S. L., Barry, M. (2007) Innovation as a Learning Process: embedding *design thinking*. *California Management Review*, 50(1) 25–56.
- Benner, M. J., Tushman, M. (2002) Process management and technological innovation: A longitudinal study of the photography and paint industries. *Administrative Science Quarterly*, 47(4), 676-707.
- Bessant, J., Maher, L. (2009) Developing radical service innovations in healthcare - The role of design methods. *International Journal of Innovation Management*, 13(04) 555-568.
- Beverland, M. B. (2005) "Managing the design innovation-brand marketing interface: Resolving the tension between artistic creation and commercial imperatives." *Journal of Product Innovation Management*, 22 (2), 193-207.
- Birkinshaw, J., Gibson, C. (2004) Building ambidexterity into an organization. *MIT Sloan Management Review*, 45, 47-55.
- Birkinshaw, J., Bouquet, C., Barsoux, J. L. (2012) The 5 myths of innovation. *MIT Sloan Management Review*, 52(2).
- Boer, H., Gertsen, F. (2003) From continuous improvement to continuous innovation: a (retro)(per)spective. *International Journal of Technology Management*, 26(8) 805-827.
- Boland, R. J., Collopy, F. (2004) *Managing as Designing*. Stanford Business Books.
- Borja de Mozota, B. (2010) The Four Powers of Design: A Value Model in Design Management. *Design Management Review*, 17(2) 44–53.
- Borja De Mozota, B., Kim, B. Y. (2009) Managing Design as a Core Competency: Lessons from Korea. *Design Management Review*, 20(2) 66–76.
- Bowker, G. C., Star, S. L. (2000) *Sorting things out: Classification and its consequences*. The MIT Press.
- Brown, S. L., Eisenhardt, K. M. (1995) Product development: past research, present findings, and future directions. *Academy of management review*, 20(2), 343-378.

- Börjesson, S., Elmquist, M. (2011) Developing Innovation Capabilities: A Longitudinal Study of a Project at Volvo Cars. *Creativity and Innovation Management*, 20(3) 171–184.
- Börjesson, S., Elmquist, M. (2012) Innovation capabilities - what are they? Towards a systems view of the prerequisites for innovation in large firms. *Unpublished Working Paper*, Chalmers University of Technology.
- Börjesson, S., Elmquist, M., Hooge, S. (2013, forthcoming) The challenges of innovation capability building: learning from longitudinal studies of innovation efforts at Renault and Volvo Cars. Forthcoming in *Journal of Engineering and Technology Management*.
- Brown, T. (2008) *Design Thinking*. Harvard Business Review, 86(6) 84–92.
- Brown, T. (2009) *Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation*. HarperBusiness.
- Brown, T., Wyatt, J. (2010) Design Thinking for Social Innovation. *Stanford Social Innovation Review*, Winter, 30–35.
- Brown, T., Katz, B. (2011) Change by Design. *Journal of Product Innovation Management*, 28(3) 381–383.
- Bruce, M., Bessant, J. R. (2002) *Design in Business : Strategic innovation through design*. Financial Times/Prentice Hall.
- Bruce, M., Cooper, R. (2000) *Creative product design: a practical guide to requirements capture management*. John Wiley & Sons.
- Bryman, A., Bell, E. (2007) *Business research methods*. Oxford University Press.
- Buchanan, R. (1992) Wicked problems in design thinking. *Design issues*, 8(2) 5–21.
- Burchill, G., Fine, C.H. (1997) Time Versus Market Orientation in Product Concept Development: Empirically-based Theory Generation, *Management Science*, 43, 465–478.
- Büschgens, T., Bausch, A., Balkin, D. B. (2013) Organizational Culture and Innovation: A Meta-Analytic Review. *Journal of Product Innovation Management*. 30(4) 763-781
- Carlgren, L. (2009). Early Involvement of Industrial Designers in Product Development: Exploring Motives and Challenges. Licentiate Thesis, Chalmers University of Technology.
- Carlgren, L., Elmquist, M., Rauth, I. (2012) Implementing design thinking in large organizations. *IPDM Conference 2012*, Manchester.
- Carr, S. D., Halliday, A., King, A. C., Liedtka, J., Lockwood, T. (2010) The Influence of Design Thinking in Business: Some Preliminary Observations. *Design Management Review*, 21(3) 58–63.

- Chiva, R., Alegre, J. (2009) Investment in Design and Firm Performance: The Mediating Role of Design Management. *Journal of Product Innovation Management*, 26(4) 424–440.
- Christensen, C. (1997) *The innovator's dilemma: when new technologies cause great firms to fail*. Harvard Business Press.
- Cohen, W. M., Levinthal, D.A. (1990) Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35:128-152.
- Cole, R. E. (2002) From continuous improvement to continuous innovation. *Total quality management*, 13(8), 1051-1056.
- Collopy, F. (2010) Comment on blog post: Design Thinking is Killing Creativity. *DesignSojourn*. Retrieved October 14, 2013 from: <http://www.designsojourn.com/design-thinking-is-killing-creativity/>
- Collopy, F. (2009) Lessons Learned - Why the Failure of Systems Thinking Should Inform the Future of Design Thinking. *Fastcompany*. Retrieved October 14, 2013 from: <http://www.fastcodesign.com/1291598/lessons-learned-why-the-failure-of-systems-thinking-should-inform-the-future-of-design-think>
- Cooper, R. G. (1988) The new product process: a decision guide for management. *Journal of Marketing Management*, 3, 238-255.
- Cross, N. (1990) The nature and nurture of design ability. *Design Studies*, 11(3): 127-140.
- Cross, N. (2004) Expertise in Design. *Design Studies*, 25(5) 427-441.
- Cross, N. (2011) *Design Thinking: Understanding How Designers Think and Work*. Berg Publishers.
- Crossan, M. M., Apaydin, M. (2010) A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47(6) 1154-1191.
- Cruickshank, L. (2010) The innovation dimension: Designing in a broader context. *Design Issues*, 26(2) 17-26.
- Cruickshank, L., Evans, M. (2012) Designing creative frameworks: design thinking as an engine for new facilitation approaches. *International Journal of Arts and Technology*, 5(1) 73–85.
- Damanpour, F., Gopalakrishnan, S. (2001) The dynamics of the adoption of product and process innovation in organizations. *Journal of Management Studies*, 38(1) 45-65.
- De Waal, G.A., Knott P., (2013) Innovation tool adoption and adaptation in small technology-based firms. *International Journal of Innovation Management*, 17(03).
- Dubois, A., Gadde, L.-E. (2002) Systematic combining: an abductive approach to case research. *Journal of Business Research*, 55(7) 553–560.



- Dumay, J., Garanina, T. (2013) Intellectual capital research: a critical examination of the third stage. *Journal of Intellectual Capital*, 14(1) 10-25.
- Dunne, D., Martin, R. (2006) Design Thinking and How It Will Change Management Education: An Interview and Discussion. *Academy of Management Learning and Education*, 5(4) 512–523.
- Easterby-Smith, M., Thorpe, R., Jackson, P. (2012) *Management research, 4<sup>th</sup> Edition*. Sage Publications, London
- Edeholt, H. (2007) Design och Innovation. In Edman, R. (Eds.) *Under ytan: en antologi om designforskning*, 222-235. Raster Förlag, Stockholm.
- Edmondson, A. C., McManus, S. E. (2007) Methodological fit in management field research. *Academy of management review*, 32(4), 1246-1264.
- Eisenhardt, K. (1989) Building theories from case study research. *Academy of Management Review*, 14, 488-511.
- Eisenhardt, K., Tabrizi, B. N. (1995) Accelerating adaptive processes: Product innovation in the global computer industry. *Administrative Science Quarterly*, 40(1) 84-110.
- Eisenhardt, K., Graebner, M. (2007) Theory Building from Cases: opportunities and challenges. *Academy of Management Journal*, 14(4) 532–550.
- Ellonen, H. K., Jantunen, A., Kuivalainen, O. (2011) The role of dynamic capabilities in developing innovation-related capabilities. *International Journal of Innovation Management*, 15(03), 459-478.
- Elmqvist, M. (2007) *Enabling Innovation: Exploring the Prerequisites for Innovative Concepts in R&D*. Doctoral Thesis, Chalmers University of Technology.
- Elmqvist, M., Segrestin, B. (2007) Towards a new logic for Front End management: From drug discovery to drug design in Pharmaceutical R&D. *Journal of Creativity and Innovation Management* 16(2): 106-120.
- Emerson, R.M., Fretz, R.I., Shaw L.L. (2001) Participant observation and field notes. In Atkinson, P., Coffey, A., Delamont, S., Lofland, J., Lofland, L. (Eds.) *Handbook of Ethnography*, 352-368. Sage, London.
- Engwall, M. (2003) *Produktutveckling bortom kunskapens gränser*. Studentlitteratur, Lund.
- Engwall, M., Kling, R., Werr, A. (2005) Models in action: how management models are interpreted in new product development. *R&D Management*, 35(4) 427-439.
- Fagerberg, J. (2005) Innovation: A guide to the literature. In Fagerberg, J., Mowery, D. C., Nelson, R. R. (Eds.) *The Oxford handbook of innovation*, 11-26. Oxford University Press, Oxford.

Felin, T., Foss, N. J. (2009) Organizational routines and capabilities: Historical drift and a course-correction toward microfoundations. *Scandinavian Journal of Management*, 25(2), 157-167.

Filippetti, A (2011) Innovation modes and design as a source of innovation: a firm-level analysis. *European Journal of Innovation Management*, 14(1) 5-26.

Flick, U. (2009) *An Introduction to Qualitative Research*. SAGE.

Francis, D., Bessant, J. (2005) Targeting innovation and implications for capability development. *Technovation*, 25(3) 171–183.

Garcia, R., Calantone, R. (2002) A critical look at technological innovation typology and innovativeness terminology: a literature review. *Journal of product innovation management*, 19(2), 110-132.

Gemser, G., Leenders, M. A. (2001) How integrating industrial design in the product development process impacts on company performance. *Journal of Product Innovation Management*, 18(1) 28-38.

Gephart, R. P. (2004) Qualitative research and the Academy of Management Journal. *Academy of Management Journal*, 47(4), 454-462.

Goffin, K., Lemke, F., Koners, U. (2010) *Identifying latent needs: creating breakthrough products*. Palgrave: Basingstoke, UK.

Govindarajan, V., Trimble, C. (2010) *The other side of innovation: solving the execution challenge*. Harvard Business Review Press, Boston.

Guba, E. G., Lincoln, Y. S. (1994) Competing paradigms in qualitative research. In Denzin, N.K., Lincoln, Y. S. (Eds.) *Handbook of qualitative research*, 104–116. Thousand Oaks, CA: SAGE.

Halvorsen, K. (1992) *Samhällsvetenskaplig metod - Teori Forskning Praktik*. Lund: Studentlitteratur.

Hanington, B. (2003) Methods in the making: A perspective on the state of human research in design. *Design Issues*, 19(4), 9-18.

Hargadon, A., Sutton, R.I. (1997) Technology brokering and innovation in a product development firm. *Administrative Science Quarterly* 42 (4): 716–749.

Hassi, L., Laakso, M. (2011) Design Thinking in the Management Discourse: Defining the Elements. *In 18th IPDM Conference*. Delft.

Hatchuel, A., Weil, B. (2003) A new approach of innovative design: an introduction to the C-K theory. *International Conference on Engineering Design*

- Hobday, M., Boddington, A., Grantham, A. (2012) An Innovation Perspective on Design: Part 2. *Design Issues*, (28) 18–29.
- Holloway, M. (2009) How tangible is your strategy? How design thinking can turn your strategy into reality. *Journal of Business Strategy*, 30(2/3) 50–56.
- IDEO (2009) *Human-centered design toolkit, 2<sup>nd</sup> Edition*. Retrieved October 14, 2013 from [http://www.ideo.com/images/uploads/hcd\\_toolkit/IDEO\\_HCD\\_ToolKit.pdf](http://www.ideo.com/images/uploads/hcd_toolkit/IDEO_HCD_ToolKit.pdf)
- Jahnke, M. (2012) A design perspective on the concept of dynamic capabilities. In Karjalainen, T-M. (ed.) (2012). *IDBM papers vol 2*, (138-149), Helsinki: International Design Business Management Program.
- Jahnke, M. (2013) *Meaning in the Making: Introducing a hermeneutic perspective on the contribution of design practice to innovation*. PhD Thesis. University of Gothenburg.
- Janssen, K.L., Dankbaar, B. (2008) Proactive involvement of consumers in innovation: Selecting appropriate techniques. *International Journal of Innovation Management*, 12(03) 511-541.
- Johansson, U., Svengren Holm, L. (2008) *Möten kring design – om relationer mellan design, teknik och marknadsföring*. Studentlitteratur, Lund.
- Johansson-Sköldberg, U., Woodilla, J., Çetinkaya, M. (2013) Design Thinking: Past, Present and Possible Futures. *Creativity and Innovation Management*, 22(2) 121–146.
- Kalogerakis, K., Lüthje, C., Herstatt, C. (2010) Developing innovations based on analogies: experience from design and engineering consultants. *Journal of Product Innovation Management*, 27(3), 418-436.
- Kano, N., Seraku, N., Takahashi, F., Tsuji, S. (1984) Attractive quality and must-be quality. *Hinshitsu (Quality, The Journal of the Japanese Society for Quality Control)*, 14 (2), 39-48.
- Kelley, T., Littman, J. (2001) The art of innovation: lessons in creativity from IDEO, America's leading design firm. *Currency/Doubleday*.
- Kelley, D., Kelley, T. (2013) *Creative Confidence: Unlocking the Creative Potential Within Us All*. CROWN PUB Incorporated.
- Kimbell, L. (2011) Rethinking Design Thinking: Part I. *Design and Culture*, 3(3) 285–306.
- Kimbell, L. (2012) Rethinking Design Thinking: Part II. *Design and Culture*, 4(2) 129–148.
- Krippendorff, K. (2006) *The semantic turn: a new foundation for design*. CRC/Taylor & Francis.
- Kristensson, P., Gustafsson, A., Archer, T. (2004) Harnessing the creative potential among users, *Journal of Product Innovation Management*, 21(1), 4-14.

- Kvale, S. (1997) *Den kvalitativa forskningsintervjun*, Studentlitteratur, Lund.
- Lafley, A. G., Charan, R. (2008) *The game-changer: how every leader can drive everyday innovation*. London: Profile Books.
- Lawson, B. and Samson, D. (2001) Developing Innovation Capability in Organisations : A Dynamic Capabilities Approach. *International Journal of Innovation Management*, 5(03) 377–400.
- Lawson, B. (2006) *How designers think: the design process demystified* (4th ed.) Elsevier.
- Leavy, B. (2011) Roger Martin explores three big ideas: customer capitalism, integrative thinking and design thinking. *Strategy & Leadership*, 39(4) 19–26.
- Le Masson, P., Weil, B., Hatchuel, A. (2006) *Les processus d'innovation: Conception innovante et croissance des entreprises*. Hermes science publ.
- Leonard-Barton, D. (1990) A dual methodology for case studies: synergistic use of a longitudinal single site with replicated multiple sites. *Organization Science*, 1(3) 248-266.
- Leonard-Barton, D. (1992) Core capabilities and core rigidities: A paradox in managing new product development. *Strategic management journal*, 13(S1), 111-125.
- Leonard, D., Rayport, J.F. (1997) Spark innovation through emphatic design. *Harvard Business Review*, 75(6) 102-113.
- Lester, R.K., Piore, M. J. (2004) *Innovation: The Missing Dimension*. Cambridge, MA: Harvard University Press
- Liedtka, J. (2004) Design Thinking: The Role of Hypotheses Generation and Testing. Boland, R.J., Collopy, F. (Eds.) *Managing as Designing*, 193–197. Stanford Business Books.
- Liedtka, J., King, A., Bennett, D. (2013) *Solving Problems with Design Thinking: Ten Stories of What Works*. Columbia University Press.
- Liedtka, J., Ogilvie, T. (2011) *Designing for growth*. Columbia University Press.
- Lin, M., Hughes, B., Katica, M., Zuber, C., Plsek, P. (2011) Service design and change of systems, human-centered approaches to implementing and spreading service design. *International Journal of Design*, 5(2) 73-86.
- Lindberg, T., Köoppen, E., Rauth, I., Meinel, C. (2012) On the Perception, Adoption and Implementation of Design Thinking in the IT Industry. Plattner, H., Meinel, C., Leifer, L. (Eds.) *Design Thinking Research: Studying Co-Creation in Practice*. Berlin, Heidelberg: Springer.
- Lindblom, C. E. (1959). The science of " muddling through". *Public administration review*, 79-88.

- Luchs, M., Swan, K. S. (2011) Perspective: The Emergence of Product Design as a Field of Marketing Inquiry. *Journal of Product Innovation Management*, 28(3) 327–345.
- Lynn, G., Morone, J., Paulson, A. (1996) Marketing and discontinuous innovation: the probe and learn process. *California management review*, 38(3)
- March, J. G. (1991) Exploration and exploitation in organizational learning. *Organization science*, 2(1), 71-87.
- Martin, R. (2009) *The design of business: why design thinking is the next competitive advantage*. Harvard Business Press.
- Martin, R. (2010) Design thinking: achieving insights via the “knowledge funnel.” *Strategy and Leadership*, 38(2) 37–41.
- Martin, R. (2011) The Innovation Catalysts. *Harvard Business Review*, 89(6) 82-87.
- Mascitelli, R. (2000) From experience: harnessing tacit knowledge to achieve breakthrough innovation. *Journal of product innovation management*, 17(3) 179-193.
- McCreary, L. (2010) Kaiser Permanente’s - Innovation on the Front Lines. *Harvard Business Review*, 88(9) 92–127.
- McDermott, C. M., O'Connor, G. C. (2002) Managing radical innovation: an overview of emergent strategy issues. *Journal of product innovation management*, 19(6), 424-438.
- Micheli, P., Jaina, J., Goffin, K., Lemke, F., Verganti, R. (2012) Perceptions of Industrial Design: The “Means” and the “Ends.” *Journal of Product Innovation Management*, 29(5) 687–704.
- Michlewski, K. (2008) Uncovering Design Attitude: Inside the Culture of Designers. *Organization Studies*, 29(3) 373–392.
- Moss-Kanter, R. (2006) Innovation: the classic traps. *Harvard Business Review*, 84(11), 72.
- Mouritsen, J. (2006) Problematising intellectual capital research: ostensive versus performative IC. *Accounting, Auditing & Accountability Journal*, 19(6) 820-841.
- Narver, J.C., Slater, S.F., MacLachlan, D.L. (2004) Responsive and proactive market orientation and new product success. *Journal of Product Innovation Management*, 21(5), 334-47.
- Noble, C. (2011) On Elevating Strategic Design Research. *Journal of Product Innovation Management*, (865) 389–393.
- Norman, D.A., Verganti, R. (2012) Incremental and Radical Innovation: Design Research versus Technology and Meaning Change. Unpublished Working Paper, Politecnico di Milano and Mälardalen University.

- O'Connor, G.C., Ayers, A.D. (2005) Building a radical innovation competency. *Research-Technology Management*, 48(1) 23-31.
- O'Connor, G.C., DeMartino, R. (2006) Organizing for radical innovation: an exploratory study of the structural aspects of RI management systems in large established firms. *Journal of Product Innovation Management*, 23(6) 475-497.
- O'Connor, G. (2008) Major Innovation as a Dynamic Capability: A Systems Approach. *Journal of product innovation management*, 25(4) 313–330.
- O Reilly, C. A., Tushman, M. L. (2004) The ambidextrous organization. *Harvard business review*, 82(4), 74-83.
- Pallas, F., Böckermann, F., Goetz, O., Tecklenburg, K. (2013) Investigating Organisational Innovativeness: Developing A Multidimensional Formative Measure. *International Journal of Innovation Management*.
- Perks, H., Cooper, R., Jones, C. (2005) Characterizing the Role of Design in New Product Development: An Empirically Derived Taxonomy. *Journal of Product Innovation Management*, 22(2) 111–127.
- Persson, S. (2005) *Toward Enhanced Interaction between Engineering Design and Industrial Design*, Ph.D. Thesis, Product and Production Development, Chalmers University of Technology, Gothenburg
- Persson, S., Karlsson, M.A., Rohlin, K. Räisänen, C. (2007) New actors in product development: Investigating communication and collaboration in interdisciplinary product development teams, 14<sup>th</sup> *International Product Development Management Conference*, Porto.
- Plattner, H., Meinel, C., & Leifer, L. (Eds.) (2012) *Design Thinking Research: Studying Co-creation in Practice*. Springer.
- Prahalad, C.K., Hamel, G. (1990) The core competence of the corporation. *Harvard Business Review*, 68(3) 79–91.
- Ragin, C.C., Becker, H.S. (1992) *What is a case? Exploring the foundations of social inquiry*, Cambridge Universal Press, Cambridge, UK.
- Ravasi, D., Stigliani, I. (2012) Product Design: a Review and Research Agenda for Management Studies. *International Journal of Management Reviews*, 14(4) 464–488.
- Reid, S. E., de Brentani, U. (2004) The fuzzy front end of new product development for discontinuous innovations: A theoretical model. *Journal of Product Innovation Management* 21(3): 170-184.
- Rowe, P. G. (1991) *Design Thinking*. MIT Press, Boston.

- Roberts, D. L., Palmer, R. (2012) Developing a visceral market learning capability for new product development. *International Journal of Market Research*, 54(2) 199.
- Rosensweig, R. R. (2011) More than Heroics: Building Design as a Dynamic Capability. *Design Management Journal*, 6(1), 16-26.
- Rylander, A (2009) Design thinking as knowledge work: Epistemological foundations and practical implications. *Design Management Journal*, 4(1) 7-19.
- Rylander, A (2011) *New Perspectives in Design Management*, Editor Jill Wodilla  
Business and Design Lab Publications: Göteborg
- Sandberg, J. (2005) How do we justify knowledge produced within interpretive approaches? *Organizational Research Methods*, 8(1), 41-68.
- Sarasvathy, S.D. (2001) Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2) 243-263.
- Sato, S., Lucente, S., Meyer, D., Mrazek, D. (2010) Design Thinking to Make Organization Change and Development More Responsive. *Design Management Review*, 21(2) 44–52.
- Schön, D. A. (1983) *The reflective practitioner: how professionals think in action*. Basic Books.
- Schön, D.A. (1990) The design process. *Varieties of thinking: essays from Harvard's Philosophy of Education Research Center*. VA Howard.
- Schreyögg, G., Kliesch-Eberl, M. (2007) How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization. *Strategic Management Journal*, 28(9) 913-933.
- Schumpeter, J.A. (1934) *The Theory of Economic Development*. 7th edn (transl. Opie, R.) Harvard University Press: Cambridge, MA.
- Seidel, V., Fixson, S. (2013) Adopting 'Design Thinking' in Novice Multidisciplinary Teams: The Application and Limits of Design Methods and Reflexive Practices. *Journal of Product Innovation Management*.
- Siggelkow, N. (2007) "Persuasion with case studies". *Academy of Management Journal*, 50: 20–24.
- Simons, T., Gupta, A., Buchanan, M. (2011) Innovation in R&D: Using design thinking to develop new models of inventiveness, productivity and collaboration. *Journal of Commercial Biotechnology*, 17(4) 301–307.
- Stanford d.school. (2010) *bootcamp bootleg*. Stanford d.school.
- Stanford d.school (2009) *Steps in a Design Thinking Process*. Retrieved April 5, 2013, from <https://dschool.stanford.edu/groups/k12/wiki/17cff/>

Stanford d.school (2013) *Use our methods*. Retrieved August 27, 2013 from <http://dschool.stanford.edu/use-our-methods/>

Star, S. L., Griesemer, J. R. (1989) Institutional ecology, translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social studies of science*, 19(3), 387-420.

Steiber, A., Alänge, S. (2013) A corporate system for continuous innovation: the case of Google Inc. *European Journal of Innovation Management*, 16(2) 243-264.

Stigliani, I., Ravasi, D. (2012) Organizing thoughts and connecting brains: Material practices and the transition from individual to group-level prospective sense making. *Academy of Management Journal*, 55(5) 1232-1259.

Teece, D.J., Pisano, G., Shuen, A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7): 509–533.

Tidd, J., Bessant, J., Pavitt, K. (2005) *Managing innovation: integrating technological, market and organizational change (3<sup>rd</sup> Edition)*. John Wiley & Sons Ltd, Haddington, UK

Tischler, L. (2009) A Designer Takes On His Biggest Challenge Ever. *Fast Company*. Retrieved October 14, 2013, from <http://www.fastcompany.com/magazine/132/a-designer-takes-on-his-biggest-challenge-ever.html>

Tonkinwise, C. (2011) A taste for practices: Unrepressing style in design thinking. *Design Studies*, 32(6) 533–545.

Tushman, M., Reilly, C. (1996) Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California management review*, 38, 4: 8-30.

Utterback, J., Vedin, B-A., Alvarez, E., Eken, S., Sanderson, S., Tether, B., Verganti, R. (2006) *Design-Inspired Innovation*, World Scientific Publishing, New York, NJ.

Verganti, R. (2008) Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda. *Journal of Product Innovation Management*, 25(5) 436–456.

Verganti, R., Öberg, Å. (2013) Interpreting and envisioning—A hermeneutic framework to look at radical innovation of meanings. *Industrial Marketing Management*, 42(1), 86-95.

Veryzer, R., de Mozota, B. B. (2005) The Impact of User-Oriented Design on New Product Development: An Examination of Fundamental Relationships. *Journal of Product*, 22(2) 128–143.

Von Hippel, E. (2009) Democratizing innovation: the evolving phenomenon of user innovation. *International Journal of Innovation Science*, 1(1) 29-40.

Von Stamm, B. (2010) Innovation - What's Design Got to Do with It? *Design Management Review*, 15, 10–19.



- Voss, C., Tsikriktsis, N., Frohlich, M. (2002) Case research in operations management. *International Journal of Operations and Production Management*, 22(2) 195-219.
- Ward, A., Runcie, E., Morris, L. (2009) Embedding innovation: design thinking for small enterprises. *Journal of Business Strategy*, 30(2/3) 78–84.
- Walsh, V. (1996) Design, innovation and the boundaries of the firm. *Research Policy*, 25(4) 509-529.
- West, M.A. (2002) Sparkling fountains or stagnant ponds: an integrative model of creativity and innovation implementation within groups. *Applied Psychology: An International Review*, 51, 355-386.
- Wheelwright, S. C., Clark, K. B. (1992) *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency and Quality*. The Free Press, Macmillan, New York
- Whicher, A., Raulik-Murphy, G., Cawood, G. (2011) Evaluating design: Understanding the return on investment. *Design Management Review*, 22(2), 44-52.
- Whittington, R. (2006) Completing the practice turn in strategy research. *Organization studies*, 27(5), 613-634.
- Wylant, B. (2008) Design thinking and the experience of innovation. *Design Issues*, 24(2), 3-14.
- Wyman, G., Holland, V., Yates, S. (2012) Conversations with the Marketplace: An application of Design Thinking and Action Methods for SME Route-to-Market Planning. *International Journal of Innovation Science*, 4, 77–88.
- Zollo, M., Winter, S. G. (2002) Deliberate learning and the evolution of dynamic capabilities. *Organization science*, 13(3), 339-351.
- Åhlström, P., Karlsson, C. (2008) *Longitudinal field studies*. In Karlsson, C. (Eds.) *Researching Operations Management*, 196-235. Routledge.
- Öberg, C. (2010) Customer roles in innovations. *International Journal of Innovation Management*, 14(06) 989-1011.
- Öberg, Å. (2012) *Innovation driven by meaning* (Doctoral dissertation, Mälardalen University).

- Martin, R. (2010) Design thinking: achieving insights via the “knowledge funnel.” *Strategy and Leadership*, 38(2) 37–41.
- Martin, R. (2011) The Innovation Catalysts. *Harvard Business Review*, 89(6) 82-87.
- Mascitelli, R. (2000) From experience: harnessing tacit knowledge to achieve breakthrough innovation. *Journal of product innovation management*, 17(3) 179-193.
- McCreary, L. (2010) Kaiser Permanente’s - Innovation on the Front Lines. *Harvard Business Review*, 88(9) 92–127.
- McDermott, C. M., O'Connor, G. C. (2002) Managing radical innovation: an overview of emergent strategy issues. *Journal of product innovation management*, 19(6), 424-438.
- Micheli, P., Jaina, J., Goffin, K., Lemke, F., Verganti, R. (2012) Perceptions of Industrial Design: The “Means” and the “Ends.” *Journal of Product Innovation Management*, 29(5) 687–704.
- Michlewski, K. (2008) Uncovering Design Attitude: Inside the Culture of Designers. *Organization Studies*, 29(3) 373–392.
- Moss-Kanter, R. (2006) Innovation: the classic traps. *Harvard Business Review*, 84(11), 72.
- Mouritsen, J. (2006) Problematizing intellectual capital research: ostensive versus performative IC. *Accounting, Auditing & Accountability Journal*, 19(6) 820-841.
- Narver, J.C., Slater, S.F., MacLachlan, D.L. (2004) Responsive and proactive market orientation and new product success. *Journal of Product Innovation Management*, 21(5), 334-47.
- Noble, C. (2011) On Elevating Strategic Design Research. *Journal of Product Innovation Management*, (865) 389–393.
- Norman, D.A., Verganti, R. (2012) Incremental and Radical Innovation: Design Research versus Technology and Meaning Change. Unpublished Working Paper, Politecnico di Milano and Mälardalen University.
- O'Connor, G.C., Ayers, A.D. (2005) Building a radical innovation competency. *Research-Technology Management*, 48(1) 23-31.
- O'Connor, G.C., DeMartino, R. (2006) Organizing for radical innovation: an exploratory study of the structural aspects of RI management systems in large established firms. *Journal of Product Innovation Management*, 23(6) 475-497.
- O'Connor, G. (2008) Major Innovation as a Dynamic Capability: A Systems Approach. *Journal of product innovation management*, 25(4) 313–330.
- O Reilly, C. A., Tushman, M. L. (2004) The ambidextrous organization. *Harvard business review*, 82(4), 74-83.

- Pallas, F., Böckermann, F., Goetz, O., Tecklenburg, K. (2013) Investigating Organisational Innovativeness: Developing A Multidimensional Formative Measure. *International Journal of Innovation Management*.
- Perks, H., Cooper, R., Jones, C. (2005) Characterizing the Role of Design in New Product Development: An Empirically Derived Taxonomy. *Journal of Product Innovation Management*, 22(2) 111–127.
- Persson, S. (2005) *Toward Enhanced Interaction between Engineering Design and Industrial Design*, Ph.D. Thesis, Product and Production Development, Chalmers University of Technology, Gothenburg
- Persson, S., Karlsson, M.A., Rohlin, K. Räsänen, C. (2007) New actors in product development: Investigating communication and collaboration in interdisciplinary product development teams, 14<sup>th</sup> *International Product Development Management Conference*, Porto.
- Plattner, H., Meinel, C., & Leifer, L. (Eds.) (2012) *Design Thinking Research: Studying Co-creation in Practice*. Springer.
- Prahalad, C.K., Hamel, G. (1990) The core competence of the corporation. *Harvard Business Review*, 68(3) 79–91.
- Ragin, C.C., Becker, H.S. (1992) *What is a case? Exploring the foundations of social inquiry*, Cambridge Universal Press, Cambridge, UK.
- Ravasi, D., Stigliani, I. (2012) Product Design: a Review and Research Agenda for Management Studies. *International Journal of Management Reviews*, 14(4) 464–488.
- Reid, S. E., de Brentani, U. (2004) The fuzzy front end of new product development for discontinuous innovations: A theoretical model. *Journal of Product Innovation Management* 21(3): 170-184.
- Rowe, P. G. (1991) *Design Thinking*. MIT Press, Boston.
- Roberts, D. L., Palmer, R. (2012) Developing a visceral market learning capability for new product development. *International Journal of Market Research*, 54(2) 199.
- Rosensweig, R. R. (2011) More than Heroics: Building Design as a Dynamic Capability. *Design Management Journal*, 6(1), 16-26.
- Rylander, A (2009) Design thinking as knowledge work: Epistemological foundations and practical implications. *Design Management Journal*, 4(1) 7-19.
- Rylander, A (2011) *New Perspectives in Design Management*, Editor Jill Wodilla Business and Design Lab Publications: Göteborg
- Sandberg, J. (2005) How do we justify knowledge produced within interpretive approaches? *Organizational Research Methods*, 8(1), 41-68.

- Sarasvathy, S.D. (2001) Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2) 243-263.
- Sato, S., Lucente, S., Meyer, D., Mrazek, D. (2010) Design Thinking to Make Organization Change and Development More Responsive. *Design Management Review*, 21(2) 44–52.
- Schön, D. A. (1983) *The reflective practitioner: how professionals think in action*. Basic Books.
- Schön, D.A. (1990) The design process. *Varieties of thinking: essays from Harvard's Philosophy of Education Research Center*. VA Howard.
- Schreyögg, G., Kliesch-Eberl, M. (2007) How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization. *Strategic Management Journal*, 28(9) 913-933.
- Schumpeter, J.A. (1934) *The Theory of Economic Development*. 7th edn (transl. Opie, R.) Harvard University Press: Cambridge, MA.
- Seidel, V., Fixson, S. (2013) Adopting 'Design Thinking' in Novice Multidisciplinary Teams: The Application and Limits of Design Methods and Reflexive Practices. *Journal of Product Innovation Management*.
- Siggelkow, N. (2007) "Persuasion with case studies". *Academy of Management Journal*, 50: 20–24.
- Simons, T., Gupta, A., Buchanan, M. (2011) Innovation in R&D: Using design thinking to develop new models of inventiveness, productivity and collaboration. *Journal of Commercial Biotechnology*, 17(4) 301–307.
- Stanford d.school. (2010) *bootcamp bootleg*. Stanford d.school.
- Stanford d.school (2009) *Steps in a Design Thinking Process*. Retrieved April 5, 2013, from <https://dschool.stanford.edu/groups/k12/wiki/17cff/>
- Stanford d.school (2013) *Use our methods*. Retrieved August 27, 2013 from <http://dschool.stanford.edu/use-our-methods/>
- Star, S. L., Griesemer, J. R. (1989) Institutional ecology, translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social studies of science*, 19(3), 387-420.
- Steiber, A., Alänge, S. (2013) A corporate system for continuous innovation: the case of Google Inc. *European Journal of Innovation Management*, 16(2) 243-264.
- Stigliani, I., Ravasi, D. (2012) Organizing thoughts and connecting brains: Material practices and the transition from individual to group-level prospective sense making. *Academy of Management Journal*, 55(5) 1232-1259.
- Teece, D.J., Pisano, G., Shuen, A. (1997) Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7): 509–533.

- Tidd, J., Bessant, J., Pavitt, K. (2005) *Managing innovation: integrating technological, market and organizational change (3<sup>rd</sup> Edition)*. John Wiley & Sons Ltd, Haddington, UK
- Tischler, L. (2009) A Designer Takes On His Biggest Challenge Ever. *Fast Company*. Retrieved October 14, 2013, from <http://www.fastcompany.com/magazine/132/a-designer-takes-on-his-biggest-challenge-ever.html>
- Tonkinwise, C. (2011) A taste for practices: Unrepressing style in design thinking. *Design Studies*, 32(6) 533–545.
- Tushman, M., Reilly, C. (1996) Ambidextrous Organizations: Managing Evolutionary and Revolutionary Change. *California management review*, 38, 4: 8-30.
- Utterback, J., Vedin, B-A., Alvarez, E., Eken, S., Sanderson, S., Tether, B., Verganti, R. (2006) *Design-Inspired Innovation*, World Scientific Publishing, New York, NJ.
- Verganti, R. (2008) Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda. *Journal of Product Innovation Management*, 25(5) 436–456.
- Verganti, R., Öberg, Å. (2013) Interpreting and envisioning—A hermeneutic framework to look at radical innovation of meanings. *Industrial Marketing Management*, 42(1), 86-95.
- Veryzer, R., de Mozota, B. B. (2005) The Impact of User-Oriented Design on New Product Development: An Examination of Fundamental Relationships. *Journal of Product*, 22(2) 128-143.
- Von Hippel, E. (2009) Democratizing innovation: the evolving phenomenon of user innovation. *International Journal of Innovation Science*, 1(1) 29-40.
- Von Stamm, B. (2010) Innovation - What's Design Got to Do with It? *Design Management Review*, 15, 10–19.
- Voss, C., Tsiriktsis, N., Frohlich, M. (2002) Case research in operations management. *International Journal of Operations and Production Management*, 22(2) 195-219.
- Ward, A., Runcie, E., Morris, L. (2009) Embedding innovation: design thinking for small enterprises. *Journal of Business Strategy*, 30(2/3) 78–84.
- Walsh, V. (1996) Design, innovation and the boundaries of the firm. *Research Policy*, 25(4) 509-529.
- West, M.A. (2002) Sparkling fountains or stagnant ponds: an integrative model of creativity and innovation implementation within groups. *Applied Psychology: An International Review*, 51, 355-386.
- Wheelwright, S. C., Clark, K. B. (1992) *Revolutionizing Product Development: Quantum Leaps in Speed, Efficiency and Quality*. The Free Press, Macmillan, New York
- Whicher, A., Raulik-Murphy, G., Cawood, G. (2011) Evaluating design: Understanding the return on investment. *Design Management Review*, 22(2), 44-52.

Whittington, R. (2006) Completing the practice turn in strategy research. *Organization studies*, 27(5), 613-634.

Wylant, B. (2008) Design thinking and the experience of innovation. *Design Issues*, 24(2), 3-14.

Wyman, G., Holland, V., Yates, S. (2012) Conversations with the Marketplace: An application of Design Thinking and Action Methods for SME Route-to-Market Planning. *International Journal of Innovation Science*, 4, 77-88.

Zollo, M., Winter, S. G. (2002) Deliberate learning and the evolution of dynamic capabilities. *Organization science*, 13(3), 339-351.

Åhlström, P., Karlsson, C. (2008) *Longitudinal field studies*. In Karlsson, C. (Eds.) *Researching Operations Management*, 196-235. Routledge.

Öberg, C. (2010) Customer roles in innovations. *International Journal of Innovation Management*, 14(06) 989-1011.

Öberg, Å. (2012) *Innovation driven by meaning* (Doctoral dissertation, Mälardalen University).