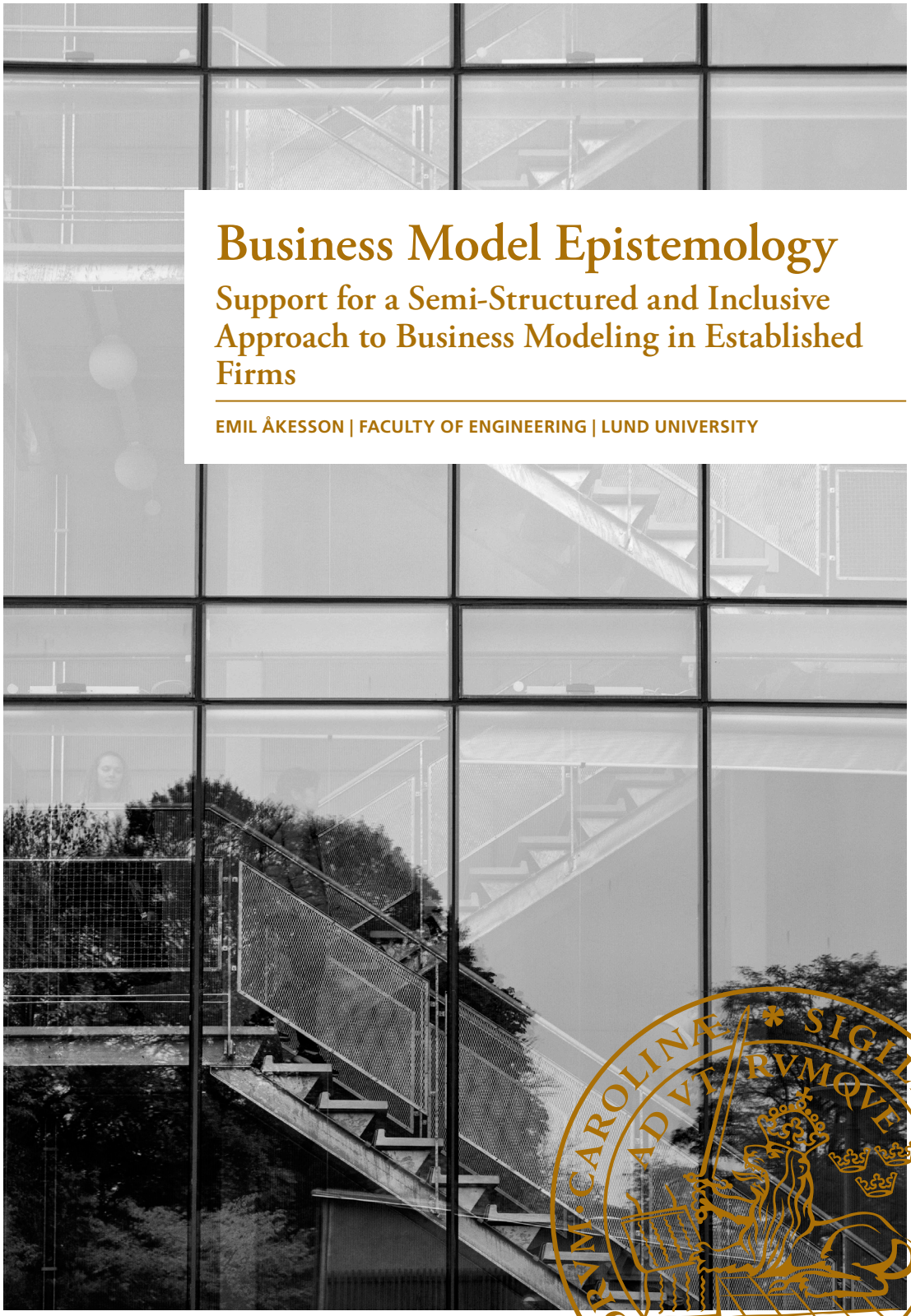
Business Model Epistemology

Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms

Åkesson, Emil

2022

Document Version:
Publisher's PDF, also known as Version of record



Business Model Epistemology

Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms

EMIL ÅKESSON | FACULTY OF ENGINEERING | LUND UNIVERSITY

Business Model Epistemology

Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms

Emil Åkesson

LUND
UNIVERSITY

DOCTORAL DISSERTATION

Doctoral dissertation for the degree of Doctor of Philosophy (PhD) at the Faculty of Engineering at Lund University. To be publicly defended on November 18, 2022, at 9:15, in Stora Hörsalen, Ingvar Kamprad Designcentrum, Sölvegatan 26, Lund.

Faculty opponent
Prof. Kristian J. Sund

Organization LUND UNIVERSITY Faculty of Engineering Department of Design Sciences Author: Emil Åkesson	**Document name:** Doctoral Thesis **Date of issue:** 2022-11-18 **Sponsoring organization:** Forskarskolan MIT

Title and subtitle: Business Model Epistemology – Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms

Abstract:

The world is facing a climate crisis and established firms are set to play a critical role in the societal changes that are needed to defeat it. At the same time, digital technologies are advancing to enable many of the technological solutions that will be required. Together, these two trends, toward greater environmental sustainability and digitalized business, superficially suggest opportunities for business development in established firms. Nevertheless, more substantial change in these directions has appeared difficult to accomplish, and many established firms remain in their current tracks of 'business as usual'.

In search of instruments for business development initiatives such as those related to sustainability and digitalization, much attention has been focused on business models. The business model term came into popular usage around the turn of the millennium and signifies possibilities to do business in fundamentally different ways, as demonstrated by the many internet-based firms that emerged during this era. Since then many different formalized frameworks for working with business models have been proposed. With the aim of guiding practitioners in this work, a large part of these has sought to establish exactly what kinds of conceptual components need to be considered to construct a working business model. A prominent and widely used example of this ontological approach is the Business Model Canvas; a tool that is based on the idea that business models can be defined in terms of a finite set of components, and instantiated as a standardized framework for universal reference in modeling activities.

However, although there are several benefits to this ontological approach, it does not directly address some of the critical challenges that business modeling in established firms often faces. In the established context, business model innovation is not simply a search for a new business model, but often also a transitioning from an established and often historically successful business model. Moreover, when initiatives such as those for environmental sustainability and digitalization are assumed, more substantial and path-breaking changes are often required. This effectively means that a transitioning is often also required on the level of the innovation process itself; from a mode of continuous innovation into a mode of discontinuous innovation.

The research presented in this thesis directly addresses these challenges by interpreting the overall process of business model innovation in established firms as an epistemological process of situated conceptual change. This interpretation, which takes inspiration from both previous management and cognitive science theory, contributes to a more interpretive and natural view on business models as instruments for learning, and, as mediators of cognitive change at both the individual and organizational level. As discussed in this thesis, from both an empirical and a theoretical basis, this view takes on particular significance when business model formulation is conducted as a delegated practice, separate from decision makers with authority on their eventual implementation. Overall, from a practical perspective, the proposed epistemological view is found to critically change the conditions for the design of business model tools—suggesting a more semi-structured and inclusive approach to their design.

Key words: business model, innovation, digitalization, sustainability, cognition, conceptual change

Classification system and/or index terms (if any)

Supplementary bibliographical information		**Language:** English
ISSN and key title		**ISBN:** 978-91-8039-437-6 (print), 978-91-8039-438-3 (pdf)
Recipient's notes	**Number of pages:** 91	Price
	Security classification	

Business Model Epistemology

Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms

Emil Åkesson

LUND
UNIVERSITY

Cover photo: Charlotte Carlberg Bärg

Faculty of Engineering
Department of Design Sciences

ISBN 978-91-8039-437-6 (print), 978-91-8039-438-3 (pdf)

Printed in Sweden by Media-Tryck, Lund University
Lund 2022

Acknowledgements

My PhD journey has been as challenging as it has been rewarding. Along the way, I have gained a deeper recognition of the complexities that come with management, both as research field and as a practice. With this recognition, has also grown a strong sense of humility for those who venture into it. I would therefore first like to extend my sincere appreciation to the managers and business developers who have so generously contributed to this thesis. Your courage and persistence in trying to find a better way of doing business, often without appropriate support from your organizations, is admirable.

I would like to thank my supervisors, Lars Bengtsson and Jessica Wadin. Thank you for the opportunity to take this PhD journey, for the freedom of exploration you have given me, and for your continual encouragements.

I would also like to thank my co-authors, Fredrik Nilsson, Kajsa Ahlgren Ode, Lars Bengtsson, and Hussan Munir. With you I have learned many valuable lessons about writing, including the necessity of 'getting out of your own head' to create something meaningful together.

I also want to express my gratitude to the Management and IT (MIT) research school. Most of all, thank you to all the wonderful PhD students that I have met there over the years. A big thank you also to all my fellow PhD students at the Department of Design Sciences. Together we have shared the ups and downs of our respective journeys and your support and encouragements have been very helpful to me.

Finally, this thesis would not have been possible without the support of my family and friends. Most of all, Jenny, thank you for being such a great partner in managing all the challenges and uncompromising demands on energy and time that have come with this PhD journey. To my parents, Paul and Kerstin, thank you for all your encouragements and support throughout my life and this PhD journey. And, to my wonderful sons, Ellis and Axel, who have joined my life while I have been on this journey. You have been and will forever continue to be my inspiration. I love you all very much.

Abstract

The world is facing a climate crisis and established firms are set to play a critical role in the societal changes that are needed to defeat it. At the same time, digital technologies are advancing to enable many of the technological solutions that will be required. Together, these two trends, toward greater environmental sustainability and digitalized business, superficially suggest opportunities for business development in established firms. Nevertheless, more substantial change in these directions has appeared difficult to accomplish, and many established firms remain in their current tracks of 'business as usual'.

In search of instruments for business development initiatives such as those related to sustainability and digitalization, much attention has been focused on business models. The business model term came into popular usage around the turn of the millennium and signifies possibilities to do business in fundamentally different ways, as demonstrated by the many internet-based firms that emerged during this era. Since then many different formalized frameworks for working with business models have been proposed. With the aim of guiding practitioners in this work, a large part of these has sought to establish exactly what kinds of conceptual components need to be considered to construct a working business model. A prominent and widely used example of this ontological approach is the Business Model Canvas; a tool that is based on the idea that business models can be defined in terms of a finite set of components, and instantiated as a standardized framework for universal reference in modeling activities.

However, although there are several benefits to this ontological approach, it does not directly address some of the critical challenges that business modeling in established firms often faces. In the established context, business model innovation is not simply a search for a new business model, but often also a transitioning from an established and often historically successful business model. Moreover, when initiatives such as those for environmental sustainability and digitalization are assumed, more substantial and path-breaking changes are often required. This effectively means that a transitioning is often also required on the level of the innovation process itself; from a mode of continuous innovation into a mode of discontinuous innovation.

The research presented in this thesis directly addresses these challenges by interpreting the overall process of business model innovation in established firms as an epistemological process of situated conceptual change. This

interpretation, which takes inspiration from both previous management and cognitive science theory, contributes to a more interpretive and natural view on business models as instruments for learning, and, as mediators of cognitive change at both the individual and organizational level. As discussed in this thesis, from both an empirical and a theoretical basis, this view takes on particular significance when business model formulation is conducted as a delegated practice, separate from decision makers with authority on their eventual implementation. Overall, from a practical perspective, the proposed epistemological view is found to critically change the conditions for the design of business model tools—suggesting a more semi-structured and inclusive approach to their design.

Populärvetenskaplig sammanfattning

Hur ska vi komma till rätta med de stora utmaningar som den globala klimatkrisen ställer oss inför? Som individer kan vi alla bidra genom att sortera våra sopor, köra miljövänligt, eller kanske välja att ta cykeln till jobbet. Alla våra individuella bidrag räknas förstås. Men stora delar av vår mänskliga förmåga att förändra världen kommer inte från hur vi agerar var och en, utan från vår gemensamma förmåga att organisera oss och tillsammans åstadkomma resultat som är större än våra individuella bidrag summerade. Tillsammans bildar vi politiska partier, ideella organisationer, och en mängd andra former av sociala rörelser. Men det finns en särskild typ av organisation som har en ovanligt stor potential att göra skillnad: företag. Dessa organisationer löser många av våra vardagliga problem och förbättrar våra liv på sätt som vi kanske inte alltid tar oss tid att reflektera över. Särskilt bra på att snabbt erbjuda nya lösningar är förmodligen nya företag, men störst avtryck gör dock de företag som är stora och äldre. Etablerade företag har inte bara flest anställda och kunder, mest resurser, och störst nätverk—i många fall är dessa företag även en del av de globala problem som behöver lösas. Därför är det viktigt att den här specifika kategorin av företag kommer igång och är framgångsrika i sina omställningar till mer hållbara sätt att driva affärer.

Affärsmodeller har föreslagits som viktiga instrument för utvecklingen av nya sätt att driva både nya och etablerade företag. Användandet av begreppet *affärsmodell* växte fram samtidigt som internet möjliggjorde helt nya sätt att t.ex. skapa relationer till kunder i slutet av 90- och början av 00-talet. Ur denna period kom affärsmodell som begrepps att stå för en slags affärsmässig kreativitet, nya värdeskapande möjligheter, och nya slags företag. Först på senare tid har affärsmodeller också kommit att stå för en del av de miljömässiga, strukturella problem som mer traditionella företag och industrier ofta ses vara en del av. I samband med detta har det också vuxit fram en förväntan att den kreativitet som många nya, ofta internet-baserade, företag har visat även bör kunna appliceras i mer etablerade företag, i deras strävan mot mer digitala och hållbara affärer.

Men förutsättningar för affärsmodellerande i etablerade företag är annorlunda än de i nyare företag. Detta faktum har betydelse dels för hur arbete med affärsmodeller ser ut (och kan studeras) i etablerade företag, men även för vilka verktyg som är mest lämpliga att använda i praktiken. Till skillnad från arbete med affärsmodeller i nya företag sker allt arbete med affärsmodeller i etablerade företag i en kontext som starkt präglats och i många fall fortsätter att präglas av en existerande och ofta historiskt framgångsrik affärsmodell.

Detta betyder i sin tur att innovation i etablerade företag med syfte att ställa om till en ny affärsmodell i grunden är en övergångsprocess, från en affärsmodell till en annan. Men mer än så, i de fall som förändringsinitiativ innebär fundamentalt annorlunda affärsmodeller, vilket ofta är fallet med initiativ fokuserade på ökad hållbarhet och/eller digitalisering, behövs ofta en övergångsprocess, inte bara mellan affärsmodeller, utan även mellan olika typer av innovationsprocesser. Medan etablerade företag vanligtvis arbetar enligt så kallad kontinuerlig innovation, där inkrementella förändringar står i centrum, kräver ofta mer radikala förändringar ett tillvägagångssätt som i forskning på etablerade företag ofta kallas för diskontinuerlig innovation, och som forskningen länge kopplats till svårhanterliga kunskapsgap.

Som ett sätt att direkt möta båda dessa två överlappande utmaningar har jag i den här avhandlingen utgått från en tolkning av affärsmodellsrelaterat arbete som en process för *konceptuell utveckling*: en sorts lärande-process som tidigare studerats inom kognitionsvetenskap med fokus på forskares, studenters, och barns kunskapsutveckling (i vilken ett koncept kan sägas motsvara en specifik 'bit' kunskap). Den här tolkningen av affärsmodellsarbete relaterar till tidigare forskning på det sätt att affärsmodeller ofta har diskuterats i termer av vilka koncept som bör ingå som komponenter i en komplett affärsmodell. Dessa diskussioner, om än mestadels akademiska, har även haft inflytande över hur praktiskt orienterade verktyg för affärsmodellsarbete har designats. Ett framstående exempel på detta är Business Model Canvas, ett verktyg som, baserat på Alexander Osterwalders doktorsavhandling från 2004, definierar nio elementära affärsmodells-koncept, och som över tid har kommit att bli vanligt förekommande hos både akademiker och praktiker.

Fördelarna med att fokusera på konceptuell *utveckling* istället för konceptuella *komponenter* är flera. För det första finns det en etablerad forskningsinriktning inom kognitionsvetenskap som byggt upp en bred teoribas för detta, och för det andra överlappar denna forskning på flera sätt med tidigare forskning på diskontinuerlig innovation i etablerade företag. I min egen forskning har jag sett hur affärsmodellsarbete ofta har delegerats från beslutsfattare till affärsutvecklare, samt hur detta har skapat kunskapsskillnader som till slut blivit hinder i den övergripande innovationsprocessen. Den här typen av problematik har inte adresserats i särskilt hög grad i tidigare forskning, varken i den forskning som studerat affärsmodellsarbete generellt eller i den forskning som fokuserat på verktyg. För forskningen betyder den föreslagna tolkningen i grunden alltså ett fokusskifte: från affärsmodeller och deras komponenter till affärsmodellerande individer och deras kunskapsresa; ett fokusskifte som mer praktiskt även pekar mot design av mer flexibla och inkluderande verktyg.

Appended papers

Paper I

Title: Management Tools for Business Model Innovation - A Review

Author(s): Hussan Munir, Lars Bengtsson, and Emil Åkesson

Status: Munir, H.; Bengtsson, L. & Åkesson E. (2022) Management tools for business model innovation - a review, in Agarwal, R., Green, R., Patterson, E. & Pugalia, S (Eds.).: *Innovation,* Routledge Series on Ideas in Business and Management. Routledge.

Paper II

Title: Theorizing in Established Firms: Models as Sources of Conceptual (Dis)Continuity

Author(s): Emil Åkesson and Fredrik Nilsson

Status: Resubmitted for publication in the Strategic Entrepreneurship Journal.

Paper III

Title: Business Model Innovation in Established firms: Conceptual Challenges and How to Manage Them

Author(s): Emil Åkesson, Kajsa Ahlgren Ode, and Lars Bengtsson

Status: Åkesson, E; Ahlgren Ode, K & Bengtsson, L (2021) Business Model Innovation in Established firms: Conceptual Challenges and How to Manage Them, *Academy of Management Proceedings* (1), 12323.

Paper IV

Title: Visual Business Modeling for Conceptual Change

Author(s): Emil Åkesson and Kajsa Ahlgren Ode

Status: In review for publication in the Journal of Business Models.

List of figures

List of tables

Abbreviations

BMI: Business Model Innovation

Table of Contents

"To the extent that the book portrays scientific development as a succession of tradition-bound periods punctuated by non-cumulative breaks, its theses are undoubtedly of wide applicability. But they should be, for they are borrowed from other fields. Historians of literature, of music, of the arts, of political development, and of many other human activities have long described their subjects in the same way. Periodization in terms of revolutionary breaks in style, taste, and institutional structure have been among their standard tools. If I have been original with respect to concepts like these, it has mainly been by applying them to the sciences, fields which had been widely thought to develop in a different way. Conceivably the notion of a paradigm as a concrete achievement, an exemplar, is a second contribution. I suspect, for example, that some of the notorious difficulties surrounding the notion of style in the arts may vanish if paintings can be seen to be modeled on one another rather than produced in conformity to some abstracted canons of style." (p. 207)

Thomas Kuhn in 1969 Postscript to *The Structure of Scientific Revolutions*

Introduction

In this chapter, I introduce and motivate the research presented in this thesis by describing the basic concepts that relate to the problem studied. From having done so, I define the purpose and research question that has driven the research forward. Finally, at the end of this chapter, I provide a short overview of how the remainder of this thesis is structured.

Digitalization, sustainability, and business models

In an ongoing trend that stretches over many decades, firms have been incorporating digital technologies as fundamental components in their businesses. With these technologies, which keep evolving along expected and sometimes unexpected paths, new ways of doing business are becoming possible. At the same time, firms are increasingly at the receiving end of demands from customers, regulators, employees, and society-at-large, to change their businesses to become more environmentally friendly. Digital technologies not only suggest occasions to address important environmental issues by piggybacking on technology-driven change processes, but can in many cases also contribute with effective solutions to problems of this kind.

Altogether, these trends have become evident in the wide-spread use of terms like ‘digitalization’, ‘sustainability’, and ‘business model’. Popularized with the wave of new internet-based business in the 1990s (Massa *et al.*, 2017), the latter of these terms has now moved into popular usage; coming to represent both the problems and solutions to firms’ technological and environmental footprints. In line with these sentiments, from an academic point of view, business models have been proposed as mediating tools that translate value between the technological and economical domains (Chesbrough and Rosenbloom, 2002), suggesting a shift in the very meaning of innovation; from being a predominantly technological process to being a process that more broadly situates technological development in the economic context (Chesbrough, 2007). In academia, this shift is generally captured with the term

'business model innovation' (BMI), which stands for a journey of technological-economical innovation that centers on the business model as its main artefact (Foss and Saebi, 2017a).

Accordingly, much previous research has been devoted to discussing how business models can be formalized to be of the most use in mediating the BMI process. Although many of these formalizations, developed in academia, appear to not have made it into the actual practices of managers (Täuscher and Abdelkafi, 2017; Havemo, 2018), a notable exception has been the Business Model Canvas (Osterwalder and Pigneur, 2010); a tool that builds on the doctoral thesis of Alexander Osterwalder (2004), and that in recent years has established itself as the most frequently occurring formalization of a business model as a tool, in both academia and practice (Täuscher and Abdelkafi, 2017). Yet, despite its popularity, critical questions have recently been raised about its theoretical basis (Foss and Saebi, 2017b), as well as how it relates to the challenges associated with BMI in established firms (Sund *et al.*, 2016; Massa and Hacklin, 2021).

Challenges in established firms

While it is easy to see how new and old business models capture a sense of the journey that many firms appear destined to take, from previous research we know that accomplishing this journey is not an easy task (Foss and Saebi, 2017a). With references to the pioneering work of Schumpeter (1942), and his idea of 'creative destruction', it has become evident that many established firms struggle, and in many cases fail, to reinvent their business (Foster and Kaplan, 2001). More specifically, recent studies of sustainability initiatives aimed at addressing the grand challenges of climate change, show that these to an unfortunate degree end up "converted into the mundane and comfortable concerns of "business as usual"" (Wright and Nyberg, 2017, p. 1633).

While, in many respects, climate change poses new and different challenges to established firms, in other respects, many of the challenges that relate to the associated change processes of these challenges are most likely not new. Similarly, although a broad look at digitalization from a macro perspective suggests many new business-related phenomena, such as new analytical capabilities, new work practices, and new access to information—and from these, new affordances in business—it is less clear that these phenomena change the basic economic, cognitive, and social processes involved their

innovation (Lanzolla *et al.*, 2020). Research on business models and BMI is therefore poised to benefit from the broad and multidisciplinary research on these processes that already exists.

From this assumption, as will be discussed at length in this thesis, in the context of established firms, the BMI process is not simply a matter of searching for or generating a new business model, but also of transitioning away from an existing—often historically successful—business model. In the cases where this transitioning requires a substantial leap, this in turn suggests that BMI in established firms also requires a transitioning on the level of the innovation process itself, from continuous to discontinuous innovation, with changes to both its aim and conditions.

In previous research on this transitioning, cognition frequently acts as a central factor in explanations of the path-dependent continuity that often occurs in established firms wanting to change in this way. On the other hand, cognition must, of course, also be part of explanations of the path-breaking discontinuity that also is possible in established firms, suggesting that failure and success both need to be considered in explanations focused on this single factor. Nevertheless, a lack of a theoretical explanation that can simultaneously hold the cognitive difficulties as much as its respective possibilities has resulted in concerns about the effectiveness of many tools for BMI (Sund *et al.*, 2016; Massa and Hacklin, 2021). Based on what conditions should business models be designed and formalized to both address the difficulties that cause many established firms to struggle or even fail, while at the same time creatively guiding practicing managers forward in their innovative journey?

Purpose and research question

In line with this problem, the purpose of the research presented in this thesis has been to, *with a cognitive focus, contribute to a better understanding of why it is that some established firms have difficulties with succeeding in their BMI process, and how this process, accordingly, can be better supported with tools*. In relation to this purpose, the research in this thesis adopts a managerial-centric perspective, and further assumes, based on previous research (Massa *et al.*, 2017; Foss and Saebi, 2017a), that business models can be conceptualized as more or less effective tools in this process.

From this purpose, the following subdivided research question has been posed:

How can managers in established firms succeed with BMI?

a. Why is BMI in established firms difficult?

b. What tools can effectively support managers in these difficulties?

A short outline of the thesis

The remainder of this thesis proceeds as follows:

In the next chapter, the problem briefly described in this introductory chapter will be unpacked in greater detail to establish a view of how far previous research has progressed.

In the third chapter, I will first reflect on my scientific approach to the research presented in this thesis. Following this, I will describe the research processes, as well as my contribution in these, that have led me to my conclusions. Looking back at these processes, I will then discuss the bases for how my research can be evaluated.

In the fourth chapter, summaries of the appended papers will be provided to enable a quick overview of my findings.

In the fifth chapter, I will synthesize the findings in the appended papers and discuss their joint contribution to the research problem that I have studied.

In the sixth chapter, the broader implications that my contributions have on research on business models will be discussed. Towards the end of this chapter, I will also discuss the general limitations to these contributions and implications, and suggest how these can be addressed in future research.

In the final chapter, a few brief remarks on my work will conclude this thesis.

Background

In this chapter, I provide an overview of previous research related to the purpose and research question of this thesis. This overview will first focus on more context-independent research on business models, what they are and the central ways in which they have been approached with tools. From there, the focus will be moved into the context of established firms, to review some of the most central research on the challenges that established firms face in innovating their business. Finally, a short description of business modeling as a representational problem will be given, as a precursor to the research that will subsequently be presented in this thesis.

Conceptualizing business models

The term 'business model' emerged with the increase of new digital and internet-enabled businesses in the mid-1990s and has steadily grown in popularity since (Massa *et al.*, 2017). In more recent years, the term has also become associated with the growing interest to change businesses to become more environmentally sustainable (Bocken *et al.*, 2013). In its growing popularity, usage of the business model term has developed in several distinct directions. From their review of the business model literature, Massa *et al.* (2017) identified three broad categories of meaning associated with the term. These include the interpretation of business models as *attributes of real firms*, suggesting that different business models can be used to categorize and compare different kinds of firms. Moving into the context of firms, business models have also been interpreted as *formal conceptual representations*, thus providing reference descriptions for organizational members of how their firm's business works. Finally, business models have also been interpreted as kinds of *cognitive/linguistic schemas*, residing more informally in the minds and language of mangers engaged in thinking and talking about business.

Along with the increasing popularity of business models, relating to all its different interpretations, interest in how established firms can change with new

business models has also grown (Foss and Saebi, 2017a). Although a variety of terms have been used to refer to versions of this process, such as 'business model transformation' (e.g. Aspara *et al.*, 2013), 'business model reconfiguration' (e.g. Massa and Hacklin, 2021), and 'business model adaptation' (e.g. Saebi *et al.*, 2017), as a more general term, 'business model innovation' (BMI) has most commonly come to represent this process (Foss and Saebi, 2017a).

To succeed with BMI, researchers have proposed that managers need to be creative in developing and communicating new business models. In academia, multiple tools have been proposed to support managers with this. Most of these have followed the interpretation of business models as formal conceptual representations and focused on defining what a generic business model should consist of, based on the assumption that a *structured formalization* of its basic components would help guide managers in their developing of new and more specific business models (Täuscher and Abdelkafi, 2017).

Business models differ from other models found in firms, such as financial or organizational models, in that what they represent exist more broadly at the conceptual level (Teece, 2010; Martins *et al.*, 2015). This suggests that business models, as models of real-world business, involve components that cannot easily be pointed to in the real-world; things that are primarily conceptual. For example, although terms like 'lock-in', 'two-sided market', 'razor-and-blades', and 'value proposition', represent useful and frequently employed concepts in many business models, with real-world consequences for business performance, these things nevertheless do not exist as real-world objects.

Although defining business models as conceptual constructs has been a source of disagreement among researchers, consensus has generally been found in broad definitions that include all firms. A central proposition in research on business models and BMI has therefore been that all firms, implicitly or explicitly, employ a business model (Magretta, 2002). In these definitions, business models are, from a very general perspective, descriptions of the goal-oriented functioning of firms (Massa *et al.*, 2017), often defined in terms of their systemic creation and capture of value (Zott and Amit, 2010). Yet, such broad definitions necessarily involve a large portion of "implicit assumptions about customers, the behavior of revenues and costs, the changing nature of user needs, and likely competitor responses" to make them functional in a specific context (Teece, 2010, pp. 172-173). To this end, much research on business model tools has been devoted to finding more appropriately granular definitions (Markides, 2015); to support managers in their explication of such

specificity, while at the same maintaining a balance with generality, for applicability across different kinds of firms. A leading example of this research is found in Alexander Osterwalder's (2004) doctoral thesis and his development of a *business model ontology*, a version of which later emerged in the Business Model Canvas tool (Osterwalder and Pigneur, 2010), which over time has emerged as the most popular formalization of a business model tool (Täuscher and Abdelkafi, 2017).

In developing his business model ontology, Osterwalder's (2004) aim was to established a structured approach to business modeling, with the ontology serving as a kind of reference model for different practice-oriented instantiations (such as the subsequent Business Model Canvas), while at the same time preparing for these to be computer-based to better facilitate comparison, sharing, and simulation of business models. From this perspective, Osterwalder's ontological approach is similar to more causality-oriented approaches (e.g. Cosenz and Noto, 2018; Groesser and Jovy, 2016; Weiner and Weisbecker, 2011), which in many cases also ultimately envision business models as software-based tools (Szopinski *et al.*, 2019; Bouwman *et al.*, 2020).

Following Gruber (1993), and Guarino and Giaretta (1995), Osterwalder (2004) defined his business model ontology as an "explicit specification of a conceptualization", with "conceptualization as an intentional semantic structure which encodes the implicit rules constraining the structure of a piece of reality" (p. 39); thus, serving as "a description (like a formal specification of a program) of the concepts and relationships in a specific domain" (p. 2). With this in mind, Osterwalder sought a standard formalization of business models by specifying a hierarchy of conceptual categories, with each category defined by a finite set of attributes.

Inspired by the four-box structure of the Balanced Scorecard (Kaplan and Norton 1991), Osterwalder's ontology starts with 'product', 'customer interface', 'infrastructure management', and 'financial aspects' as its most general components. From reviewing the business model literature, these components were then decomposed into nine sub-components: 'value proposition', 'target customer', 'distribution channel', 'relationship', 'value configuration', 'capability', 'partnership', 'cost structure', and 'revenue model' (a version of this level of the hierarchy is recognizable in the Business Model Canvas). In turn, these components also decompose into the next level down the hierarchy. For example,

> "A VALUE PROPOSITION represents value for one or several TARGET CUSTOMER(s) and is based on one or several CAPABILITY(ies). It can be further decomposed into its set of elementary OFFERING(s). A VALUE PROPOSITION is characterized by its attributes DESCRIPTION, REASONING, VALUE LEVEL and PRICE LEVEL and an optional LIFE CYCLE." (Osterwalder, 2004, p. 50)

However, despite its attractiveness in providing a clear reference of what concepts constitute a business model, critical concerns have been raised about the appropriateness of this kind of structured, ontological approach to business models. From a general point of view, these concerns have been based on the lack of theoretical grounding in the selection of concepts to include—often represented by an unstructured borrowing of existing strategic management concepts into the business model literature—leading some researchers to see the conceptualization of business models in this way as an ill-structured problem, without a stable solution (Foss and Saebi, 2017b). As an illustration of this, in their reviews of the business model literature, Shafer *et al.* (2005) and Clauss (2016) were respectively able to list 42 and 73 conceptual components across different business model conceptualizations. More recently, Budler *et al.* (2021) performed a bibliometric review of research on business models. In their study, they found a rich set of different business model ontologies, relating to a diverse set of different research domains, thus suggesting that conceptualizations of business models need to become more sensitive to the contexts in which they are found.

Moreover, in addition to the lack of theoretical basis and conceptual stability, in the context of established firms, the structured ontological approach also raises critical concerns related to *representativeness*; that is, the extent to which business models capture that which changes in a situated and context-dependent BMI process. As will be discussed in this thesis, these concerns suggest that the focus on structured ontologies in formalizations of business model tools may be less effective in addressing the conditional challenges that confront managers working with BMI in established firms (Massa and Hacklin, 2021).

Business model innovation in established firms

New business models suggest possibilities to understand future business alternatives in more coherent ways to make better investment decisions. Being able to bring different business-related concepts together to enquire into their

integrated ability to establish functional value creation and capture represents a promising proposition for managers in established firms. Yet, in established firms, new business models are not formulated out of context. Instead, the process of formulating new business models is situated in an existing and, in many cases, historically successful business, with all its specific assumptions folded into the daily practices of the firm. Given that all firms employ a business model, explicitly or implicitly, BMI in established firms is thus not only a problem of searching for new business models, but also of transitioning away from existing business models. However, more than that, when fundamentally different business models are sought—as is often the case with initiatives relating to digitalization and environmental sustainability—a transitioning may also be required on the level of the innovation process itself: from a mode of continuous innovation into a mode of discontinuous innovation. From a long line of empirical studies, we know that the pursuit of this latter kind of transitioning comes with several challenges.

The complex interdependencies of real-world business

In their landmark study of digitalization at Polaroid, Tripsas and Gavetti (2000) demonstrated how historical ways of thinking about business constrained managers in thinking about future business possibilities related to the new kind of technology. Specifically, although significant efforts were made to develop technologically advanced digital cameras, several managers at Polaroid struggled to break out of a thinking influenced by the razor-and-blades pricing strategy that had been part of the core logic in the firm's commercialization of film cameras—a logic that, nevertheless, did not appropriately fit with the potential value to be created and captured with the new digital cameras. In studying technological discontinuities like this, Tushman and Anderson (1986) influentially argued that technologies which are 'competence-destroying', that is, require new and different knowledge to be made use of in business, are more easily adopted in nascent firms than they are in established firms. Soon thereafter, Henderson and Clark (1990) further explained this phenomenon by distinguishing between those new technologies which imply componential changes and those which imply architectural changes, with the latter kind requiring a broader rethinking of the critical interdependencies involved in their implementation. Significantly, complexities of this latter kind do not only involve technologies, but also, more broadly, the organization of markets and government regulations related to these new technologies (Abernathy and Clark, 1985). Thus, the complex interdependencies that relate to radically new technologies often stretch beyond the boundaries of firms, in many cases

suggesting that profitability will depend on critical choices concerning the complementarity and appropriability of these technologies integrated into an industrial context (Teece, 1986). With a more nuanced take on Henderson and Clark's findings, Christensen and Rosenbloom (1995) hence argued that it is not simply the architectural dimension that makes discontinuous technological change more difficult for established firms to manage, but that they require different 'value networks', of suppliers, competitors, and customers, to be successfully commercialized. Consequently, from the perspective of existing value networks and current market dependencies, fundamental technological change may therefore be *perceived* as counter-intuitive and less worthy of investments when the value of these hinge on different value network and market dependencies (Christensen and Rosenbloom, 1995; Christensen, 1997).

Related to these structures, on the industrial level, previous research has shown how established firms often come to converge on a finite set of shared concepts that stop them from perceiving alternative ways of doing business (Huff, 1982; Spender, 1989)—even as these ways are demonstrated by competitors. As an illustration, in their landmark study of the Scottish knitwear industry, Porac *et al.* (1989) found that the *mental models* that managers constructed of themselves, their businesses, and their environment, were largely similar across a community of Scottish knitwear manufacturers. The managers in this community shared beliefs about identities: what kind of businesses they were, what kind of suppliers they relied on, what kind of market they were in, who their customers' must be, and what kind of companies they competed with. In their view, they manufactured high-quality knitted outerwear, under their own brand name, using traditional manufacturing methods, serving the higher end of the market via a limited group of sales channels, and, competing only with those other Scottish firms with whom they identified as being in the same business. As far as competition was concerned, the managers in the Scottish knitwear community identified the growing low-cost Asian manufacturers as being in a different business. Similarly, they thought, their much larger European counterparts in Italy produced "high fashion" rather than what they identified for themselves as "classic elegance" (p. 407). The managers in the Scottish knitwear industry also shared beliefs about causation, and what it takes to compete successfully in the environment which they perceived themselves and similar actors to be in. These beliefs included ideas about the sensitivity of their customers to economic trends, which skills to develop and which skills were beyond their own (as well as their competitors') reach, what kind of supplies made the difference in the final quality of their products, and at which volumes to sell these, for example. These beliefs, about identity and causation, were sometimes supplemented with contrasting beliefs in Porac *et*

al.'s interviews, but often only as afterthought, and with some reservation as to their relevance. In general, managers across this community of firms largely shared a model of the competitive situation of their businesses. Through a process of specialization, the community of practitioners in the Scottish knitwear industry engaged in a self-reinforcing pattern of decision making behavior which maintained their perceived boundaries of their competitive situation. This perception contributed to a narrowing of the attention and range of channels through which information about their world were collected:

> "The enactment cycle demonstrates the complex interweaving of technical and cognitive factors in structuring a transactional network. The producer-agent-retailer-consumer network has been set up to solve certain technical problems in the production and delivery of manufactured knitwear. For example, the use of agents allows the small Scottish producer to economize in the distribution of its products in world markets. Similarly, agents specialize in traditionally designed lines of clothing to economize on time since supplying all types of retail shops is impossible. However, each of these technical choices is based upon a definition of the business as 'selling classically designed clothing'. Reciprocally, each choice reinforces this definition by narrowing the range of informal channels through which relevant market information flows." (Porac *et al.*, 1989, pp. 409-410)

At a time when market globalization was on the rise and radically new technologies of production were emerging, Porac *et al.*'s study contributed to the strategic management literature with a recognition that managers make strategic decisions based on their socio-cognitive interpretations of themselves, their businesses, and their environment. As such, Porac *et al.*'s study is situated in a long tradition of interpretive sociological research, following in the footsteps of intellectual pioneers like Kuhn, Berger and Luckmann, Blumer, and Weick. Berger and Luckmann (1966) famously argued that knowledge is socially constructed, and according to Blumer (1969), individuals interpret the meaning of their environments and themselves in an ongoing process of social interaction, with the consequence that they, as they gather into different social groups, tend to "live in different worlds, and guide themselves by different meanings" (p. 21). Similarly, in the context of organizations, Weick's (1979; 1995) concept of sensemaking stresses the duality of how individuals both interpret and enact meaning in social interaction to construct identities and consensus in their work. In discussing socially embedded interpretations, perceptions, and world views, neither Berger and Luckmann's, Blumer's, nor Weick's ideas are very far from those in Kuhn's (1962) socio-cognitive description of science. Indeed, with a particular interest in the progression of science, Blumer placed significant

attention on the meaning and use of scientific concepts and their sensitizing function in human perception; in citing Kant, Blumer emphasized that "perception without conception is blind; conception without perception is empty" (1969, p. 168). Hence, in research on discontinuous innovation in established firms, multiple analogical references have been made to the scientific process as described by Kuhn (1962)—of normal science interrupted by scientific revolutions; often likening this to the innovation process described by Schumpeter (1942)—of industrial evolution punctuated by creative destruction (Dosi, 1982; Huff, 1982; Abernathy and Clark, 1985; Clark, 1985; Teece, 1986; Prahalad and Bettis, 1986; Henderson and Clark, 1990; Barr *et al.*, 1992; Christensen and Rosenbloom, 1995; Huff *et al.*, 2000).

The procedural similarities between science and innovation

Briefly summarized, Kuhn argued that science progresses *conceptually* based on the following characteristics (1962/2012, pp. 164, 208):

1. A focus on detailed problem solving, in
2. well-defined communities of problem solvers, with
3. similar training and experience in problem solving.
4. A lack of competition between different communities, with
5. solutions judged and accepted by the same communities, and
6. systems of values to resort to in periods of crisis.

The overall theme of these characteristics is a professional and community-based orthodoxy in problem-solving. Thus, using Kuhn's concept of scientific paradigms as a metaphor, Dosi (1982) argued that, *from an epistemological point of view*, managers in established firms often come to rest in "a set of procedures, a definition of the 'relevant' problems and of the specific knowledge related to their solution [as well as] its own concept of 'progress' based on its specific technological and economic trade-offs" (Dosi, 1982, p. 148). Similarly, from framing innovation in firms as a problem-solving process, Clark (1985) pointed to the central role that concepts play in in this process.

Much like progress in science can be traced with the concepts that have focused its problem-solving activities, a similar tracing of concept can be done for technological progress in firms. Specifically, to capture the market-related interdependencies of technological concepts in firms (such as, for example, 'internal combustion engine' and 'automatic transmission', each of which imply a particular fit with customer choice), Clark demonstrated how such

concepts, over time, evolve into complex design hierarchies, that is, conceptual hierarchies that reciprocally guide problem-solving activities. Based on these, Clark furthermore argued that continuous and discontinuous innovation, respectively, can be distinguished as changes down or up these hierarchies, where movements down hierarchies are "associated with refinement or extension of higher order concepts" (p. 249) and an entrenchment with previous commitments. More recently, Arthur (2009, pp. 134-143) has described this kind of development has a "structural deepening" of technology, with lock-in and, in turn, an "adaptive stretch" of old technology to new circumstances as consequences. Movements up the hierarchy, on the other hand, Clark argued, are instead "associated with departure from existing approaches, and the setting out of a new agenda for subsidiary parameters" and tend to "destroy the value of established commitments and competence, and call forth new skills and resources" (Clark, 1985, p. 249) According to Clark, managing across different design hierarchies (cf. Tushman and O'Reilly, 1996) tend to be challenging for these very same reasons.

In line with Clark's description of the elaboration of design hierarchies, from having empirically reviewed the trajectories of technology concepts in different industries, Utterback and Suarez, (1993) subsequently portrayed innovation in firms as a cycle that incrementally shifts from product development to refinements of production processes: a cycle that is restarted with technological discontinuities. This description is also in line with the evolution of dominant product strategies, which are often initiated with an uncoordinated focus on product performance, and develop via an intermediary focus on sales, towards an eventual systemic focus on costs (Utterback and Abernathy, 1975).

Hence, with a lesser focus on technologies, several researchers have also highlighted similarities between the practices and goals of science, and strategy formulation (Rumelt, 1979); suggesting that research on managers should have a lot to learn from research on the creative processes in science (Simon, 1985); and, that strategy formulation like science, over time, often tends to be a discontinuous process (Hedberg and Jönsson, 1977). More recently, but with a focus on nascent firms, Felin and Zenger (2009; 2017) have argued that successful new strategies stem from the creative abilities of entrepreneurs to construct theories as guides to their perception of otherwise undervalued resources. Brought into the context of established firms, previous research has similarly indicated how differing perception of environmental trends can cause members of innovation departments/teams to have difficulties in convincing

the rest of their firm's organization of more radically new business model ideas (Egfjord and Sund, 2020; Sund *et al.*, 2021).

Thus, in analogy to Kuhn's paradigms, the kinds of innovations that discontinuous technologies make possible often come into conflict with 'dominant logics' that especially top managers homogenously come to rely on in their strategic decision making (Prahalad and Bettis, 1986), and which often require a process of both learning and unlearning to overcome (Nystrom and Starbuck 1984; Bettis and Prahalad 1995). Taking business models to represent such dominant logics, in another landmark study, Chesbrough and Rosenbloom (2002) demonstrated how the presence or absence of new and fundamentally different business models respectively acted as mediators or barriers in evaluating investments into different technology spin-offs at Xerox PARC. This, they said, because business models, on a cognitive level, help managers translate value creation and capture between the technological and economic domains. From these perspectives, just like Kuhn's scientific paradigms are replaced via a process of discontinuous conceptual change, in leaping across structural gaps maintained by conceptual incommensurability (see Holyoak and Thagard [1996] and Andersen *et al.* [2006] for interesting and deeper discussions specifically related to conceptual hierarchies), new kinds of businesses could similarly emerge from a discontinuous change of the concepts that make up the mental models of managers in established firms (Barr *et al.*, 1992; Hamel, 2000; Huff *et al.*, 2000).

Organization and cognitive representations as central factors

In established firms, much like in scientific communities, knowledge is often not just the product of any one problem-solver, but the result of long series of different individuals' problem-solving activities, which over time has evolved into a coherent fit (Sigglekow, 2002). This suggests that the learning that has enabled existing businesses to evolve into their current form has migrated from an individual level into a firm level, with increasing homogeneity of knowledge as result. Thus, it has been suggested that research on new value creation in established firms should pay closer attention to how new knowledge and capabilities that originate at the individual level, in what Felin and Hesterly (2007) have called 'nested heterogeneities', induce consequences on the collective level. These descriptions build on the recognition that both individuals and organizations can be conceptualized as "learning entities", where individual creativity and insight can be accumulated as collective knowledge and capabilities in the "rules, procedures, routines and shared

norms which guide the problem-solving activities and patterns of interaction among its members" (Lam, 2006, p. 11).

Yet, because prior knowledge is an influential factor in the ability to absorb new knowledge, and learn, at both the individual and the organizational level, this suggests that established firms will be more inclined to evolve into a homogenous path-dependent learning (Cohen and Levinthal, 1990). Thus, with references to the organizationally induced boundedness of human rationality and the simplified representations of reality that managers necessarily rely on (Simon, 1947/1997), previous research has pointed toward cognitive representation as a source of the inertia and failure that has frequently been found in empirical studies of innovation in established firms. To succeed with a transitioning from continuous into discontinuous innovation thus implies changes to the cognitive representations of managers, and especially those of top managers responsible for making critical decisions relating to investments into new kinds of businesses (Walsh, 1995; Tripsas and Gavetti, 2000; Chesbrough and Rosenbloom, 2002; Kaplan *et al.*, 2003; Gary and Wood, 2011). All this points to the apparent paradox in proposing cognition, and cognitive representations particularly, as both the problem and solution to the transitioning into discontinuous innovation in established firms; suggesting that these two characteristics somehow operate as "two sides of the same coin" (Lam, 2006, p. 11).

In *Skapande företagsledning*, Normann (1975) pioneered many of these ideas in his efforts to unpack growth in firms as a qualitative knowledge development process situated in the firm's 'idea system' and its 'dominant ideas'. In his analysis, Normann focused on a firm's *'business idea'* as a theoretical construct of the way each firm operates. Essentially a precursor to the firm's business model, Normann defined a business idea with the following characteristics: a historical, knowledge- and capability-based, coherent, systemic, and multi-level (including market, products, and resources) expressions of how a firm "functions and makes money" (pp. 52-53).

With references to both Kuhn and general learning theory, Normann proposed that "a significant number of business ideas—at least in their first developmental stages—can be related to a single individual" (p. 102), and that further research should be devoted to explore how individuals learn and develop new business ideas. However, the individual learning process was not the primary focus for Normann. Instead, the central question of his work related to the *structural challenges* of effecting both learning and unlearning in a transitioning between the dominant ideas of the firm as a whole—in what he called an "interpretation- and idea-regulation-process" (p. 181). According

to Normann, this process requires a special kind of top management leadership capable of managing the set of different knowledge- and capability-related blockages or tensions *in the firm's cognitive system*, that emerge as one or more conceptual frameworks ("föreställningsramar" in original, p. 199) tied to the development of new business ideas come into confrontation with the firm's dominant ideas.

In line with these ideas, research on business models have recently begun to focus on the organizational tensions that can emerge during BMI processes (e.g. Sund *et al.*, 2016; 2021; Egfjord and Sund, 2020), and the role that business models play as boundary objects in distributed cognition (e.g. Roessler et al., 2019; Shepherd et al., in press); phenomena that will be central to this thesis as well.

Business modeling as a representational problem

From the previous sections on the situated challenges of BMI in established firms and the critical role that manager's cognitive representations play in this process, light is cast on business modeling as a representational problem. More specifically, from exploring the similarities between science and innovation, an interpretation of BMI in established firms as a process of conceptual change has emerged. With this interpretation comes also a new and different conceptualization of business models. With inspiration from the critical role that models play in science (Morrison and Morgan, 1999), and especially economics (Morgan, 2012), Baden-Fuller and Morgan (2010) have suggested that researchers more generally should acknowledge business models as models. Taking models as her basis, Nersessian (1992; 2010) has studied how the cognitive representations of scientists can change to enable both continuous and discontinuous conceptual change through a process of reasoning, as well as how individual cognitive representations can be seen as evolving in distributed cognitive systems (Nersessian *et al.*, 2003; Osbeck and Nersessian, 2006). Although Nersessian's research is situated in the scientific context, it nevertheless relates to a theoretical development that stretches across a continuum of human cognition, where concepts represent the basic building blocks of all our human thoughts and perceptions (Prinz, 2002; Barsalou, 2009). Thus, in conjunction with studies of conceptual development in children (Kitcher, 1988; Keil, 1992; Gopnik and Meltzoff, 1997; Carey, 2009) and students (Smith, 2007; Wiser and Smith 2016; Harring *et al.*, 2017; Lundholm and Davies, 2013), previous research suggests that managers in established firms are not an exception to the challenges of conceptual change.

Methodology

In this chapter, I present my reflections on the methodological issues that are tied to the research presented in this thesis. This includes my thoughts on the scientific approach that I have taken, the research processes that I have participated in, and finally, the important questions that relate to its evaluation.

Scientific approach

Since starting my PhD I have been fascinated by the reaction that I have often encountered when telling that I have previously studied physics. From the social science perspective, physics is often portrayed as a mature discipline, an ideal benchmark for both scientific practice and scientific progress. But from crossing the line between the natural and social sciences I have often been met with expectations or questions that relate to a kind naïveté that is often associated with the term 'positivistic'. But, how is it possible that a scientific discipline can be viewed as both mature and naïve? According to Kristensson Uggla (2019), science is divided into two cultures of knowledge, formed by two different traditions. There are many ways in which one could look at these different traditions. One possibility is to look at them from an organizational perspective. Natural and social scientific work is generally conducted in projects of significantly different scale, with different needs for specialization, and different expectations of consensus vis-à-vis critical thinking. Natural scientific projects are often very large and expensive, and stretch over long periods of time. In these projects, members work in highly interrelated specializations, and have little need for criticizing the project in which they are working. It is not unusual with PhD students working in multi-million-dollar labs, where results are expected to emerge over decades, potentially long after the individual PhD student has moved on. There is little meaning in questioning this structure. Nor would it perhaps be legitimate to do so. Instead, for economic reasons, members are often expected to work within it, and make

the most use of its resource and established knowledge. Social science projects on the other hand are often very small (a single member is not unusual), specializations are often in opposition, and it is not only more legitimate to be critical, it is often expected. I experienced this most clearly when I attended a course in modern sociological theory at the sociology departments of the universities of Lund and Copenhagen. In this course, professors initiated seminars with a theoretical argument, after which we PhD students each took turn practicing critiquing what the professor had just argued for. This critical vein, that is more apparent in the social science tradition, but less articulated in natural science tradition, sheds some light, I think, on the paradoxical social science view on natural sciences as both more mature and more naïve. Rosenberg (2016) notes that the need for philosophical questions is both less important and less unavoidable in the natural sciences. This, he says, because natural sciences have a larger and more well-established record of success, in terms of both evident results and reliable methods. In social science, on the other hand, there is often a lack of agreement on problems, theories, and methods, and thus a greater need for critical evaluation and philosophical enquiries.

But, of course, things are never so simple. The above image of a natural science free from philosophical worries as imposed from the outside is incomplete. One must also look at the history of the sciences to find how the images of different disciplines and their traditions have emerged. As pointed out by Kristensson Uggla, "the hardboiled view on [natural] science that in a positivistic spirit has long been cultivated by [natural] science itself with the purpose of strengthening its prestige and legitimacy, rather than as a result of influences from relativistic positions within the theory of science" (2019, pp. 23-24). Thus, natural science often portrays itself in uncomplicated terms for the public eye. Yet, in reality, the positivistic 'ghost', as Kristersson Uggla suggests, has few if any voluntary proponents. From high school many of us remember the simple exercises of billiard balls and light bulbs. No philosophical enquiry needed, 'just connect the battery and light bulb with these wires'. It is only at the university that things start to get a little more complicated. Because, as evidenced by quantum mechanics, for example, they are. Indeed, we still do not have a unified theory of light. Similarly, the image of the social sciences as uniformly critical is also overly simplistic. Indeed, a central point in the research presented in this thesis hinges on a longwinded debate about objectivity versus subjectivity, reminiscent of that between the natural and social sciences (Alvesson and Willmott, 2012).

So far, through a distinction between the natural and social sciences, I have discussed a general gap in research that cuts in-between naturalism and humanism, naturalism and interpretivism, and logico-scientific and narrative knowledge. I still think there is a lot to this simplification. As Kristensson Uggla (2019) writes, these philosophical divisions are very much located in different cultures with different traditions. There is also something to be said for the different ontologies that these different traditions study. As humans studying humans, in complex social structures (academia) studying complex social structures (society, including academia), defining problems, theories, and methods is a lot harder. We social scientists usually cannot do experiments as they are done in natural science. And, as explicated by Rosenberg (2016), we already carry a lot of answers to our questions (and questions to our answers) by having learned 'folk' social theory our entire lives. Of course, we must be more critical in relation to our interpretations of data. Data is less neutral to us as social scientists. As argued by Czarniawska (1995), we, as much as our data sources, make sense of and communicate about the world in narratives. That is part of being human, scientist or not. We should not neglect this. Instead, I think, as she suggests, we should try to be sober about this relation to reality and try to use it as best as we can; we are not entirely trapped by our human experience as social researchers.

As suggested by Kristensson Uggla, there are many conflicts in the sciences. Yet we need not see these conflicts as a fault, but instead as an opportunity for dialectic reasoning to move forward, pragmatically, making the most of arguments and counterargument from different traditions. I therefore hesitate to use the far-reaching epistemological labels frequently occurring in the social sciences to describe my own work. Perhaps this hesitation comes with my background in physics, where labels like these are not as important. Labels like these are not always helpful, but often put the focus on issues that are not (or should not be) the primary focus of science, natural or social. Nevertheless, to the extent that I have put the constructed subjectivity of human cognition in the foreground of my work, I recognize that it could be categorized as *interpretivist*. But this inclination is not made on any ideological grounds. Instead, it follows from the cognitive science (e.g. Carey, 2009), and to some extent, the sociological research (e.g. Berger and Luckmann, 1966) that is the basis of my research.

Following in the footsteps of the likes of Kuhn (1962) and Blumer (1969), in contrast to popular notions of well-defined concepts, from a cognitive science perspective, there is generally a consensus that concepts cannot be defined in,

as it were, necessary and sufficient terms (Murphy, 2002). This includes the most mundane concepts such as triangles; thus, even the innocent question 'What is a triangle?' does not have a definitive answer (Andersen *et al.*, 2006). Instead, following Wittgenstein (1953), and more recently the work of Rosch (1975), it is now generally an established fact that the meaning of concepts appears in graded structures, meaning in effect that some triangles are 'more like a triangle' than others. Complicating things even further, Barsalou (1987) have since demonstrated that there is an instability of these graded structures, by pointing out that concepts are constructed in a highly *situated* and *ad hoc* way. From this it becomes clear that knowledge is intimately related to both the knower and the situation of the knower. It also becomes clear that we, as researchers, must distinguish between the static terms we use to represent concepts, such as the word 'triangle', and the concepts themselves, which, strictly speaking, only exist in our thoughts about triangles, and shift dynamically in meaning depending on in who and where they are activated.

The central role of interpretation in my research has had consequences for how I have practiced it. Methodological discussions often center on induction and deduction as the basic mechanisms for coming to scientific conclusions. Yet, as discussed by Alvesson and Sköldberg (2018, pp. 4-8) the mechanism that more often is practiced, especially in case-study research, is instead abduction. This is because induction and deduction respectively suffer from shortcomings that make progression in the scientific process difficult to explain, especially from an interpretivist point of view. While induction seeks to establish new theory from 'raw' empirical data, with the implicit assumption that this process can take place without any prior theoretical conceptions, deduction in contrast does not add anything but prior theoretical conceptions to the process. Thus, on the one hand, induction does not take into consideration the idea that data (facts) are always theory-laden (Hansen, 1958). Deduction, on the other hand, neglects empirically driven theoretical change. Sidestepping the separation of theory and data that is inherent in both these mechanisms, abduction instead admits new data while at the same time acknowledging the theoretical interpretation that is always present in abstracting new concepts from empirical phenomena. Alvesson and Sköldberg (2018) describe this difference as the inclusion of *understanding* into the process, where understanding can be interpreted as "a hypothetical overarching pattern, which, if it were true, would explain the [often surprising] case in question" (p. 4). Similarly, with reference to the work of Pierce, Swedberg (2014) suggests that much theorizing in the social sciences is carried forward by abduction as a process of educated guessing, in search for the best available explanation of empirical phenomena. As such, Swedberg suggests that one can think of theorizing in the social

sciences as a kind of art. This does not mean, however, that 'anything goes'. Instead, borrowing from Reichenbach and Popper, Swedberg suggests that theorizing may usefully be thought of as having both a context of discovery, where new ideas are generated, and a context of justification, where found ideas are critically examined; two contexts that are intimately related but nevertheless built on different mechanisms. In line with this, Swedberg proposes that new research can be divided into an unstructured explorative discovery-focused phase of early theorizing, followed by a justification-focused phase where a more structured design can be applied. Notwithstanding this, because abduction does not result in any logically necessary conclusions (unlike deduction), whatever conclusions are drawn must always be tested in further empirical research (Alvesson and Sköldberg, 2018).

The approach taken to research in this thesis is primarily abductive in that I, together with my co-authors, have searched for the most appropriate explanation for the phenomena that we have encountered in our empirical sampling. In turn, this has resulted in a multidisciplinary approach, were the best available explanations from multiple research fields have been considered. Of course, the search for the best available explanations has not, in any sense, been exhaustive. Nevertheless, it has resulted in an understanding or 'hypothetical overarching pattern' of explanation that, to a satisficing degree (using Simon's [1947] terminology), has suggested new and valuable insights. This pattern is *the interpretation of BMI as a process of conceptual change*, inspired largely from existing theoretical explanations of conceptual change in science, as provided by Nersessian (2010), but also, more generally, from cognitive science research on conceptual change in humans (e.g. Carey, 2009; Murphy, 2002; Prinz, 2002; Andersen *et al.*, 2006; Smith, 2007; Margolis and Laurence, 2015; Wiser and Smith, 2016; Amin and Levrini, 2018). Still, within the scope of my own research, insights drawn from this pattern of explanation remain in what can best be described as an explorative and discovery-driven phase of early theorizing. Additional and more structured research designs will be required in the future to develop and properly justify it. Nevertheless, the discovery-driven logic that I have followed in my research has served me well, as it has allowed me to recursively reflect on the very processes that I have been attempting to study in managers and firms.

In line with the interpretivist approach, like Nersessian, I have also adopted a *naturalist* approach in my study of BMI. Nersessian describes this approach (applied to her research) as follows:

> "A naturalist recasting of the problem of conceptual change in science shifts the focus of the problem from the conceptual structures themselves to the nature of the practices employed by human agents in creating, communicating, and replacing scientific representations of a domain. That is, it shifts the focus from the products to the processes, from the structures to the practices. Conceptual changes need to be understood in terms of the people who create and change their representations of nature and the practices they use to do so." (2010, p. 5)

In my own research, this approach has meant switching the focus on business models as static objects to instead beginning to see them as part of dynamic processes, situated naturally in the minds and practices of managers.

Of courses, from the point of view of Denzin and Lincoln (2005), a situated, interpretivist, and naturalist perspective is nothing other than a generic definition of qualitative research itself. To distinguish between different kinds of qualitative research, thus requires additional demarcations. Specifically, Denzin and Lincoln, define the *constructivist* paradigm as assuming a relativist ontology, a subjective epistemology, and naturalistic methods (p. 32). From my research on the model-based practices of managers, and in line with my reflective journey with these practices, my own research clearly also follows this paradigm. In line with this paradigm, I assume that the world is conceptualized differently by different people, meaning that ontologies are relative to the individual knower (including I as well as my respondents); that concepts are individual and co-created, meaning that different knowers contribute differently to the advancement of shared knowledge (including I as well as my respondents); and, that concepts are naturally and meaningfully situated in contexts (including mine and those of my respondents).

Research processes

Overall, the process in which the research of this thesis has been conducted has consisted of the following components: a single case study, a literature review, a multiple case study, and a conceptual study; all of which have resulted in one paper each that taken together address the purpose and research question of this thesis. See Fig. 1 for an illustrative timeline.

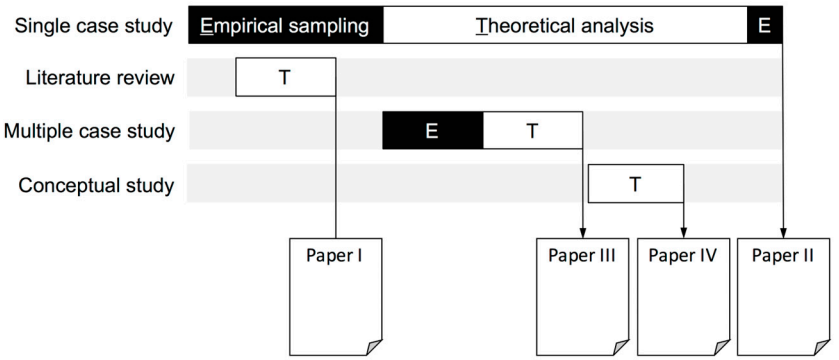


Figure 1 – Overview of research process

Gaining access to empirical sampling has been a great challenge my research for this thesis. This has influenced my research strategy in at least two ways. As a first consequence, it altered the purpose of my research. Initially, in the absence of access to empirics, in the first year of my PhD my primary purpose was to study the influence of data-related power-dependence relations (inspired by Pfeffer and Salancik [1978/2003]) in BMI. Indeed, two international conference presentations were made on this topic. And, as a second consequence, after my current purpose eventually emerged, based on the data that I gained access to, it is also possible that the size of my empirical sampling steered my research into the theoretical predomination that over time has come to characterize it. Nevertheless, two of the four studies and papers presented in this thesis have been based on empirical sampling. Empirical sampling has also been conducted for a third paper (testing the modeling ideas discussed in Paper III with practitioners of one of the cases of Paper III), yet due to time constraints, this paper is not included in this thesis.

For Paper II, my co-author Fredrik Nilsson and I conducted a set of seven semi-structured interviews with the top management team and business developer at the case firm Svenska Retursystem (SRS). These interviews were followed-up in a workshop with two of the interview respondents. With only a few exceptions, interviews were conducted in physical meetings. All interviews and the workshop were audio recorded and transcribed in full. Supplementing these, sampling was also conducted by reviewing firm documents, and especially the firm's annual and sustainability reports.

For Paper III, my co-author Kajsa Ahlgren Ode and I interviewed eleven individuals actively involved in BMI initiatives across five different firms.

These firms were of different size, industry, and maturity in their BMI process. Because of the COVID-19 pandemic, all interviews were conducted electronically, over the phone or via a live-streamed video app. All interviews were audio recorded and transcribed in full.

See Table 1 for an overview of the empirical sampling. Although the scope of this sampling is relatively small, this limitation is compensated for with the large theoretical and empirical literatures, from both the management and cognitive sciences, with which it has been interpreted.

Table 1 – Overview of empirical sampling

	Paper I	Paper II	Paper III	Paper IV
Interviews	-	Seven semi-structured interviews with the top management team and business developer of the single case firm.	Eleven semi-structured with individuals actively engaged in BMI initiatives at five case firms firms, each of different size, industry, and BMI maturity.	-
Workshops	-	One unstructured follow-up workshop with feedback discussions with the top technology manager and business model developer.	-	-
Documents	-	Annual and sustainability reports (2017-2021).	-	-

Literature review – Paper I

The process of conducting the literature review for Paper I started from a discussion about what tools managers were using in their BMI work. This discussion soon transitioned into a discussion about the availability of tools in the business model literature and what recommendations managers were exposed to from academia. From this, a search in Scopus was performed using *"business model innovation*" AND "tool*"* as a search string, as well as a method of forward snowball sampling, using Heikkilä *et al.*'s (2016) paper as a starting point. Titles, keywords, and abstracts were included in the Scopus search, and Heikkilä *et al.*'s paper was selected based on its relevance to the aim of our research. Initially, 52 papers were found in the Scopus search. From manually filtering these, based on their relevance in providing description of one or several BMI tools, and from excluding all papers that were singularly focused on sustainability, 24 papers were eventually selected. Along with the

snowball sampling, another 11 papers were found, making the final count of papers reviewed 35.

Single case study – Paper II

The extended and iterated work related to Paper II stretched across the work with all the other papers, and therefore signifies both the beginning and end of my investigation of the interpretation of BMI as a process of conceptual change for this thesis. Along the way, multiple theoretical concepts and models were considered, some of which have remained in focus and been developed, and some of which have been discarded.

The work with this paper eventually turned out a synthesis of multiple theoretical perspectives, ranging from strategic management, innovation management, business model innovation, and not least, several cognitive science literatures related to conceptual change, predictive processing, and scientific modeling practices. The theoretical journey, however, started with an empirical sampling in the form of the relatively small set of semi-structured interviews that were conducted with the top management team and business developer at SRS in the context of their recent commitment to digitalize their products, thereby hypothetically opening their business for significant innovation. Although the goal of the interviews was to learn about the initial decision making process of the firm, and, with inspiration from Kaplan's (2008) study of framing contests, the respondents' individual framing of this process, an extended period of coding eventually changed this initial theoretical direction.

From participating in a course on qualitative theorizing at the School of Economics and Management at Lund University, as well as a course on modern social theory (including the sociology of science) at the department of sociology at both Lund University and the University of Copenhagen, I eventually came to see the respondent's reasoning as a form of the model-based reasoning described by Nersessian (2010). This then paved way for a deeper reflection about the challenging-yet-possible conceptual change contained in such modeling (e.g. Thagard, 1992; Holyoak and Thagard, 1996; Andersen *et al.*, 2006; Carey, 2009), suggesting a new and different interpretation of both business models and their role in the BMI process. In turn, this eventually also lead me to consider the relation between mental models, simulation, and predictive theories of the mind (e.g. Craik, 1943; Gentner and Stevens, 1983; Johnson-Laird, 1983; 2006; Sloman, 2005; Hohwy, 2013; Clark, 2013; 2016).

In conducting the interviews, to anchor our empirical sampling in their respective perspectives, I and Fredrik Nilsson first asked the respondents about their work-related backgrounds and interests. We then moved on to ask the respondents to describe, in general terms, how the decision process had proceeded and what arguments, suggestions, forums, activities, etc. had been central in it. Only after the decision process had been described in general terms did we explicitly introduce the term 'business model' into the questions (except if it was first introduced by the respondents). We did so by first asking the respondents to define what the term business model meant to them, and then what role business models thus conceived had played, or could continue to play, in their decision-making process. The reason for delaying the introduction of the business model term was to try to not influence the respondents with our own preconceptions of it.

In coding the transcriptions of the interviews, to stay open to notions of action and change in the respondents' answers, I followed Miles *et al.*'s (2014) method of process coding using gerunds. In iterated reading, structuring, and evaluation of codes in this way, I also leaned on the suggestion to ask what the data could be an expression of (Ryan and Bernard, 2003); what question the data might be an answer to (Becker, 1998); and to try to distinguish between first order concepts, given by respondents, and second order concepts, that more appropriately may be recognized as explanations of first order concepts by myself as researcher (Van Maanen, 1979). From this process, higher-order themes eventually started to emerge. In these higher-order themes, I discovered similarities between the way the respondents talked and the way Nersessian had described model-based reasoning in the form of thought-experimental narratives:

> "The thought-experimental narrative describes a sequence of events that calls upon the audience to imagine a dynamic scene, one that unfolds in time. The function of the narrative is to guide the reader to construct a model of the situation described by it and to make inferences through simulating the events and processes depicted by the model." (2010, p. 175)

Yet, these narratives, although in the form of mental models (Bower and Morrow, 1990), did not resonate particularly well with the current literature on business models, even as these had been presented as cognitive representations. In the form advocated by Nersessian, mental models like these are not simply static descriptions of situations (cf. business models as schema [Martins *et al.*, 2015]), but conceptual systems that are purposefully and dynamically constructed to place attention on particular "features relevant to

[the] *epistemic goals* of the problem-solving context" (p. 175, emphasis in italics added); features that highlight the constraints and possibilities of conceptual combination and analogy in a process of reasoning that, over time, may mediate a conceptual discontinuity at the cognitive level:

> "Cycles of building, simulation, and inference can lead to the emergence of models that represent novel combinations of constraints, including the possibility of those that outstrip the representational resources of the specific domains from which the constraints were drawn–genuine conceptual innovations." (Nersessian, 2010, p. 201)

As a final step in the research process for Paper II, while I focused on writing and developing the paper (with inspiration from Davis [1971], Huff [1999], Golden-Biddle and Locke [2007], and Alvesson and Sandberg [2013]), Fredrik Nilsson collected and analyzed written documents such as annual reports, as way to follow-up on actions that had (or had not) been taken since the interviews were conducted.

Multiple case study – Paper III

With these insights and the work with Paper II, I next ventured into a new cooperative project with Kajsa Ahlgren Ode, to try to find out what challenges managers actively engaged in BMI at established firms were facing, in conjunction with their current and wanted practices of tools. Before conducting our empirical sampling, some preliminary research was conducted into the literature on tools that possibly could address the conceptual change that might be found in the context of established firms. This research soon settled on cognitive mapping (Axelrod, 1976; Eden, 1988) as it was presented in Bryson *et al.*'s (2004) book entitled 'Visible Thinking: Unlocking causal mapping for practical business results'.

The semi-structured interviews in this multiple case study proceeded with an interview guide that in a sequential way directed the focus from the background, role, and interests or each respondent; to question about the respondents' current work with business models; to, more specifically, their work in developing business models; to the challenges that respondents had experienced in this development; to finally, a discussion about what kind of tools were currently used, or were seen by the respondents as potentially useful. Towards the end of each interview, a short discussion about our own ideas about what could constitute a useful tool (including cognitive/causal

mapping as a basis) were also discussed with the respondents, to let them add or make corrections to our previously researched ideas for tools.

From having transcribed the complete set of semi-structured interviews, Kajsa Ahlgren Ode and I conducted two parallel coding processes, with the aim of establishing less biased and more balanced interpretations. To enable this parallel process and the eventual merging of our results, NVivo was used as a coding platform. In the eventual joint process of merging our separately established codes, the meaning of individual codes and their potential overlap was thoroughly discussed until eventually a set of distinct codes was created. From this set, we then proceed, again each on our own, to form higher level themes of our respondents' expressions.

From these empirical findings, we then returned to the literature to both broaden and deepen our search for appropriate tools. This led us to consider group model building, as developed in the system dynamics literature (Sterman, 2000; Andersen *et al.*, 1997; Vennix, 1999). It also led us to dive deeper into the basic assumptions of cognitive mapping as applied in a collective context (Eden *et al.*, 1981; Eden, 1988; Eden and Ackermann, 1998; Ackermann and Eden, 2011), as well as how this research stream related to that in system dynamics (Eden *et al.*, 2009). In writing the final version of the paper, I and Kajsa Ahlgren Ode were joined by Lars Bengtsson.

Conceptual study – Paper IV

For Paper IV, the empirical findings in Paper III along with its theoretical discussion of what a useful tool for BMI in established firms might be were further developed. This development was fully conceptual, and engaged with the cognitive science literature on visual representation, which had previously not entered my research: to establish the basis for the effectiveness of business models as visual tools. To do this, insights from this literature were synthesized with research on business models, research on discontinuous innovation in firms, as well as Nersessian's (2010) theory of model-based reasoning. This eventually led to the development of several theoretical propositions for the design of business model tools in relation to the challenges found in Paper II and Paper III. Supplementing these, a visual notation based on an activity-systems view on business models was also proposed.

Contributions to the research question

Overall, my individual contribution in these four studies and their respective papers, and in turn, their contribution to the research question of this thesis, is summarized in Table 2 below.

Table 2 – Overview of contributions and my responsibilities

	Paper I	Paper II	Paper III	Paper IV
RQa: *Why is BMI in established firms difficult?*	-	A single case study focused on the difficulties related to BMI in an established firm. My role: shared responsibilty for empirical sampling with Fredrik Nilsson, and main responsibility for theorizing and writing.	A multiple case study focused on the difficulties and tools related to BMI in five established firms. My role: shared responsibility for empircal sampling with Kajsa Ahlgren Ode.	-
RQb: *What tools can effectively support managers in these difficulties?*	A literature review of the BMI tools that have been curently proposed in academia. My role: shared responsibility for searching and writing with Hussan Munir and Lars Bengtsson.	-	A conceptual discussion on what tools would adress found challenges. My role: shared responsibility for theorizing and writing with Kajsa Ahlgren Ode and Lars Bengtsson.	A conceptual study on the effectivness of business models as visual tools. My role: main responsibility for theorizing and writing.

Reflections on research quality

How can we tell if and how these research processes have had any good results? Evaluating the quality of qualitative research is notoriously difficult. Some researchers have altogether denied the possibility that either the methods or results of qualitative research can be put up against a yardstick, whatever its markings may be. For these researchers, a subjectively good story is enough. Others have argued that very strict measures be put in place, to prevent qualitative research from going off the rails of objective reality. This latter category of researchers struggle with the idea that, no matter how strictly it is

evaluated, to be communicable and (in a very real sense) publishable, qualitative research must ultimately be shaped into a story. From their discussion of the range of viewpoints that stretch between these two extremes, Alvesson and Sköldberg (2018, pp. 366-376) suggest that qualitative researchers should abandon the ideal that qualitative results should be communicated in a language that is as exact as possible, while nevertheless striving to maintain the important connection between constructed theory and empirical phenomena. This somewhat loose suggestion, again, finds a natural overlap with sociological and cognitive science research, and specifically that concerned with concepts.

Returning to the question of how to evaluate qualitative research, Alvesson and Sköldberg discuss a few different options. In one of these, the interpreted empirical material could be evaluated based on the arguments (pp. 169-170) it brings for understanding social reality in a particular way. As discussed, in line with current research on concepts, this understanding will naturally vary between different readers of the research. Yet, in so far as this understanding can be contextualized (e.g. in a story), there will nevertheless be some convergence on its meaning. Thus, research on concepts finds itself in agreement with Alvesson and Sköldberg's suggestions for evaluation criteria as: an open attitude toward the "interpretive dimension of social phenomena"; a critical reflection of the political and social context of the research; in recognition of both the "ambiguities of language" and its rhetorical purposes (p. 371). In addition to these criteria, Alvesson and Sköldberg also suggest that qualitative research can be evaluated based on its "richness in points", meaning the way it connects to empirical reality while at the same time developing insights that clearly go beyond what the empirics by itself can say (p. 372).

While taking these suggestions by Alvesson and Sköldberg seriously, it is also helpful to lean on a more structured framework for presentation. Traditionally, reliability and validity have been cornerstone criteria for the evaluation of much previous research. The frequently cited Yin (2018, p. 43) breaks these criteria down further for their application to case studies, suggesting that research be evaluated in terms of its construct validity, internal validity, external validity, and reliability. Yet, these criteria have often been criticised for being less applicable to more purely qualitative research (Bryman and Bell, 2015, p. 400). More closely in line with an interpretive and constructivist approach (Denzin and Lincoln (2005) and Alvesson and Sköldberg's suggestions, I have therefore chosen to evaluate the quality of my research based on the following measures: *credibility*, *transferability*, *dependability*,

and *confirmability*; all of which together suggest the *trustworthiness* of the research (Lincoln and Guba, 1985). See Table 3 for an overview.

Table 3 – Overview of research quality

Quality criterium	Paper I	Paper II	Paper III	Paper IV
Credibility	-	Respondent validation in workshop with two of the interview respondents.	Respondent validation based on feedback and discussion with all interview respondents.	-
Transferability	-	Thick description of empirical findings in paper with multiple quotes.	Thick description of empirical findings in paper with multiple quotes.	-
Dependability /Confirmability	-	Auditable meeting notes, participant lists, interview guides, audio recordings, written transcriptions, coding charts, and paper drafts.	Auditable meeting notes, participant lists, interview guides, audio recordings, written transcriptions, coding charts, and paper drafts.	-

Credibility

The credibility measure assumes that there can be different interpretations of social science phenomena, and suggests that researchers can employ measures that illuminate one interpretation from multiple perspectives. This can, for example, be accomplished through *respondent validation* (Bryman and Bell, 2015, p. 401), where the respondents are given the chance to agree or disagree with said interpretations. To an extent, this was done in the workshop conducted as part of the empirical sampling in Paper II. Nevertheless, it is important to also acknowledge the limits to which the second order concepts (Van Maanen, 1979) that I used in my theorizing can be validated in relation to the first order concepts that my respondents used. Indeed, many of the theoretical conclusions that were finally drawn from the interviews for this paper would put inappropriately high demands on the respondents' meta-cognitive abilities, had they been asked to fully validate them.

In contrast, the interviews in Paper III were conducted in a more direct approach, in what can more closely (although certainly not fully) be compared an engaged approach (Van de Ven, 2007), with more direct back-and-forth discussion between us researchers and the respondents. In line with this

approach, toward the end of these interviews, the respondents were also given the chance to respond and give feedback to some of our preconceptions of both the challenges and the possible tools to address these.

Transferability

The transferability measure refers to the extent to which research can be applied to contexts other than those from which its conclusions have emerged. As a basis of my multidisciplinary research, a significant transfer of ideas has of course already taken place, suggesting on some level that further transferability may also be possible. Other than transferring ideas from other research fields to my research field, a large part of the theoretical conclusions of this paper have already been transferred in-between other research domains, such as between research on the scientific process and research on child development (Kitcher, 1988; Carey, 2009). Within the bounds of my research, with the multiple case study for Paper III, efforts were made to investigate some of the challenges found in Paper II by more broadly sampling a diverse set of firms. Despite this diversity, important similarities were found. However, notwithstanding these past transfers, it is of course a separate question whether the aggregated material that I have produced is further transferable. To this end, *thick description* (Bryman and Bell, 2015, p. 402) has been suggested as a means to increase the transferability of qualitative research. Although the empirical sampling that I have conducted is limited, to the extent that it has been possible, I have always striven towards providing as much context and details in the writings of both Paper II and Paper III. It is my hope that these strivings will encourage other researchers, in other contexts, to transfer and build on the ideas that I, in this way, have presented.

Dependability

In terms of dependability, this is a difficult question for me to entirely answer. I have come to see the conclusions of my research as quite evident, and have developed a firm belief that there is some important truth to these. To the extent that these beliefs are dependable, I can only, as it has been suggested in making research material available for *auditing* (Bryman and Bell, 2015, p. 403), lean on the critical examination of others. Therefore, throughout the process of working with both Paper II and Paper IV, other than having continuously presented my results to other researchers, all material has also meticulously been sorted and stored electronically for later review. This includes meeting

notes, participant lists, interview guides, audio recordings, written transcriptions, coding charts, and paper drafts. Wherever respondent anonymity can be maintained as requested, this material is available to any auditor who should feel so inclined as to review it.

Confirmability

The material provided for a hypothetical audit can, of course, also be used to confirm that I have conducted my research according to scientific values (Bryman and Bell, 2015, p. 403). More directly, it is my hope that my reflexivity in this chapter has provided some qualifying indications that the research presented in this thesis has been conducted in a way that is, to the degree that this is possible, transparently scientific.

Summary of appended papers

Paper I

Management Tools for Business Model Innovation – A Review

With the first of the appended papers, a review of the business model literature was presented with the aim of identifying and classifying tools discussed within the scope of BMI research. Although defining terms such as business model and BMI has proven difficult (Massa *et al.*, 2017; Foss and Saebi, 2017a), in line with its aim, this paper suggested the following pragmatic definition of a research-driven BMI tool: "any tool that is intentionally and explicitly (by a researcher) proposed to be used to facilitate a change of the way a firm creates value, delivers and captures value from it, both in terms of changes in key elements and/or links in the architecture of elements" (p. 2). With this definition in mind, a literature review was then conducted, using *"business model innovation*" AND "tool*"* as a search string in Scopus, and with forward snowball sampling starting from Heikkilä *et al.*'s (2016) paper on the topic. To distinguish between different classes of tools, three categories were used: stages targeted in the BMI process, strategic objectives pursued, and age and/or size of firms considered. From this analysis, several conclusions were drawn.

First, from sub-categorizing the BMI stages into exploration, design, test, and implementation, it was found that a majority of the tools surveyed were aimed at the design stage of the BMI process. In this sub-category, the Business Model Canvas (Osterwalder and Pigneur, 2010), stood out as a leading and, from its citations, inspirational example. Interestingly, no tools specifically developed for BMI were found for the exploration stage, which instead related to the use of traditional tools for strategic analysis, such as PESTEL (Gupta, 2013), SWOT (Piercy and Giles, 1989), or Porter's (1980) Five-Forces. For the test stage, the few tools that were found, focused on different kinds of stress testing, scenario analyses, or computer simulations. Those tools that were found to address the implementation stage, were found to provide checklists

for organizational action, support planning via process maps, or guides to structure performance metrics.

Second, from sub-categorizing the strategic objectives of BMI tools into starting a new business, increasing the profitability of an existing business, and growing an existing business, it was found that increasing the profitability of an existing business was the most frequently presented strategic objective.

Third, and in line with the above finding, it was also found that many of the tools presented assumed the context of established firms, as opposed to start-ups—a finding that is puzzling since the popularity of the term 'business model' has emerged along with the possibilities of new and different kinds of internet-based business typically associated with start-ups (Massa *et al.*, 2017).

Finally, the following general conclusions were made. Overall the tools found were limited in number. Of those surveyed in this paper, a majority were, as a rule, based on a conceptual reasoning without references to empirical support (many used *a posteriori* case studies to illustrate the value and applicability of proposed tools). And many tools included some form of visualization, to facilitate creativity and analysis, on an individual, or potentially, on a collective level.

Paper II

Theorizing in Established Firms: Models as Sources of Conceptual (Dis)Continuity

With the second of the appended papers, a theoretically driven yet empirically based analysis was presented to conceptualize the role of business models in explanations of both the challenges and possibilities of innovating business in established firms. Based on an albeit small sample of empirical data, collected in seven semi-structured interviews, a workshop, and readings of company documents, the findings in this paper came out of a longitudinal case study, where my co-author Fredrik Nilsson had participated extensively. The empirical sampling involved the top management team and a business developer at the company Svenska Retursystem (SRS), which at the time of the interviews had recently made a public commitment to digitalize their business. From an extended theorizing of the collected data, the findings of this paper soon evolved into the interpretation of BMI as a process of conceptual change, with business model as the objects of a model-based reasoning process

akin to that described by Nersessian (2010) in the context of science. Three theoretical points were made to structure the argument for this conclusion.

First, the respondents used conceptual placeholders, such as 'digitalization', and more specifically, 'smart load carriers', to represent more substantially developed yet still unknown future business. Second, in their reasoning about future business, the respondents brought together different concepts in intermediary models, as thought experiments, to enquire into different the possibilities and impossibilities that would follow from these models. In these models, a significant part of the included concepts derived from the history of the established business, while others derived from outside of it. All concepts included in the models were seen to contribute with different kinds of constraints to the models, thus leading the respondents to draw constrained conclusions in different future-oriented directions. Third, in these intermediary models, conflicts in particularly appeared to arise between the conceptual constraints of the established business, and those drawn from outside of it, a large part of which revolved around new technological possibilities. These conflicts suggested a problem of incommensurability, where the value that new technologies could create for the firm, in a new business, came into a clash with the costs of these technologies, as seen from the established business.

Situating these findings in the theory-based view (Felin and Zenger, 2017) suggested an extension of this view into the context of established firms, as well as the pointing out the important roles of concepts and models in theorizing. The theory-based view had been developed to explain how it is that entrepreneurs are heterogeneously successful in developing new and strategically effective businesses. Based on research on the conceptual development in children as well as organizational learning, both of which have discussed the process of learning from fragmentary experience, the theory-based view proposed that entrepreneurs' differential performance stems from their individual capabilities to construct theories about the value of resources. The findings of this paper contributed to the theory-based view in both extending it into the context of established firms, where the conditions of prior experience are very different as compared to nascent firms, and in suggesting that it is concepts and models that are the more appropriate level of analysis in studying theorizing. More specifically, and from a cognitive point of view, it is concepts that represent the value of resources; and models and model-based reasoning that represent both the possibilities and challenges of developing concepts, continuously or discontinuously.

Paper III

Business Model Innovation in Established firms: Conceptual Challenges and How to Manage Them

With the third appended paper, the scope of sampled empirical data was broadened to include several established firms. Altogether eleven semi-structured interviews were conducted with business unit managers, business developers, and innovation leaders, all which were involved in BMI-related initiatives of different maturity; at five firms, of different sizes and industries. The interviews focused first on the different challenges that the respondents each faced in their BMI work, and then on what they would like to see in a tool that would address these challenges. Several common challenges were found, followed by a theoretical discussion, from a research perspective, of what would constitute an appropriate tool for managing these.

As in Paper II, qualitative coding of the challenges discussed by the respondents in this study pointed toward BMI challenges of a cognitive and conceptual kind. These challenges involved learning to think differently on an individual level, in not having or expecting any final answers at the start of the BMI process, as well as having the courage and persistence to, nevertheless, follow it through. These individual challenges, however, also manifested on a collective level, where those who were actively part of this process continuously struggled to communicate with those who were critical for its continuity but who were nevertheless cognitively and conceptually outside of it. To represent these knowledge gaps, the term 'BMI project boundaries' was introduced. As those who were actively engaged inside of these boundaries were often at work with formulating new business models, and those who were outside of them were often responsible with deciding about resource allocation and implementation, these results implied problems with the separation of formulation and implementation in the BMI process. Specifically, this suggested that little confidence can be had in 'hand-overs' across BMI project boundaries; between those involved in formulation of new business models and those needed for their continuance and implementation.

To manage these challenges, the respondents expressed a need to better structure the BMI process, to support the progressive learning which they saw as important foundation. Their currently tools used were often the traditional tools of strategy analysis, and not optimally designed for the BMI task. Several respondents also mentioned the Business Model Canvas as a tool that was often used, although without considerable support for moving the learning process

forward. In line with collective manifestation of challenges, a better tool would help support them in moving this process forward across BMI project boundaries; thus, supporting a more inclusive learning process with the aim of establishing more equal knowledge in the organization. Interestingly, although not a widespread practice, one respondents discussed the usefulness of being proactive in their BMI work by placeholding conceptual changes via a progressive transfer of new knowledge and ideas to future business owners.

Based on these challenges and tool discussions with respondents, this paper concluded with a theoretical discussion about the fundamentals of a suitable tool. From a wide reading involving several research literatures, the analysis eventually pointed toward a synthesis of two existing categories of tools: facilitated cognitive mapping, as developed in strategic management (e.g. Eden and Ackermann, 1998), and group model building, as developed in system dynamics (e.g. Andersen *et al.*, 1997). Although attempts to integrate these parallel research streams had previously been made (Eden *et al.*, 2009), these attempts not been made within the context of BMI. As a suggestion for such an integration, we proposed a synthesized category termed 'model-based facilitation', which for BMI would inherit the overarching aim from strategic management, of facilitating a subjective negotiation (as opposed to an objective accuracy), while at the same time inheriting from system dynamics, the aim and maintenance of a systemic (as opposed to hierarchical) model.

Paper IV

Visual Business Modeling for Conceptual Change

With the fourth appended paper, a deeper theoretical analysis was made concerning the visual design of a BMI tool that would address the conceptual challenges presented in Paper II and Paper III. This analysis took as its departure the general lack of specify between the visual design of business models and their conditional application that had been found in the BMI literature (Massa and Hacklin, 2021). To address that gap, the analysis also started with the recognition that business modeling, like many other activities in firms (Simon, 1976), has both a substantive and a procedural goal, and that to be effective in addressing the conceptual challenges of established firm, tool design needs to consider both goals. Thus, in defining the effectiveness of business models as visual representations, a context-sensitive answer to the following questioned is first needed: "What is to be represented of a business,

in what business model design, to accomplish what modeling goal(s)?" (p. 2) In the context of established firms, and for the purposes of defining the effectiveness of tools within in this context, these goals translate to developing a new business model and transitioning away from an existing business model. From these conjectures, the analysis proceeded with a closer look at the cognitive science of visual representation, followed by an interpretation of its consequences to the effective visualization of business models in established firms. As a guide for future research, several design-oriented propositions were developed. The paper concluded with an illustrative suggestion of a tool that would be in line with these propositions; a version of model-based facilitation, as suggested in Paper III, extended with an activity-system-based visual design termed 'Activity-Value-Cost (AVC) notation'.

From cognitive science research on visual representation, several important insights were transferred to BMI research. From the former literature, we know that internal and external models, in the form or mental models and visual models, can form a special kind of representational system in what is generally referred to as 'augmented cognition' (Hegarty, 2011). In other words, there appears to emerge a kind of internal-external coupling between these different kinds of models. Moreover, external visual models not only support internal cognitive processes with mental models, but also alter them in important ways, by causing different cognitive behavior (Zhang and Norman, 1994). These effects stem from the inherent features of visualizations as representations: in their intrinsic selectivity and goal-orientation (Barsalou, 1992).

In line with early research by Larkin and Simon (1987), visual models contribute with a kind of selective 'computational offloading' to overall cognition, supporting internal higher-level cognitive processes via the engagement of the visual system (Hegarty, 2011). In doing so, visual modeling reduces the load on working memory, and improve both the ability and speed of making inferences (Kotovsky, Hayes, and Simon, 1985; Bauer and Johnson-Laird, 1993), as well as support a relative increase of complexity that can be handled (Simon and Larkin, 1987). More specifically, this happens through an active manipulation of models, in what is referred to as 'cognitive tracing', and via a perceptive recognition of visual patterns in models, so-called 'emergent features' (Scaife and Rogers, 1996). From empirical studies, it has been shown that visual models thus not only act as external storage of internal knowledge, in this way, but that visual modeling, via a manipulation of selective visual content, also shape internal cognitive processes (Zhang and Norman, 1994; Zhang, 1997). Importantly, these effects also suggest support for visual representation as conducive of conceptual change (Cheng, 1999; 2011), and

specifically, the kind of model-based reasoning for conceptual change described by Nersessian (2010). Nevertheless, this line of research has also suggested how effectiveness is improved by basing visual designs on relevant prior knowledge.

In line with these insights, to develop a set of propositions as design principles, a framework consisting of three factors were established: ease of production (Scaife and Rogers, 1996), plastic generativity, and semantic transparency (Cheng, 2011). Via a theoretical analysis, these factors were fulfilled respectively by proposing the activity-based view as a familiar design platform; by seeking creativity via emergent features from a managed increase in complexity; and, by planning for an inclusive approach to the modeling process, with creative negotiation as a proactive use of complexity.

In sum, the following general conclusions were reached. First, there is no universality to be found in the effective design of business models as visual representations. Before consider what tool to use or design, the goal(s) or modeling must be defined. Second, there are no tools that can be applied to difficult problems (such as those presented in these appended papers) that will make solving them easy. To succeed, hard work, courage, and persistence is likely to be needed. Third, it is not enough to acquire or establish an effective design. In the end, any tool design is only as good as the skills and knowledge contributed by its users. Nevertheless, considering first the goal(s) of modeling and the consequences that follow for design should help.

Contributions

In this chapter, I return to the research questions of this thesis and review and synthesize the contributions that have been made to answering it. These contributions will then be the basis for the discussion of implications for current and future research, presented in the next chapter.

Purpose and research questions revisited

As a guide for the research presented in this thesis, the following subdivided research question was posed:

How can managers in established firms succeed with BMI?

a. Why is BMI in established firms difficult?

b. What tools can effectively support managers in these difficulties?

From the findings summarized in the previous chapter, in conjunction with the theoretical background of this thesis, in this section I review and synthesize what contributions have been made to answering this question. In doing so, I start with its first component (*RQa*), of the challenges of BMI in established firms, and then move on to its second component (*RQb*), of how these challenges can be appropriately addressed in a tool design.

Why is BMI in established firms difficult?

Starting with the question of what makes BMI in established firms difficult, several findings affirm the validity of interpreting BMI as a process of conceptual change. This interpretation first entered the theoretical domain of this thesis from the empirical analysis conducted for Paper II. From iterating back-and-forth between the transcribed interviews and a broad reading of related (and unrelated) theory, the qualitative coding process conducted in developing this paper co-developed with the idea that the models the

respondents constructed in their reasoning about future business could be considered as business models. From this insight, inspired by Nersessian's (2010) theory on model-based reasoning for discontinuous conceptual change in science, closer attention was subsequently paid to the componential role of concepts and their role in both maintaining and bridging the discontinuities found here in the form of conceptual incommensurability. The theoretical frameworks that these insights opened to, in both previous management and cognitive science research, then led to the recognition of three main contributions to the question of what makes BMI in established firms difficult. In expanding the empirical scope with Paper III, by enquiring into the challenges faced by managers actively engaged in BMI at several different firms, and from deepening the theoretical analysis in Paper IV, these contributions were further strengthened and, in some regards, extended. Overall, as summarized in Table 4, several new concepts were introduced into research on business models and BMI.

Table 4 – Concepts contributed to research on business models and BMI

Term	Paper	Meaning
Model-based reasoning	II	Reasoning with internal and/or external models of business to enquire into hypothetical alternatives stemming from constraints introduced via conceptual combination.
Conceptual placeholders	II	Business-related terms that stand for conceptual changes that are not yet fully known.
Conceptual constraints	II	Constraints that emerge as business-related concepts are combined.
Conceptual resources	II	Concepts that can be combined to elicit new business alternatives.
Conceptual incommensurability	II	Perceptual limits of how concepts can be combined.
BMI project boundaries	III	The cognitive separation between individuals who are actively engaged in the BMI process and those individuals who are more passively engaged but nevertheless critical to its development and/or continuation.
Model-based facilitation	III	Collective model-based reasoning with a facilitator and business models as causal maps.
AVC notation	IV	Activities, values, and costs as the basic building blocks of business models as activity-system causal maps.

The first of the contributions to *RQa* is the consideration of *model-based reasoning* as a mediating yet challenging factor. As presented in the theoretical background of this thesis, real-world business is often complex in that it involves dynamic and interdependent structures stretching across technologies,

markets, and government regulations; complex structures that to some degree need to be reflected in the business models that are taken to represent real-world business. It is perhaps not a surprise that managers, in thinking and reasoning about such structures, need to construct and manipulate models. Yet, previous research on business models has largely been silent on this process and its consequences for the success or failure of BMI initiatives in established firms. Rather than assume a naturalist approach to business models and study them as they appear in a situated context, in much of previous research, a normative approach has instead been employed. In this approach, much previous research has primarily aimed at developing formal frameworks for how business models should be constructed, with a neglect of how business models are constructed, informally. Consequently, a detailed look at the challenges involved in this construction has been neglected. With Paper II, an important step was taken in the direction of both empirically and theoretically developing our understanding of the foundational role that business models play in reasoning about future business.

A second contribution to *RQa* is the role that concepts play in the process of model-based reasoning. With inspiration from Nersessian's (2010) rich naturalist description of model-based reasoning in science, it has become clear how concepts—in previous research often described as the basic building blocks of business models—can be taken to represent the trajectory that is the BMI process, with both its potential and challenges included. As the seeds of new business, *conceptual placeholders*, in the form of terms like 'digitalization', 'sustainability', and 'smart load carriers', superficially suggest a goal of the BMI process before it has begun, with all its deeper conceptual changes still unknown. And, as a source of the *conceptual constraints* that both restrict and direct the reasoning process, concepts also suggest the locus where a substantial and critical part of the innovative work must be done. Finally, concepts also suggest the strategic value of having gone through this extended and difficult work, in constituting the intangible *conceptual resources* that underlie new and different theories about the affordances of more tangible and non-conceptual resources such as new technologies.

A third and final contribution to *RQa* is the *conceptual incommensurability* between existing and new business models that can appear in model-based reasoning. While this incommensurability is primarily found at the individual level, in reasoning with conceptual constraints in models, it can nevertheless also manifest at the collective level, with critical consequences for the implementation of newly formulated business models. These collective manifestations, although primarily the focus of Paper III, were also noted in

the analysis for Paper II, as exemplified by the following quote (not included in Paper II):

> "Very often [new digital technology] is met, and has been met, internally, with the question 'how much is it?' rather than what it can achieve or what we want to do with it. That has been a great challenge." (Business developer, Paper II)

In Paper III, the empirical sampling focused intently on managers actively engaged with developing new business models. Although working at firms of different size and in different industries, their experiences from working with BMI were remarkably similar. From a parallel coding of the interviews with my co-author, Kajsa Ahlgren Ode, we found that our respondents had often struggled with knowledge differences in their communication with managers who were more passively engaged in the BMI work, and therefore, to some extent, outside of this process on a cognitive level. Nevertheless, this latter group of managers were often critically involved in the implementation of new business models, as future business owners or as decision makers with authority over resource allocation and the continuance of BMI initiates. To capture this gap theoretically, we introduced the term *BMI project boundaries*. Interestingly, to bridge this gap, one respondent made the point that their work continuously needed to placehold new knowledge with, as in their case, future business owners; suggesting an important role for conceptual placeholders on the collective level as well on the individual level.

What tools can effectively support managers in these difficulties?

Turning to *RQb*, more than revealing the difficulties of BMI in established firms, the findings in Paper II also contributed with a theoretical basis for the possibility of successful BMI in established firms. By identifying business models as internal cognitive constructs in model-based reasoning, their theoretical role in accomplishing discontinuous change was simultaneously revealed. In model-based reasoning, business models both constrain and mediate BMI via their conceptual building blocks. From a modern cognitive science perspective, concepts encode both knowledge and prior experience, allowing these to be simulated in models that can combine multiple concepts in new and innovative ways. Mental modeling can thus be viewed as a process that continuously simulates new knowledge and experience: simulations that has their basis in past knowledge and events, yet ultimately serves the mind as predictions of the future. As discussed in Paper II, leaning on neurological imaging and computational modeling, these theoretical ideas, which build on

Bayes' theorem (Clark, 2013), have recently been suggested to be part of a paradigm shift in how human cognition is conceived (Hutchinson and Barrett, 2019). Importantly, these theoretical ideas, which have not, to my knowledge, been discussed within the domain of BMI research, suggest theoretical explanations for both the path-dependent learning—at the individual *and* collective level—that is evident in previous research of innovation at established firms, as well as the generative mechanisms of reasoning and innovative thinking that is needed to overcome such path-dependency (Clark, 2016). Together with Nersessian's description of model-based reasoning, these theoretical ideas constitute a significant contribution to research on business models, providing a rich theoretical foundation for the association of business models with processes of ideation, without, at the same time, neglecting its challenges.

Going back to Paper I, our review of existing tools led us to conclude that, although the tools found were limited in number, a large part has indeed focused on established firms. From our review, we also concluded that existing tools could be classified according to different BMI stages. In this classification, a majority appeared to target the design stage of the BMI process. Those tools that, nevertheless, targeted the test and implementation stages, did so by focusing on such things as stress testing, computer simulations, checklists, process maps, and performance metrics; suggesting that these two latter classes of tools assumed a separation between the formulation and implementation of business models. A possible explanation for this may be the predominant strategic focus that was found for existing tools on increasing the profitability of an existing business. As far as this explanation holds, our review of tools in Paper I thus also provides an indication that little effort has been placed on more fundamental BMI, where discontinuous business models blur the boundaries between formulation and implementation, as found in Paper III.

Raising concerns about their conditional applicability, from our review of tools in Paper I, we also concluded that many existing tools have not been designed from an empirical basis. Instead, whenever empirical data was used in conjunction with the reviewed tools, it was rather to test theoretically derived tools. In addition, we also found a substantial inheritance of tools from strategy; a finding that later recurred in the responses from respondents in Paper III. As discussed in that paper and elsewhere (e.g. Gibe and Kalling, 2019; Bigelow and Barney, 2020), strategies and business models are, without doubt, related constructs. Yet, they also differ in important aspects. From discussing these differences, and in conjunction with our empirical findings,

in Paper III, we identified two parallel lines of tool research as relevant—collective cognitive mapping and group model building—and discussed a synthesized version of these with the term *model-based facilitation*. From strategic management, we identified the facilitated cognitive mapping tool developed by Eden and Ackermann (1998; 2011) as usefully addressing the collective challenges that we had found in our interviews with managers. Yet, to more appropriately fit with the systemic character of business models, we also discussed how group model building, as developed in system dynamics (e.g. Andersen *et al.*, 1997), also needs to be considered as an important source of systems-related design insights.

Finally, in Paper IV, based on the empirical insights gathered from Paper II and Paper III, the interdependent challenges and possibilities of modeling were turned into a more practical, yet theory-driven, analysis on the design of business models through visualization. The analysis of this paper attended more closely to business modeling in established firms as a representational problem, and suggested that business model tools for BMI from this perspective should be designed based on both a substantive and a procedural goal. At first glance, accomplishing both these goals may appear to be a daunting task. However, leaning on cognitive science research and the idea that this work can be supported by simultaneous engagement of both internal and external models suggests theoretical reasons to be more optimistic. From contextualizing this cognitive science research in research on BMI, several design-oriented propositions along with a simple visual notation based on an activity-system view on business models, the *AVC notation,* were contributed to research on business models and BMI.

In sum, several contributions were made to answering both *RQa* and *RQb*, as well as to establish how answers to these individual questions overlap to suggest how managers in established firms can succeed with BMI. In the next section, I will discuss how these contributions relate more broadly to previous research that, in both similar and dissimilar ways, has preceded my own research, and how this, from an overall perspective, points toward a shift in focus for future research on BMI and business model tools.

Discussion

In this chapter, I move on to discuss more broadly what implications the contributions of this thesis have for current and future research on business models in established firms, as well as for the design of tools for BMI in this context. In the final section of this chapter, I also discuss the limitations of this thesis along with opportunities for future research.

Shifting the focus from ontology to epistemology

From Baden-Fuller and Morgan's (2010) suggestion to view business models as models, in conjunction with the interpretation of BMI as process of conceptual change, it is a short step to also acknowledging business models as part of representational systems. As discussed in Paper IV, all models gain their representing qualities from mirroring a select set of information in their represented targets. In this view, representation is formally a system consisting of two domains—a model domain and a target domain—related via a finite set of information that corresponds equally to a subset of the information contained in both domains. From this it follows that the model and target domains are, with the exclusion of a limited set of information, different in their informational content; and, that the practices of modeling, that is, of constructing and manipulating models, is intrinsically selective and goal-oriented (Palmer, 1978; Barsalou, 1992). These ideas carry important implications for how modeling both is and should be practiced, suggesting that, to be effective, modeling must start with a clear answer to the following question: *"What is to be represented of a business, in what business model design, to accomplish what modeling goal(s)?"* (Paper IV, p. 2)

Business modeling as a representational problem

In Paper IV, the modeling goals for BMI in established firms were respectively framed as the substantive and procedural goals of developing a new business

model and transitioning away from an existing business model. When this procedural goal implies fundamental change to the conceptual components of the existing business model, a transitioning on the level of the innovation process, from a mode of continuous to a mode of discontinuous innovation, is furthermore required. With these goals in mind, in continuation of the discussion presented in Paper IV, it is possible to draw a two-by-two topology depicting business modeling as a representational problem. See Fig. 2 below.

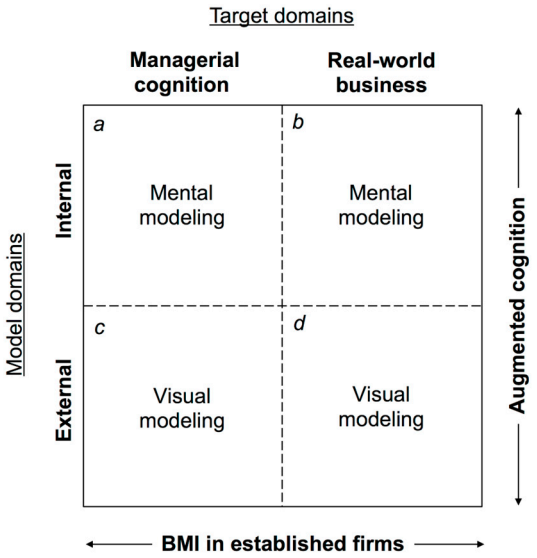


Figure 2 – A typology of business modeling as a representational problem

As can be seen in the figure, this topology distinguishes between two types of model domains associated with business modeling in established firms. These refer to business models as mental models (boxes *a* and *b* in Fig. 2) as well as to business models as visual models (*c* and *d*). The dashed line between these two types of model domains indicate the internal-external coupling that occurs with augmented cognition. In addition to these two model domains, business modeling in established firms potentially also involve two types of target domains. These are, one the one hand, the real-world business of new or existing business models (*b* and *d*), and on the other hand, managers' cognitive representations of such real-world businesses (*a* and *c*). Although the horizontal dimension across the two target domains are both mental modeling

(*a* and *b*) and visual modeling (*c* and *d*), respectively, these are distinguished in that the left-hand side (*a* and *c*) essentially refers to meta-cognitive modeling, whereas the right-hand side (*b* and *d*) does not.

To be appropriately representative in relation to the two (substantive and procedural) goals of BMI in established firm, business models may or may not include both model domains (that is, modeling can theoretically be restricted to the internal model domain, as illustrated in Paper II), yet may be required to include information which purposefully relates to both target domains. This latter requirement becomes especially important when a transitioning from continuous into discontinuous innovation is needed to proceed; where business models hence will need to represent concepts that simultaneously relate to the domain of real-world business as well as the domain of managers' cognitive representations of such.

Overall, the topology above suggests a broadening of the scope of what changes conceptually in the BMI process, from a single focus on business models as representing real-world business to a dual focus that also include business models as representing managers' cognitive representations; blurring the boundaries between the three different interpretations of business models discussed in previous research (Massa *et al.*, 2017). From the interpretation of BMI as a process of conceptual change, the primary focus in conceptualizing business models as theoretical constructs for research thus effectively shifts from inventorying their real-world business components, to recursively focusing on their mediating role in managers' conceptualizing of business: a shift from ontology to epistemology. Simply put, whereas an ontological focus remains concentrated on the right-hand column of Fig. 2, an epistemological focus instead emphasizes the importance of both columns. In the next section, the larger implications of this will be discussed by broadening the scope to include the organizational level.

Business models as sources of intra-organizational tensions

From an epistemological point of view, business models relate broadly with previous research on problem representation, learning, decision-making, and change in organizations. As presented in the background chapter of this thesis, the ideas of Normann (1975) lend an interesting background on BMI as studied in this thesis. Normann, in turn, drew inspiration from several other central texts in management research, among which the pioneering work of Penrose stands out as a particularly useful reference point for discussion of the contributions of this thesis as they relate to organization.

In her treatise, *The Theory of the Growth of Firms*, Penrose (1959) portrayed the firm as collection of resources that in combination enable a set of 'productive services' to create and capture a 'productive opportunity'. According to Penrose, entrepreneurs hold an 'image' in their mind of their environment as well as the application of their firm's resources in that environment. Far from being an objective fact, Penrose said, this image is based on the subjective knowledge and experience of entrepreneurs and thus implies a uniqueness to the productive services and productive opportunity of each firm. In Penrose's view, whereas objective knowledge represents the broadly recognized 'state of the arts' and is easily and formally transmissible between individuals, subjective knowledge is instead based on experience that "itself can never be transmitted; it produces a change—frequently a subtle change—in individuals and cannot be separated from them" (p. 48).

Over time, Penrose also suggested, pursuing a single productive opportunity tends to result in a 'single-mindedness' in firms, that stems from its 'inherited' resources and "an appropriate form of organization inherited from the past and operated by people, also inherited from the past, who share a common tradition, who are accustomed to the organization and to each other, and who thus form an entity which works with sufficient consistency and efficiency in broad areas to make unnecessary having any one individual comprehend and direct its detailed working" (p. 16). Nevertheless, subjective perception of existing resources also means that there are unused productive services in any firm. Thus, the idea that each firm perceives the potential services from its resources heterogeneously is, according to Penrose, at the same time the basis of its competitive advantage, limitations to its growth, as well as its innovation potential. Penrose discussed these resources of the firm as either physical or human, and suggested that these two resource classes were critically linked via the knowledge and experience of the latter.

Although Penrose did not explicitly frame her analysis in terms of conceptual change, it is easy to see a place in her work for the conceptual resources discussed in this thesis. From a Penrosian point of view, as part of the human resources of firms, conceptual resources can thus be seen to enable a kind of perceptual services that, in turn, contribute to the heterogeneous productive services from the firm's both physical and human resources. Moreover, as the cognitive constructions of such conceptual resources, the mental business models discussed in this thesis can readily be viewed as the images that entrepreneurs form in their mind (of their environments, resources, services, and productive opportunities).

More recently, research focusing more directly on BMI in established firms has examined the organizational dimension of business models and the consequences of this view for organizational structure and decision-making (Foss and Saebi, 2015). Tied to this view is the basic question of what level in organizations that business models can be expected to be found. While some have distinguished between business models at the level of the corporation and at the level of business units (Casadesus-Masanell *et al.*, 2015), a general presumption has nevertheless been that business models reside at the higher levels of organizational structure (Foss and Saebi, 2015). And, while some of this research has focused on business models as a basis for organizational design, other research has concentrated more critically on the antecedent and moderating roles that organization plays in BMI processes (Foss and Saebi, 2015). In relation to these two latter foci, it has in addition been suggested that BMI depends on the existence or development of dynamic capabilities (Leih *et al.*, 2015; Teece, 2018).

Dynamic capabilities have been defined as the capability to sense or shape new opportunities; to seize these opportunities via business modeling and investments; and then, to transform the organization accordingly (Teece, 2013). These capabilities have been suggested to span across the entire firm as organizational learning but also reserves a special role for top management whose leadership is required to sustain these dynamic capabilities (Leih *et al.*, 2015). In its most basic form, as described by Teece (2013), the dynamic capabilities framework advocates a decentralized organizational form for its sensing component, with "information rolling up to top management" (p. 52) from lower-level entrepreneurial managers who scan, learn, create, and engage in the interpretive activities needed to establish "informed conjectures" (p. 11) about new business opportunities. While the aim of this organizational strategy is to establish a continuous firm-level responsiveness to exogenous changes in markets and technologies, Teece (2013) also suggest that it can contribute to intra-organizational tensions due to its bearing on knowledge integration, which, in turn, may require "a collaborative non-hierarchical management style assisted by establishing councils and other integration forums" (p. 39).

Although Teece (2013) suggests that sensing new opportunities will require different managerial competences as compared to seizing them, he nevertheless suggests that developing business models (as part of seizing) is also a creative practice that, similar to the sensing of opportunities, often requires "informed guesses" based on tacit knowledge about "customer and competitor behavior, as well as the behavior of costs" (pp. 25-26). Still, this

practice, Teece (2018) suggests, in contrast to those related to sensing, are generally part of the domain of top managers.

Similarly, but with a more discerning view on what I have referred to as discontinuous change in this thesis, Foss and Sieglitz (2015) emphasize the critical role of top management's leadership in their case study of architectural and radical BMI at LEGO. In the face of its inherent uncertainty, this kind of process, they say, requires an active "entrepreneurial judgement by the top management team" (p. 119), in contrast to more modular and/or incremental BMI, which may suffice with top management's monitoring, sponsoring, or moderating of activities.

On the other hand, previous research has also suggested that more discontinuous BMI is likely to require separate organizational units to mitigate the organizational tensions created between the new and existing businesses; and, that a balanced participation of top management—weighing the experimental freedom of new business units with the sense of ownership that will ultimately be required from top managers—is often needed to be successful in this organizational restructuring (Sund *et al.*, 2016; Sund *et al*., 2021). However, previous research has also indicated how such organizational divisions, improperly managed, nevertheless risk exacerbating organizational tensions by, for example, creating a structural basis for the development of perceptual differences (Egfjord and Sund, 2020).

Arguably, as problem representations of high-level organizational goals, business models fall naturally into the domain of high-level decision-makers like top management teams. Yet, as found Paper III and in line with previous research, this relation is not always adhered to, with the result of intra-organizational tensions being created in the BMI process. Penrose's (1959) analysis also suggests some important clarifications to these intra-organizational tensions. Most relevant is her disaggregation of productive services into managerial and entrepreneurial services. Penrose defined entrepreneurs in terms of the entrepreneurial services they provided, meaning "those contributions to the operations of a firm which relate to the introduction and acceptance on behalf of the firm of new ideas, particularly with respect to products, location, and significant changes in technology, to the acquisition of new managerial personnel, to fundamental changes in the administrative organization of the firm, to the raising of capital, and to the making of plans for expansion, including the choice of method of expansion" (pp. 28-29). Managerial services, in contrast, "relate to execution of entrepreneurial ideas and proposals and to the supervision of existing operations" (pp. 28-29). In

Penrose's view, these two services are "more often than not" (p. 29) performed by the same individuals.

Similar to Normann, Penrose also made clear that any analysis of change in firms must look to their "organization as a whole" (p. 6). However, this holistic perspective has not been a prominent feature of much previous management research. In a recent cross-sectional review of research relating organizational structure to information-processing and decision-making, Joseph and Gaba (2020) found a general neglect of intra-organizational tensions from information-based conflicts. Overall, the result of their review points to a fragmentation of previous research's foci on how information is, on the one hand, aggregated, and, on the other hand, constrained by organizational structure. In conjunction with not having sufficiently studied these two interdependent traits of information processing in organizations, Joseph and Gaba also point out that previous research focusing on problem-skill matching, screening of ideas, and adaptation have not been very explicit about the role that cognitive representations, interpretation, and ambiguity of information play in identifying and solving problems in individual yet collectively situated processes.

From conceiving business models in the way discussed in this thesis, the phenomenon presented in Paper III can be critically reframed as a delegation of high-level decision-makers' problem representations to lower-level business developers. As both Penrose and Normann discuss, from an epistemological point of view, information, in the shape of knowledge and tacit experience, is generally not easily transmissible. In the terms presented here, an underestimation of this fact is likely to result in a mismatch between new and innovative problem representations (business models) and structural authority (decision makers). This also pin-points the blurred boundaries that exist between knowledge, problem-formulations, and skills. In model-based reasoning, mental models and concepts are not simply repositories of (old or new) knowledge, but active components in thinking about and interpreting both problems and their solutions. Thus, when business modeling is delegated to lower-level business developers, what is delegated is not simply information processing for new knowledge, but also information processing for new problem representations, as well as for new skills. The intra-organizational tensions that then may arise as new business models are communicated upward for screening can therefore be said to not only arise from conflicts of information (as knowledge), but more critically, from conflicts in problem representation and cognitive skills; stemming from what, in effect, in many cases has been a delegation of higher-level managers own specialization.

Framed in Penrose's terminology, the findings in Paper III suggests that business modeling, as an entrepreneurial service, is often not performed by the same individuals that performed (and would perform) the associated managerial services relating to both the execution of existing operations and entrepreneurial ideas. Indeed, it was this divergence that led the entrepreneurial business developers in our interviews to express their frustration over the knowledge gap that their work had contributed to in their organizations. Taking entrepreneurial and managerial services to stem from the heterogeneous conceptual resources of their respective individuals, from a Penrosian point of view, we can now see more clearly from where this frustration stems.

Toward more semi-structured and inclusive designs of tools

The shift from an ontological to an epistemological view on business models suggests two broad implications for the design of business model tools. See Table 5 for an overview.

Table 5 – Implications for tool design: ontological versus epistemological approaches

	Ontological	**Epistemological**
Formalization	*Structured:* Standardized categories as guides for concepts to include in descriptions of existing and new business models.	*Semi-structured:* Causal maps constructed with situated concepts as reflections of existing or new thinking about business.
Representativeness	*Exclusive:* Only concepts that fit within the standardized categories arranged by external experts are valid.	*Inclusive:* All concepts that are perceived by stakeholders as related to the modeled business are valid.

First, the epistemological shift implies a shift in the *formalization* of business models. Returning to the example of Osterwalder (2004), the overarching aim of his ontological approach was to produce a *structured* formalization of business models. Here the goal was to enable a standardized description of an existing or new business model, for sharing and analysis, and potentially, for simulation in software-based implementations. From the analyses in the appended papers and in this thesis, we can now see how some of the inherent limitations of this approach. Specifically, in its formal definition of the components of business models, the ontological view externalizes the situated transitioning that may be necessary in many established firms. To be clear, this is not a fault in tools such the Business Model Canvas, which follow an

ontological approach, but an argument for a consideration of alternatives, as applicable to the different goal(s) of business modeling tied to different contexts. In a recent interview, Osterwalder addresses this critical point with an analogy of the multiple tools a surgeon needs to perform different kinds of surgeries. Osterwalder continues, "[The Business Model Canvas] never pretended to do everything", "Let's not reinvent tools that work; let's make new tools where there are none" (Osterwalder and Euchner, 2019, p. 15). Indeed, from a more popular scientific point of view, in the recently published book *The Invincible Company* (Osterwalder *et al.*, 2020), Osterwalder and colleagues also discuss some of the challenges of established firms that have been explored in this thesis.

Nevertheless, by directing the formalization of business models in a structured way, toward, for example, their implementation in software-based tools for computer simulations, the ontological view risks neglecting the function of the human mind to be creative and innovative on its own, through mental simulation (Nersessian, 2010). Although distinct from the research presented in this thesis, research on business models has recently started to consider the cognitive role that business models can play in managers' reasoning in relation to dominant logics (Schneckenberg *et al.*, 2019). And, mental simulation is a process that has previously been pointed to as critical to the identification of opportunities in entrepreneurship (Gaglio, 2004), strategic theorizing (Felin and Zenger, 2009); as a way to think counterfactually and develop path-breaking new perceptions of resource affordances. Thus, rather than concentrate on business models as formal conceptual representations (cf. Massa *et al.*, 2017), as is often the case with ontological approaches, the epistemological view instead sees business models as more informally and cognitively situated. This, of course, does not prohibit any structure in the design of tools. Contrarily, as discussed in Paper IV, there are good reasons to purposefully structure business models even as tools for situated conceptual change (taking into consideration, for example, their ease of production, plastic generativity, and semantic transparency). What is needed, however, is a more *semi-structured* approach: that replaces standardization with the aim of more fully supporting the range of changes involved in BMI at established firms (see Fig. 2). The AVC notation presented in Paper IV supports this aim. Examples of other tools, that are closer in line with this approach, include those previously proposed by Gassmann *et al.* (2014) and Furnari (2015).

Hence, intimately related to their formalization, the epistemological shift also implies a shift in the designed *representativeness* of business models. Rather than structure business model tools based on academic preconceptions, the

epistemological view instead points to concerns related to the preconceptions of managers. Critically, it is managers' concepts that must be used in the construction and manipulation of business models. Moreover, in line with the discussion above, it is clear that the conceptual changes that occur at the individual level can have important consequences at the collective level. These consequences, in turn, suggest that business modeling for conceptual change in established firms, is likely to benefit from a more *inclusive* approach, where representativeness comes not only from a semi-structured formalization of business models to include individual managers' own concepts, but also from involving individuals whose cognitive representations influence the development and/or continuation of the BMI process in a longer perspective. Although an ontological approach does not preclude inclusive business modeling, using for example, the Business Model Canvas—on the contrary, a part of its appeal is its enabling of collective work—it is nevertheless inherently exclusive in its guidance of what kinds of concepts to include. Overall, the representativeness suggested in this thesis, as indicated in Paper III and IV, suggests that the design of business model tools need to account for the inter-subjectivity that is an important factor/component of creative work in organizations, as previously argued by Eden and colleagues who have also provided extensive practical guidance to this end (e.g. Eden *et al.* 1981; Eden and Ackermann, 1997; Ackermann and Eden, 2011).

These concerns, of formalization and representativeness, are, of course, not limited to Osterwalder's (2004) explicitly developed business model ontology. The Business Model Canvas tool, which has been developed on the basis of an ontological view on business modeling, has continued to show its influence throughout the research conducted for this thesis: in previous (Täuscher and Abdelkafi, 2017) as well as our own review of the research literature (Paper I) and, in our interviews with practicing managers (Paper III). Yet, as our findings in Paper I indicate, there are other tools developed in academia that similarly stem from the same objective and theoretically driven approach as that in Osterwalder (2004); tools which have not taken sufficient empirical consideration of the situated challenges that managers often face in established firms. As result, there has been a bias in previously developed tools toward the formulation of new business models, without sufficient consideration of their implementation.

Limitations and opportunities for future research

With these contributions and implications, important steps have been taken to close some of the gaps in the BMI literature that have previously been identified (Foss and Saebi, 2017a). From my detailing of the interpretation of BMI as a process of conceptual change, as well as from pointing out its two transitional goals, this research presented in this thesis signifies important contributions to its definition and dimensionalization; and, through this detailing, I have also identified some important moderating variables of BMI as a process, such as model-based reasoning and concepts, indicating in addition how these bridge the micro-foundational individual and firm levels via cognition.

Nevertheless, despite its merits, the reach of the research presented in this thesis is limited in several respects. As much as a broad scope of multidisciplinary theory has been incorporated to build its main arguments, the research would benefit from further empirical sampling. Perhaps more appropriately considered as 'early theorizing' (Swedberg, 2014), this research would, like abductively based research in general (Alvesson and Sköldberg, 2018), gain from more rigorously designed and justification-focused follow-ups. Such research could, for example, test conceptual discontinuity more explicitly, by longitudinally recording and comparing managers' initial and outcome conceptual systems (Carey, 2009), as exemplified by Smith (2007) in her study of discontinuous conceptual change in the classroom. As has been pointed out also in previous management research, discontinuities can in fact only be verified in hindsight (Dosi, 1982; Anderson and Tushman, 1990; Kaplan *et al.*, 2003). In relation to this, opportunity also awaits future researchers wanting to test different formalizations of business models as tool, to establish empirically how exactly such designs differentially can be used to effectively address the representative problem(s) in individual and collective conceptual change.

Concluding remarks

Through a cognitive-level and managerial-centric analysis, this thesis has examined both the challenges and possibilities of business modeling in established firms. Terms like digitalization, sustainability, and business model have become common in both academic and popular language. Some have and would perhaps continue to dismiss these terms as superficial 'buzz words'. However, notwithstanding their superficiality, terms like these stand for changes that reach into the fundamental structures of how business *and* management research, with their respective real-world consequences, are both carried out and represented. With the research conducted for this thesis, I have sought to unpack the managerial journey, in established firms, that connects the superficiality of terms like digitalization and sustainability to their deeper meaning. From interpreting BMI as a process of conceptual change, new perspectives have been gained that, not least for me personally, have provided valuable and interesting insights. My hope with this thesis, is that others will share these insights. More research is needed to establish the ideas presented in this thesis on firmer ground, and if I have inspired such research, then my efforts have been worthwhile.

References

Abernathy W. J., & Clark, K.B. (1985) Innovation: Mapping the winds of creative destruction. *Research Policy,* 14(1): 3-22.

Ackermann, F., & Eden. C. (2011) *Making strategy: The journey of strategic management (2nd ed.).* London: Sage.

Alvesson, M, & Sandberg, J (2013) *Constructing research questions: Doing Interesting Research.* London, UK: Sage.

Alvesson, M., & Willmott, H. (2012) *Making sense of management: A critical introduction (2nd ed.).* London, UK: Sage.

Alvesson, M., & Sköldberg, K. (2018) *Reflexive methodology: New vistas for qualitative research.* Thousand Oaks, CA: Sage.

Amin, T. G., & Levrini, O. (Eds.). (2018). *Converging perspectives on conceptual change: Mapping an emerging paradigm in the learning sciences.* London: Routledge.

Andersen, D. F., Richardson, G. P., & Vennix, J. A. (1997) Group model building: adding more science to the craft. *System Dynamics Review: The Journal of the System Dynamics Society,* 13(2): 187-201.

Andersen, H., Barker, P., Chen, X. (2006) *The cognitive structure of scientific revolutions.* Cambridge University Press.

Argyris, C., Schön, D. A. (1974) *Theory in practice: Increasing professional effectiveness.* San Fransisco, CA: Jossey-bass.

Arthur, W. B. (2009) *The nature of technology: What it is and how it evolves.* New York, NY: The Free Press.

Aspara, J., Lamberg, J. A., Laukia, A., & Tikkanen, H. (2013). Corporate business model transformation and inter-organizational cognition: The case of Nokia. *Long Range Planning,* 46(6): 459-474.

Axelrod, R. (1976) *Structure of decision: The cognitive maps of political elites.* Princeton, N.J: Princeton University Press.

Baden-Fuller, C., & Morgan, M.S. (2010) Business models as models. *Long Range Planning,* 43(2–3): 156–171.

Barr, P. S., Stimpert, J. L., & Huff, A. S. (1992) Cognitive change, strategic action, and organizational renewal. *Strategic management journal,* 13(S1): 15-36.

Barsalou, L. W. (1987) The instability of graded structure: Implications for the nature of concepts. In U. Neisser (Ed.), *Concepts and Conceptual Development: Ecological and Intellectual Factors in Categorization*. Cambridge: Cambridge University Press.

Barsalou, L. W. (1992) *Cognitive psychology: An overview for cognitive scientists.* New York: Psychology Press.

Barsalou, L. W. (2009) Simulation, situated conceptualization, and prediction. *Philosophical Transactions of the Royal Society B: Biological Sciences,* 364(1521): 1281-1289.

Bauer, M. I., & Johnson-Laird, P. N. (1993) How diagrams can improve reasoning. *Psychological science,* 4(6): 372-378.

Becker, H. S. (1998) *Tricks of the trade - How to think about your research while you're doing it.* Chicago, IL: University of Chicago Press

Berger, P. L., & Luckmann, T. (1966) *The social construction of reality: A treatise in the sociology of knowledge.* New York: Doubleday.

Bettis, R. A., & Prahalad, C. K. (1995) The dominant logic: Retrospective and extension. *Strategic Management Journal,* 16(1): 5-14.

Bigelow, L, & Barney, J. B. (2020) What can strategy learn from the business model approach? Journal of Management Studies, Forthcoming.

Blumer, H. (1969) *Symbolic Interactionism: Perspective and Method.* Berkeley, CA: University of California Press.

Bocken, N., Short, S., Rana, P. & Evans, S. (2013) A value mapping tool for sustainable business modeling, *Corporate Governance,* 13(5): 482-497.

Bower, G. H., & Morrow, D. G. (1990) Mental models in narrative comprehension. *Science,* 247: 44-48.

Bouwman, H., De Reuver, M., Heikkilä, M., & Fielt, E. (2020) Business model tooling: where research and practice meet. *Electronic Markets,* 30(3): 413-419.

Bryman, A., & Bell, E. (2015) Business research methods (4th ed.). Oxford: Oxford University Press.

Bryson, J. M., Ackermann, F., Eden, C., & Finn, C. B. (2004) *Visible thinking: Unlocking causal mapping for practical business results.* John Wiley & Sons.

Budler, M., Župič, I., & Trkman, P. (2021) The development of business model research: A bibliometric review. *Journal of Business Research,* 135: 480-495.

Carey, S. (2009) *The origin of concepts.* Oxford: Oxford University Press.

Cheng, P. C. H. (1999) Unlocking conceptual learning in mathematics and science with effective representational systems. *Computers & Education,* 33(2-3): 109-130.

Cheng, P. C. H. (2011) Probably good diagrams for learning: Representational epistemic recodification of probability theory. *Topics in Cognitive Science,* 3(3): 475-498.

Chesbrough, H. (2007) Business model innovation: it's not just about technology anymore, *Strategy & Leadership,* 35(6): 12-17.

Chesbrough, H., & Rosenbloom, R.S. (2002) The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change,* 11(3): 529-555.

Christensen, C. M. (1997) *The innovator's dilemma: when new technologies cause great firms to fail.* Cambridge, MA: Harvard Business School Press.

Christensen, C. M., & Rosenbloom, R. S. (1995) Explaining the attacker's advantage: Technological paradigms, organizational dynamics, and the value network. *Research policy,* 24(2): 233-257.

Clauss, T. 2016. Measuring business model innovation: conceptualization, scale development, and proof of performance. *R&D Management,* 47(3), 385-403.

Clark, A. (2013) Whatever next? Predictive brains, situated agents, and the future of cognitive science. *Behavioral and Brain Sciences,* 36(3): 181-204.

Clark, A. (2016) *Surfing uncertainty: Prediction, action, and the embodied mind*. Oxford, UK: Oxford University Press.

Clark, K. B. (1985) The interaction of design hierarchies and market concepts in technological evolution. *Research Policy,* 14(5): 235-251.

Cohen, W. M., Levinthal, D. A. (1990) Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly,* 35: 128-152.

Cosenz, F., & Noto, G. (2018) A dynamic business modeling approach to design and experiment new business venture strategies. *Long Range Planning,* 51(1): 127-140.

Craik, K. J. W. (1943) *The nature of explanation.* Macmillan University Press.

Czarniawska-Joerges, B. (1995) Narration or Science? Collapsing the Division in Organization Studies, *Organization,* 2(1): 11-33.

Davis, M. S. (1971) That's Interesting: Towards a Phenomenology of Sociology and a Sociology of Phenomenology. *Philosophy and Social Science,* 1(4): 309-344.

Denzin, N. K., & Lincoln, Y. S. (2005) Introduction: The Discipline and Practice of Qualitative Research. In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research* (pp. 1–32). Thousand Oaks, CA: Sage.

Dosi, G. (1982) Technological paradigms and technological trajectories: a suggested interpretation of the determinants and directions of technical change. *Research Policy,* 11(3):147-162.

Eden, C. (1988) Cognitive mapping. *European Journal of Operational Research,* 36(1): 1-13.

Eden, C., & Ackermann, F. (1998) Making strategy: The journey of strategic management. London: Sage.

Eden, C., Ackermann, F., Bryson, J. M., Richardson, G. P., Andersen, D. F., & Finn, C. B. (2009) Integrating modes of policy analysis and strategic management practice: Requisite elements and dilemmas. *Journal of the Operational Research Society,* 60(1): 2-13.

Eden, C., Jones, S., Sims, D., & Smithin, T. (1981) The intersubjectivity of issues and issues of intersubjectivity. *Journal of Management Studies,* 18(1): 37-47.

Egfjord, K. F.-H., & Sund, K. J. (2020) Do you see what I see? How differing perceptions of the environment can hinder radical business model innovation. *Technological Forecasting and Social Change*, 150,119787.

Felin, T., & Hesterly, W. S. (2007) The knowledge-based view, nested heterogeneity, and new value creation: Philosophical considerations on the locus of knowledge. *Academy of Management Review,* 32(1): 195-218.

Felin, T., & Zenger, T. R. (2009) Entrepreneurs as theorists: on the origins of collective beliefs and novel strategies. *Strategic Entrepreneurship Journal,* 3(2): 127-146.

Felin, T., & Zenger, T. R. (2017) The theory-based view: Economic actors as theorists. *Strategy Science,* 2(4): 258-271.

Foss, N.J., & Saebi, T. (2017a) Fifteen Years of Research on Business Model Innovation: How Far Have We Come, and Where Should We Go? *Journal of Management,* 43(1): 200–227.

Foss, N. J., & Saebi, T. (2017b) Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning,* 51(1), 9-21.

Foster, R., & Kaplan, S. (2001) *Creative Destruction: Why companies that are built to last underperform the market--And how to success fully transform them.* New York: Currency.

Gaglio, C. M. (2004) The role of mental simulations and counterfactual thinking in the opportunity identification process. *Entrepreneurship Theory and Practice,* 28(6): 533-552.

Gary. M. S., & Wood, R. E. (2011) Mental models, decision rules, and performance heterogeneity. *Strategic Management Journal,* 32(6): 569-594.

Gassmann, O., Frankenberger, K., & Csik, M. (2014) *The business model navigator: 55 models that will revolutionise your business.* Harlow, UK: Pearson.

Gentner, D. & Stevens, A.L. (Eds.) (1983) *Mental Models.* Hillsdale, NJ: Erlbaum.

Gopnik, A., & Meltzoff, A. N. (1997) *Words, thoughts, and theories*. Cambridge, MA: MIT Press.

Golden-Biddle, K., & Locke, K (2007) *Composing Qualitative Research (2nd ed.).* Thousand Oaks, CA: Sage.

Groesser, S. N., & Jovy, N. (2016) Business model analysis using computational modeling: A strategy tool for exploration and decision-making. *Journal of Management Control,* 27: 61-88.

Gruber, T. (1993) A translation approach to portable ontologies. *Knowledge Acquisition,* 5(2): 199-220.

Guarino, N., & Giaretta, P. (1995) Towards Very Large Knowledge Bases: Knowledge Building and Knowledge Sharing. In N. Mars. (Ed.) *Ontologies and Knowledge Bases: Towards a Terminological Clarification* (25-32) Amsterdam: IOS Press.

Hansen, N. R. (1958) *Patterns of discovery: an enquiry into the conceptual foundations of science.* Cambridge: Cambridge University Press.

Harring. N., Davies, P., & Lundholm, C. (2017) Learning economics and attitudes to market solutions to environmental problems. *Education Sciences,* 7(1): 36.

Havemo, E. (2018) A visual perspective on value creation: Exploring patterns in business model diagrams. *European Management Journal,* 36(4): 441-452.

Hegarty, M. 2011. The cognitive science of visual-spatial displays: Implica- tions for design. *Topics in Cognitive Science,* 3: 446–474.

Heikkilä, M., Bouwman, H., Heikkilä, J., Haaker, T., Lopez Nocolas, C. & Riedl, A. (2016) Business model innovation paths and tools. *29th Bled eConference.*

Hedberg, B., & Jönsson, S. (1977) Strategy formulation as a discontinuous process. *International Studies of Management & Organization*, 7(2): 88-109.

Henderson, R. M., Clark, K. B. (1990) Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly,* 35: 9-30.

Hohwy, J. (2013) *The predictive mind.* Oxford: Oxford University Press.

Holyoak, K. J., & Thagard, P. (1996) *Mental leaps: Analogy in creative thought.* Cambridge, MA: MIT Press.

Hutchinson, J. B., Barrett, L. F. (2019) The power of predictions: An emerging paradigm for psychological research. *Current Directions in Psychological Science,* 28(3): 280-291.

Johnson-Laird, P. N. (1983) *Mental models: Towards a cognitive science of language, inference, and consciousness*. Cambridge, MA: Harvard University Press.

Johnson-Laird, P. N. (2006) *How we reason.* Oxford, UK: Oxford University Press.

Joseph, J., & Gaba, V. (2020) Organizational structure, information processing, and decision-making: A retrospective and road map for research. *Academy of Management Annals,* 14(1): 267-302.

Hacking, I. (2000) *The Social Construction of What?* Cambridge, MA: Harvard University Press.

Hamel, G. (2000) *Leading the Revolution*. Cambridge, MA: Harvard Business School Press.

Huff, A. S. (1982) Industry influences on strategy reformulation. *Strategic Management Journal,* 3(2): 119-131.

Huff, A. S. (1999) *Writing for scholarly publication*. Thousand Oaks, CA: Sage.

Huff, A. S., Huff, J. O., & Barr, P. S. (2000) *When firms change direction.* Oxford, UK: Oxford University Press.

Gibe, J, & Kalling, T. (2019) *Business models and strategy.* Lund: Studentlitteratur.

Kaplan, R. S. & Norton, D. P. (1991) The balanced scorecard - measures that drive performance. *Harvard Business Review,* Jan-Feb: 71-79.

Kaplan, S. (2008) Framing contests: Strategy making under uncertainty, *Organization Science,* 19(5): 729-752.

Kaplan, S., Murray, F., & Henderson, R. (2003) Discontinuities and senior management: Assessing the role of recognition in pharmaceutical firm response to biotechnology. *Industrial and Corporate Change,* 12(2): 203-233.

Katz, J. H. (2020) The Cost of New Ideas: Idea Generators Become Less Satisfied. *Academy of Management Discoveries,* 6(4): 663-673.

Keil, F. C. (1992) *Concepts, kinds, and cognitive development.* Cambridge, MA: MIT Press.

Kitcher, P. (1988) The child as parent of the scientist. *Mind & Language,* 3(3), 217-228.

Kuhn, T. S. (1962/2012) *The structure of scientific revolutions (50th Anniversary Ed.).* Chicago, IL: University of Chicago Press

Kotovsky, K., Hayes, J. R., & Simon, H. A. (1985) Why are some problems hard? Evidence from Tower of Hanoi. *Cognitive psychology,* 17(2): 248-294.

Kristensson Uggla, B. (2019) *En strävan efter sanning: Vetenskapens teori och praktik,* Lund: Studentlitteratur.

Lam, A. (2006) Organizational innovation. In Fagerberg, J., Mowery, D. C. & Nelson, R. R. (Eds.), *The Oxford Handbook of Innovation.* Oxford, UK: Oxford University Press, 115-47.

Lanzolla, G., Lorenz, A., Miron-Spektor, E., Schilling, M., Solinas, G., & Tucci, C. (2020) Digital transformation: What is new if anything? Emerging patterns and management research. *Academy of Management Discoveries,* 6(3): 341-350.

Larkin, J. H., & Simon, H. A. (1987) Why a diagram is (sometimes) worth ten thousand words. *Cognitive Science,* 11: 65-100.

Lincoln, Y. S., & Guba, E. (1985) Naturalistic Inquiry. Beverly Hills, CA: Sage.

Lundholm, C., & Davies, P. (2013). Conceptual Change in the Social Sciences. In S. Vosniadou (Ed.) *International handbook of Research in Conceptual Change*: *2nd Edition.* (288-304). London: Routledge.

Magretta, J. (2002) Why business models matter. *Harvard Business Review,* 80(5): 86-92.

Markides, C.C. (2015) Research on Business Models: Challenges and Opportunities. *Advances in Strategic Management,* 33: 133-147.

Martins, L. L., Rindova, V. P., Greenbaum, B. E. (2015) Unlocking the hidden value of concepts: a cognitive approach to business model innovation. *Strategic Entrepreneurship Journal,* 9: 99-117.

Massa, L., & Hacklin, F. (2021) Business model innovation in incumbent firms: cognition and visual representation. Business Models and Cognition. *New Horizons in Managerial and Organizational Cognition,* 4: 203-232.

Massa, L., Tucci, C. L., & Afuah, A. (2017) A critical assessment of business model research. *Academy of Management Annals,* 11(1): 73-104.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014) *Qualitative data analysis: a methods sourcebook (3rd ed.).* Thousand Oaks, CA: Sage Publications.

Morgan M. S. (2012) *The World in the Model.* Cambridge: Cambridge University Press

Morrison, M., & Morgan, M. S. (1999) Models as mediating instruments. *Ideas in context,* 52: 10-37.

Murphy, G. L. (2002) *The Big Book of Concepts.* Cambridge, MA: MIT Press.

Nersessian, N. J. (1992) How do scientists think? Capturing the dynamics of conceptual change in science. Cognitive models of science, vol. 15, pp. 3-44.

Nersessian, N. J. (2010) *Creating scientific concepts.* Cambridge, MA: MIT press.

Nersessian, N. J., Kurz-Milcke, E., Newstetter, W. C., & Davies, J. (2003) Research laboratories as evolving distributed cognitive systems. *Proceedings of the annual meeting of the Cognitive Science Society,* 25(25): 857-862.

Normann, R. (1975) *Skapande företagsledning.* Stockholm: Aldus.

Nystrom, P.C. & Starbuck, W.H. (1984) To avoid organizational crises, unlearn. *Organizational Dynamics,* 12(4), 53-65.

Osbeck, L. M., & Nersessian, N. J. (2006) The distribution of representation. *Journal for the Theory of Social Behaviour,* 36(2): 141.

Osterwalder, A. (2004) *The Business Model Ontology - A Proposition in a Design Science Approach.* PhD Thesis, University of Lausanne, Switzerland.

Osterwalder, A., & Euchner, J. (2019) Business Model Innovation: An Interview with Alex Osterwalder. *Research-Technology Management,* 62(4): 12-18.

Osterwalder, A., & Pigneur, Y. (2010) *Business model generation: a handbook for visionaries, game changers, and challengers.* New York: John Wiley & Sons

Osterwalder, A., Pigneur, Y., Etiemble, F., & Smith, A. (2020) *The Invincible Company.* Hoboken, NJ: John Wiley & Sons.

Palmer, S. E. (1978) Fundamental aspects of cognitive representation. In Rosch, E. & Loyd, B.B. (Eds.) Cognition and categorization. Hillsdale, NJ: Lawrence Erlbaum Associates.

Penrose, E. (1959/2009) *The Theory of the Growth of the Firm*. Oxford, UK: Oxford University Press.

Pfeffer, J., & Salancik, G. R. (1978/2003) *The External Control of Organizations: A Resource Dependence Perspective (Classic ed.),* Stanford, Ca.: Stanford University Press.

Porac, J. F., Thomas, H., & Baden-Fuller, C. (1989) Competitive groups as cognitive communities: the case of Scottish knitwear manufacturers. *Journal of Management Studies,* 26: 397-416.

Prahalad, C. K., & Bettis, R. A. (1986) The dominant logic: A new linkage between diversity and performance. Strategic Management Journal, 7(6): 485-501.

Prinz, J. J. (2002) *Furnishing the mind: Concepts and their perceptual basis.* Cambridge, MA: MIT Press.

Roessler, M., Schneckenberg, D., & Velamuri, V. K. (2019) Situated Entrepreneurial Cognition in Corporate Incubators and Accelerators: The Business Model as a Boundary Object. *IEEE Transactions on Engineering Management.*

Rosenberg, A. (2016) *Philosophy of Social Science,* 5th ed., Boulder, CO: Westview Press.

Rosch, E. (1975) Cognitive representations of semantic categories. *Journal of experimental psychology: General*, 104(3): 192.

Rumelt, R. P. (1979) Evaluation of strategy: Theory and models. *Strategic Management: A New View of Business Policy and Planning,* 196-212.

Ryan, G. W., & Bernard, H.R. (2003) Techniques to identify themes. *Field Methods,* 15(1): 85-109.

Saebi, T., Lien, L., & Foss, N. J. (2017) What drives business model adaptation? The impact of opportunities, threats and strategic orientation. *Long Range Planning,* 50(5): 567-581.

Scaife, M., & Rogers, Y. (1996) External cognition: how do graphical representations work?. *International journal of human-computer studies,* 45(2): 185-213.

Schneckenberg, D., Velamuri, V., & Comberg, C. (2019) The design logic of new business models: Unveiling cognitive foundations of managerial reasoning. *European Management Review,* 16(2): 427-447.

Schumpeter JA (1942/2010) Capitalism, socialism and democracy. New York: Routledge.

Shafer, S.M., Smith, H.J., & Linder, J.C. (2005) The power of business models. *Business Horizons,* 48: 199-207.

Shepherd, D. A., Seyb, S., George, G. (in press) Grounding business Models: Cognition, boundary objects, and business-model change. *Academy of Management Review,* Forthcoming.

Simon, H. A. (1976) From substantive to procedural rationality. In *25 years of economic theory* (pp. 65-86). Boston, MA: Springer.

Swedberg, R. (2014) *The Art of Social Theory.* Princeton, NJ: Princeton University Press

Smith, C. L. (2007) Bootstrapping processes in the development of students' commonsense matter theories: Using analogical mappings, thought experiments, and learning to measure to promote conceptual restructuring. *Cognition and Instruction,* 25(4): 337-398.

Siggelkow N. (2002) Evolution toward fit. *Administrative Science Quarterly,* 47(1): 125-159.

Simon, H. A. (1985) What we know about the creative process. *Frontiers in creative and innovative management,* vol. 4, pp. 3-22.

Simon, H.A. (1947/1997) *Administrative Behaviour* (4ht ed.). New York: The Free Press.

Sloman, S. (2005) *Causal models: How people think about the world and its alternatives*. Oxford: Oxford University Press.

Spender, J. C. (1989) Industry recipes. Oxford: Basil Blackwell.

Sterman, J. (2000) *Business dynamics: Systems Thinking and Modeling for a Complex World.* Irwin/McGraw-Hill: Boston.

Sund, K. J., Bogers, M., Villarroel, J. A., & Foss, N. (2016) Managing tensions between new and existing business models. *MIT Sloan Management Review,* 57(4): 7-10.

Sund, K. J., Bogers, M. L., & Sahramaa, M. (2021) Managing business model exploration in incumbent firms: A case study of innovation labs in European banks. *Journal of Business Research*, 128: 11-19.

Szopinski, D., Schoorman, T., John, T., Knackstedt, R., & Kundisch, D. (2019) Software tools for business model innovation: current state and future challenges. *Electronic Markets,* in-press.

Teece, D. J. (1986) Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research policy,* 15(6): 285-305.

Teece, D. J. (2010) Business models, business strategy and innovation. *Long Range Planning,* 43(2-3): 172-194.

Teece, D J. (2013) *Dynamic capabilities & strategic management: Organizing for Innovation and Growth.* Oxford, UK: Oxford University Press.

Teece, D. J. (2018) Business models and dynamic capabilities. *Long Range Planning, vol*. 51, no. 1, pp. 40-49.

Thagard, P. (1992) *Conceptual revolutions.* Princeton, NJ: Princeton University Press.

Toulmin, S. (1972) *Human Understanding: The Collective Use and Evolution of Concepts*. Princeton, NJ: Princeton University Press.

Tushman, M. L., & Anderson, P. (1986) Technological discontinuities and organizational environments. *Administrative Science Quarterly,* 31:439-465.

Tushman, M.L. & O'Reilly, C. A. (1996) Ambidextrous organizations. Managing evolutionary and revolutionary change. *California Management Review,* 38(4): 8-30.

Tripsas, M., & Gavetti, G. (2000) Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal,* 21: 1147-1161.

Täuscher, K. & Abdelkafi, N. (2017) Visual tools for business model innovation: Recommendations from a cognitive perspective*. Creativity and Innovation Management,* 26(2), 160-174.

Utterback, J. M., & Abernathy, W. J. (1975) A dynamic model of product and process innovation. *Omega,* 3(6): 639-656.

Utterback, J. M., & Suarez, F. F. (1993) Innovation, competition, and industry structure. *Research Policy,* 22(1): 1-21.

Van Maanen, J. (1979) The fact of fiction in organizational ethnography. *Administrative Science Quarterly,* 24: 539-550.

Vennix, J. A. (1999) Group model-building: tackling messy problems. System Dynamics Review: The Journal of the System Dynamics Society, 15(4): 379-401.

Walsh, J. P. (1995) Managerial and organizational cognition: Notes from a trip down memory lane. *Organization Science,* 6(3): 280-321.

Weick, K. (1979) *The social psychology of organizing.* 2nd ed. Reading, MA: Addison-Wesley.

Weick, K. (1995) *Sensemaking in organizations.* Thousand Oaks, CA: Sage Publications.

Weick, K. E. (1996) Drop your tools: An allegory for organizational studies. *Administrative Science Quarterly,* 301-313.

Weiner, N., & Weisbecker, A. (2011) A business model framework for the design and evaluation of business models in the internet of services. In *Proceedings of Annual SRII Global Conference,* San Jose, California, March 30–April 2.

Wiser, M., & Smith, C. (2016) How is conceptual change possible? Insights from science education. In D. Barner and A. S. Baron (Eds.) *Core knowledge and conceptual change* (29-52). Oxford: Oxford University Press.

Wittgenstein, L. (1953) *Philosophical Investigations.* Oxford: Basil Blackwell.

Wright, C., Nyberg, D. (2017) An inconvenient truth: How organizations translate climate change into business as usual. *Academy of Management Journal,* 60(5): 1633-1661.

Yin, R. (2018) *Case study research and applications: design and methods (6th ed.).* Thousand Oaks, CA: Sage

Zhang, J. (1997) The nature of external representations in problem solving. *Cognitive Science,* 21(2): 179-217.

Zhang, J., & Norman, D. A. (1994) Representations in distributed cognitive tasks. *Cognitive Science,* 18(1): 87-122.

Zott, C., & Amit, R. (2010) Business model design: An activity system perspective. *Long Range Planning,* 43(2-3): 216-226.

The Swedish Research School of Management and Information Technology MIT

The *Swedish Research School of Management and Information Technology* (MIT) is one of 16 national research schools supported by the Swedish Government. MIT is jointly operated by the following institutions: Blekinge Institute of Technology, Chalmers University of Technology, University of Gothenburg, Jönköping International Business School, Karlstad University, Linköping University, Linnaeus University Växjö, Lund University, Mälardalen University, Stockholm University, Umeå University, Örebro University, and Uppsala University, host to the research school. At the Swedish Research School of Management and Information Technology (MIT), research is conducted, and doctoral education provided, in three fields: management information systems, business administration, and informatics.

DISSERTATIONS FROM THE SWEDISH RESEARCH SCHOOL OF MANAGEMENT AND INFORMATION TECHNOLOGY

Doctoral theses (2003-)

1. **Baraldi, Enrico (2003),** *When Information Technology Faces Resource Interaction: Using IT Tools to Handle Products at IKEA and Edsbyn.* Department of Business Studies, Uppsala University, Doctoral Thesis.

2. **Wang, Zhiping (2004),** *Capacity-Constrained Production-Inventory Systems: Modelling and Analysis in both a Traditional and an E-Business Context*. IDA-EIS, Linköpings universitet och Tekniska Högskolan i Linköping, Doctoral Thesis.

3. **Ekman, Peter (2006),** *Enterprise Systems & Business Relationships: The Utilization of IT in the Business with Customers and Suppliers*. School of Business, Mälardalen University, Doctoral Dissertation.

4. **Lindh, Cecilia (2006),** *Business Relationships and Integration of Information Technology*. School of Business, Mälardalen University, Doctoral Dissertation.

5. **Frimanson, Lars (2006),** *Management Accounting and Business Relationships from a Supplier Perspective.* Department of Business Studies, Uppsala University, Doctoral Thesis.

6. **Johansson, Niklas (2007),** *Self-Service Recovery*. Information Systems, Faculty of Economic Sciences, Communication and IT, Karlstad University, Doctoral Thesis.

7. **Sonesson, Olle (2007),** *Tjänsteutveckling med personal medverkan: En studie av banktjänster.* Företagsekonomi, Fakulteten för ekonomi, kommunikation och IT, Karlstads universitet, Doktorsavhandling.

8. **Maaninen-Olsson, Eva (2007),** *Projekt i tid och rum: Kunskapsintegrering mellan projektet och dess historiska och organisatoriska kontext.* Företagsekonomiska institutionen, Uppsala universitet, Doctoral Thesis.

9. **Keller, Christina (2007),** *Virtual learning environments in higher education: A study of user acceptance.* Linköping Studies in Science and Technology, Doctoral Thesis.

10. **Abelli, Björn (2007),** *On Stage! Playwriting, Directing and Enacting the Informing Processes*. School of Business, Mälardalen University, Doctoral Thesis.

11. **Cöster, Mathias (2007),** *The Digital Transformation of the Swedish Graphic Industry*. Linköping Studies in Science and Technology, Linköping University, Doctoral Thesis.

12. **Dahlin, Peter (2007),** *Turbulence in Business Networks: A Longitudinal Study of Mergers, Acquisitions and Bankruptcies Involving Swedish IT-companies*. School of Business, Mälardalen University, Doctoral Thesis.

13. **Myreteg, Gunilla (2007),** *Förändringens vindar: En studie om aktörsgrupper och konsten att välja och införa ett affärssystem*. Företagsekonomiska institutionen, Uppsala universitet, Doctoral Thesis.

14. **Hrastinski, Stefan (2007),** *Participating in Synchronous Online Education*. School of Economics and Management, Lund University, Lund Studies in Informatics.

15. **Granebring, Annika (2007),** *Service-Oriented Architecture: An Innovation Process Perspective.* School of Business, Mälardalen University, Doctoral Thesis.

16. **Lövstål, Eva (2008),** *Management Control Systems in Entrepreneurial Organizations: A Balancing Challenge*. Jönköping International Business School, Jönköping University, JIBS, Doctoral Thesis.

17. **Hansson, Magnus (2008),** *On Closedowns: Towards a Pattern of Explanation to the Closedown Effect*. Örebro University School of Business, Örebro University, Doctoral Thesis.

18. **Fridriksson, Helgi-Valur (2008),** *Learning processes in an inter-organizational context: A study of krAft project.* Jönköping International Business School, Jönköping University, JIBS, Doctoral Thesis.

19. **Selander, Lisen (2008),** Call Me *Call Me for some Overtime: On Organizational Consequences of System Changes.* Institute of Economic Research, Lund Studies in Economics and Management, Doctoral Thesis.

20. **Henningsson, Stefan (2008),** *Managing Information Systems Integration in Corporate Mergers & Acquisitions*. Institute of Economic Research, Lund Studies in Economics and Management, Doctoral Thesis.

21. **Ahlström, Petter (2008),** *Strategier och styrsystem för seniorboende-marknaden*. IEI-EIS, Linköping universitetet och Tekniska Högskolan i Linköping, Doktorsavhandling.

22. **Sörhammar, David (2008),** *Consumer-firm business relationship and network: The case of "Store" versus Internet.* Department of Business Studies, Uppsala University, Doctoral Thesis.

23. **Caesarius, Leon Michael (2008),** *In Search of Known Unknowns: An Empirical Investigation of the Peripety of a Knowledge Management System*. Department of Business Studies, Uppsala University, Doctoral Thesis.

24. **Cederström, Carl (2009),** *The Other Side of Technology: Lacan and the Desire for the Purity of Non-Being.* Institute of Economic Research, Lund University, Doctoral Thesis.

25. **Fryk, Pontus, (2009),** *Modern Perspectives on the Digital Economy: With Insights from the Health Care Sector*. Department of Business Studies, Uppsala University, Doctoral Thesis.

26. **Wingkvist, Anna (2009)**, *Understanding Scalability and Sustainability in Mobile Learning: A Systems Development Framework.* School of Mathematics and Systems Engineering, Växjö University, Doctoral Thesis.

27. **Sällberg, Henrik (2010*),*** *Customer Rewards Programs: Designing Incentives for Repeated Purchase.* Blekinge Institute of Technology, School of Management, Doctoral Thesis.

28. **Verma, Sanjay (2010),** *New Product Newness and Benefits: A Study of Software Products from the Firms' Perspective*. Mälardalen University, Doctoral Thesis.

29. **Iveroth, Einar (2010),** *Leading IT-Enabled Change Inside Ericsson: A Transformation Into a Global Network of Shared Service Centres*. Department of Business Studies, Uppsala University, Doctoral Thesis.

30. **Nilsson, Erik (2010),** *Strategi, styrning och konkurrenskraft: En longitudinell studie av Saab AB*. IEI-EIS, Linköpings universitet och Tekniska Högskolan i Linköping, Doktorsavhandling.

31. **Sjöström, Jonas (2010),** *Designing Information Systems: A pragmatic account*. Department of Informatics and Media, Uppsala University, Doctoral Thesis.

32. **Numminen, Emil (2010),** *On the Economic Return of a Software Investment: Managing Cost, Benefit and Uncertainty.* Blekinge Institute of Technology, School of Management, Doctoral Thesis.

33. **Frisk, Elisabeth (2011),** *Evaluating as Designing: Towards a Balanced IT Investment Approach*. IT University, Göteborg, Doctoral Thesis.

34. **Karlsudd, Peter (2011),** *Support for Learning: Possibilities and Obstacles in Learning Applications*. Mälardalen University, Doctoral Thesis.

35. **Wicander, Gudrun (2011),** *Mobile Supported e-Government Systems: Analysis of the Education Management Information System (EMIS) in Tanzania*. Karlstad University, Doctoral Thesis.

36. **Åkesson, Maria (2011),** *Role Constellations in Value Co-Creation: A Study of Resource Integration in an e-Government Context*. Karlstad University, Doctoral Thesis.

37. **Nfuka, Edephonce N. (2012),** *IT Governance in Tanzanian Public Sector Organisations*. Department of Computer and Systems Sciences, Stockholm University**,** Doctoral Thesis.

38. **Larsson, Anders Olof (2012),** *Doing Things in Relation to Machines: Studies on Online Interactivity.* Department of Informatics and Media, Uppsala University, Doctoral Thesis.

39. **Andersson, Bo (2012),** *Harnessing Handheld Computing: Framework, Toolkit and Design Propositions.* Lund University, Doctoral Thesis**.**

40. **Erixon, Cecilia (2012),** *Information System Providers and Business Relationships: A Study on the Impact of Connections*. Mälardalen University, Doctoral Thesis.

41. **Svensson, Martin (2012)**, *Routes, Routines and Emotions in Decision Making of Emergency Call Takers*. Blekinge Institute of Technology, Doctoral Thesis.

42. **Svensson, Ann (2012),** *Kunskapsintegrering med informationssystem I professionsorienterade praktiker*. Institutionen för tillämpad IT, Göteborgs universitet, Doktorsavhandling.

43. **Pareigis, Jörg (2012),** *Customer Experiences of Resource Integration: Reframing Servicescapes Using Scripts and Practices*. Karlstad University, Doctoral Thesis.

44. **Röndell, Jimmie (2012),** *From Marketing to, to Marketing with Consumers*. Department of Business Studies, Uppsala University, Doctoral Thesis.

45. **Lippert, Marcus (2013),** *Communities in the Digital Age: Towards a Theoretical Model of Communities of Practice and Information Technology*. Department of Business Studies, Uppsala University, Doctoral Thesis.

46. **Netz, Joakim (2013),** *Diffusa spänningar eller spännande tillväxt? Företagsledning i tider av snabb förändring*. Mälardalens högskola, Doktorsavhandling.

47. **Thorén, Claes (2013),** *Print or Perish? A Study of Inertia in a Regional Newspaper Industry*. Karlstad University, Doctoral Thesis.

    Stockhult, Helén (2013), *Medarbetare i dialog: en studie om viljan att göra mer än det formellt förväntade*. Örebro universitet, Doctoral Thesis.

48. **Mihailescu, Daniela (2013),** *Explaining the Use of Implementation Methodology in Enterprise Systems Implementation Context: A Critical Realist Perspective*. Lund University, Doctoral Thesis.

49. **Ghazawneh, Ahmad (2012),** *Towards a Boundary Resources Theory of Software Platforms*. Jönköping International Business School, Doctoral Thesis.

50. **Shams, Poja (2013),** *What Does it Take to Get your Attention? The Influence of In-Store and Out-of-Store Factors on Visual Attention and Decision Making for Fast-Moving Consumer Goods*. Karlstad University, Doctoral Thesis.

51. **Osowski, Dariusz (2013),** *From Illusiveness to Genuineness: Routines, Trading Zones, Tools and Emotions in Sales Work*. Department of Business Studies, Uppsala University, Doctoral Thesis.

52. **Höglund, Linda (2013)**, *Discursive Practises in Strategic Entrepreneurship: Discourses and Repertoires in Two Firms*. Örebro University, Doctoral Thesis.

53. **Persson Ridell, Oscar (2013)**, *Who is the Active Consumer? Insight into Contemporary Innovation and Marketing Practices*. Department of Business Studies, Uppsala University, Doctoral Thesis.

54. **Kask, Johan (2013),** *On business relationships as Darwinian systems: An exploration into how Darwinian systems thinking can support business relationship research*. Örebro University, Doctoral Thesis.

55. **Paulsson, Wipawee Victoria (2013)**, *The Complementary Use of IS Technologies to Support Flexibility and Integration Needs in Budgeting*. Lund University, Doctoral Thesis.

56. **Kajtazi, Miranda (2013),** *Assessing Escalation of Commitment as an Antecedent of Noncompliance with Information Security Policy*. Linnaeus University, Doctoral Thesis.

57. **Hasche, Nina (2013),** *Value Co-Creating Processes in International Business Relationships: Three empirical stories of co-operation between Chinese customers and Swedish suppliers*. Örebro University, Doctoral Thesis.

58. **Pierce, Paul (2013),** *Using Alliances to Increase ICT Capabilities*. Lund University, Doctoral Thesis.

59. **Mansour, Osama (2013),** *The Bureaucracy of Social Media: An Empirical Account in Organizations*. Linnaeus University, Doctoral Thesis.

60. **Osmonalieva, Zarina (2013)**, *Factors Determining Exploitation of Innovative Venture Ideas: A study of nascent entrepreneurs in an advisory system*. Mälardalen University, Doctoral Thesis.

61. **Holmberg, Nicklas (2014),** *The Purity of Separation of Concerns: The Service Oriented Business Process - a Design Approach for Business Agility.* Lund University, Doctoral Thesis.

62. **Poth, Susanna (2014),** *Competitive Advantage in the Service Industry. The Importance of Strategic Congruence, Integrated Control and Coherent Organisational Structure: A Longitudinal Case Study of an Insurance Company*. Department of Business Studies, Uppsala University, Doctoral Thesis.

63. **Safari, Aswo (2014),** *Consumer Foreign Online Purchasing: Uncertainty in the Consumer-Retailer Relationship*. Department of Business Studies, Uppsala University, Doctoral Thesis.

64. **Sandberg, Johan (2014)**, *Digital Capability: Investigating Coevolution of IT and Business Strategies*. Umeå University, Doctoral Thesis.

65. **Eklinder Frick, Jens (2014),** *Sowing Seeds for Innovation: The Impact of Social Capital in Regional Strategic Networks*. Mälardalen University, Doctoral Thesis.

66. **Löfberg, Nina (2014)**, *Service Orientation in Manufacturing Firms: Understanding Challenges with Service Business Logic*. Karlstad University, Doctoral Thesis..

67. **Gullberg, Cecilia (2014)**, *Roles of Accounting Information in Managerial Work*. Department of Business Studies, Uppsala University, Doctoral Thesis.

68. **Bergkvist, Linda (2014)**, *Towards a Framework for Relational-Oriented Management of Information Systems Outsourcing: Key Conditions Connected to Actors, Relationships and Process*. Karlstad University, Doctoral Thesis.

69. **Tavassoli, Sam (2014)**, *Determinants and Effects of Innovation: Context Matters.* Blekinge Institute of Technology, Doctoral Thesis.

70. **Högström, Claes (2014)**, *Fit In to Stand Out: An Experience Perspective on Value Creation*. Karlstad University, Doctoral Thesis.

71. **Jansson, Tomas (2015),** *Agila projektledningsmetoder och motivation*. Karlstads universitet, Doctoral Thesis.

72. **Ryzhkova, Natalia (2015)**, *Web-Enabled Customer Involvement: A Firms' Perspective.* Blekinge Institute of Technology, Doctoral Thesis.

73. **Sundberg, Klas (2015),** *Strategisk utveckling och ekonomistyrning: Ett livscykelperspektiv*. Företagsekonomiska institutionen, Uppsala universitet, Doctoral Thesis.

74. **Nylén, Daniel (2015),** *Digital Innovation and Changing Identities: Investigating Organizational Implications of Digitalization*. Umeå University, Doctoral Thesis.

75. **Chowdhury, Soumitra (2015)**, *Service Logic in Digitalized Product Platforms: A Study of Digital Service Innovation in the Vehicle Industry*. Gothenburg University, Doctoral Thesis.

76. **Jogmark, Marina (2015),** *Den regionala transformationsprocessens sociala dimension. Karlskrona 1989-2002*. Blekinge Tekniska Högskola, Doctoral Thesis.

77. **Sundström, Angelina (2015),** *Old Swedish Business in New International Clothes: Case Studies on the Management of Strategic Resources in Foreign-Acquired Swedish R&D Firms*. Mälardalen University, Doctoral Thesis.

78. **Öbrand, Lars (2015),** *Information Infrastructure Risk: Perspectives, Practices & Technologies*. Umeå University, Doctoral Thesis.

79. **Brozović, Danilo (2016),** *Service Provider Flexibility: A Strategic Perspective*. Stockholm University, Doctoral Thesis.

80. **Siegert, Steffi (2016),** *Enacting Boundaries through Social Technologies: A Dance between Work and Private Life*. Stockholm University, Doctoral Thesis.

81. **Linton, Gabriel (2016)**, *Entrepreneurial Orientation: Reflections from a Contingency Perspective*. Örebro University, Doctoral Thesis.

82. **Akram, Asif (2016)**, *Value Network Transformation: Digital Service Innovation in the Vehicle Industry*. Department of Applied Information Technology, Chalmers University of Technology and University of Gothenburg, Doctoral Thesis.

83. **Hadjikhani, Annoch (2016)**, *Executive Expectation in the Internationalization Process of Banks: The Study of Two Swedish Banks Foreign Activities*. Department of Business Studies, Uppsala University, Doctoral Thesis.

84. **El-Mekawy, Mohamed (2016)**, *From Theory to Practice of Business-IT Alignment: Barriers, an Evaluation Framework and Relationships with Organizational Culture*. DSV, Stockholm University, Doctoral Thesis.

85. **Salavati, Sadaf (2016)**, *Use of Digital Technologies in Education: The Complexity of Teachers' Everyday Practice*. Linnaeus University, Doctoral Thesis.

86. **Pashkevich, Natallia (2016)**, *Information Worker Productivity Enabled by IT System Usage: A Complementary-Based Approach*. Stockholm Business School, Stockholm University, Doctoral Thesis.

87. **Stone, Trudy-Ann (2016)**, *Firms in Global Value Chains.* Blekinge Institute of Technology (BTH), Doctoral Thesis.

88. **Saarikko, Ted (2016)**, *An Inquiry into the Nature and Causes of Digital Platforms.* Umeå University, Doctoral Thesis.

89. **Tona, Olgerta (2017)**, *The Journey of Mobile Business Intelligence: From Vision to Use*. Lund University, Doctoral Thesis.

90. **Fredin, Sabrina (2017)**, *History and Geography Matter: The Cultural Dimension of Entrepreneurship*. Blekinge Institute of Technology, Doctoral Thesis.

91. **Giovacchini, Elia (2017)**, *Weaving the Symbiotic Relationship: A Longitudinal Study of a Firm-Sponsored Open Source Community Relationship Maintenance*. Stockholm Business School, Stockholm University, Doctoral Thesis.

92. **Gillmore, Edward (2017)**, *Four Essays on Subsidiary Evolution: Exploring the Antecedents, Contexts and Outcomes of Mandate Loss*. School of Business, Mälardalen University, Doctoral Thesis.

93. **Crawford, Jason (2017),** *Regulation's Influence on Risk Management and Management Control Systems in Banks*. Department of Business Studies, Uppsala University, Doctoral Thesis.

94. **Von Schantz, Hanna (2017),** *Well, that makes sense! Investigating opportunity development in a technology start-up.* Stockholm Business School, Stockholm University, Doctoral Thesis.

95. **Wass, Sofie (2017)**, *The Importance of eHealth Innovations: Lessons about Patient Accessible Information*. Jönköping International Business School, Doctoral Thesis.

96. **Imre, Özgün (2018)**, *Adopting Information Systems: Perspectives from Small Organizations*. Department of Management and Engineering (IEI), Linköping University, Doctoral Thesis.

97. **Lövgren, Daniel (2017)**, *Dancing Together Alone: Inconsistencies and Contradictions of Strategic Communication in Swedish Universities*. Informatics and Media, Uppsala University, Doctoral Thesis.

98. **Charitsis, Vasileios (2018)**, *Self-Tracking, Datafication and the Biopolitical Prosumption of Life.* Karlstad University, Doctoral Thesis.

99. **Lammi, Inti (2018)**, *A Practice Theory in Practice: Analytical Consequences in the Study of Organization and Socio-Technical Change.* Department of Business Studies, Uppsala University, Doctoral Thesis.

100. **Leite, Emilene (2018)**, *Complexity in the 'Extended' Business Network: A study of Business, Social and Political Relationships in Smart City Solutions*. Department of Business Studies, Uppsala University, Doctoral Thesis.

101. **Aasi, Parisa (2018)**, *Information Technology Governance: The Role of Organizational Culture and Structure*. Department of Computer and Systems Sciences, Stockholm University, Doctoral Thesis.

102. **Servadio, Luigi (2018)**, *Customer Rituals: Ethnographic Explorations of Wine Rituals with Families and Friends.* Stockholm Business School, Stockholm University, Doctoral Thesis.

103. **Ahlgren, Kajsa (2018)**, *Travelling Business Models: On Adapting Business Models to New Contexts.* Design Sciences, Faculty of Engineering, Lund University, Doctoral Thesis.

104. **Markowski, Peter (2018)**, *Collaboration Routines: A Study of Interdisciplinary Healthcare*. Stockholm Business School, Stockholm University, Doctoral Thesis.

105. **Zaffar, Fahd Omair (2018)**, *The Value of Social Media: What Social Networking Sites Afford Organizations*. Division of Informatics, Department of Applied Information Technology, University of Gothenburg, Doctoral Thesis.

106. **Stendahl, Emma (2018)**, *Headquarters Involvement in Managing Subsidiaries.* Stockholm Business School, Stockholm University, Doctoral Thesis.

107. **Fischer, Christian (2018)**, *Business Intelligence through a Sociomaterial Lens: The Imbrication of People and Technology in a Sales Process*. Department of Business Studies, Uppsala University, Doctoral Thesis.

108. **Lagin, Madelen (2018)**, *The Price We Pay: The Autonomy of Store Managers in Making Price Decisions*. Department of Business Studies, Örebro University, Doctoral Thesis.

109. **Odar, Susanne (2019)**, *Managementinitiativ, mening och verksamhetsresultat: En retrospektiv studie av en teknikintensiv verksamhet*. Department of Management and Engineering (IEI), Linköping University, Doctoral Thesis.

110. **Radits, Markus (2019)**, *A Business Ecology Perspective on Community-Driven Open Source: The Case of the Free and Open Source Content Management System Joomla*. Department of Management and Engineering (IEI), Linköping University, Doctoral Thesis.

111. **Skog, Daniel A. (2019)**, *The Dynamics of Digital Transformation: The Role of Digital Innovation, Ecosystems and Logics in Fundamental Organizational Change*. Umeå University, Doctoral Thesis.

112. **Ek, Peter (2019)**, *Managing Digital Open Innovation with User Communities: A Study of Community Sensing and Product Openness Capabilities in the Video Game Industry*. Department of Business Studies, Uppsala University, Doctoral Thesis.

113. **Muhic, Mirella (2019)**, *Transition to Cloud sourcing – Innovation and competitive advantage*. Design Sciences, Faculty of Engineering, Lund University, Doctoral Thesis.

114. **Mankevich, Vasili (2019)**, *Digital Innovation Management: Investigating Digital Trace Data in Online Communities*. Umeå University, Doctoral Thesis.

115. **Vink, Josina (2019)**, *In/visible - Conceptualizing Service Ecosystem Design*. Karlstad University, Doctoral Thesis.

116. **Bäckström, Izabelle (2019)**, *Mirror, mirror on the wall, who's the innovator after all? An explorative study of a management-initiated employee innovation process*. Department of Design Sciences, Faculty of Engineering, Lund University, Doctoral Thesis.

117. **Bani-Hani, Imad (2020)**, *Self-Service Business Analytics and the Path to Insights: Integrating Resources for Generating Insights,* Department of Informatics, School of Economics and Management, Lund University, Doctoral Thesis.

118. **Kashyap, Shruti Rangan (2020)**, *Monsoon Paper Dragons: Transparency, Accountability, Risk, and Compliance in Banking Regulation and Practice*, Department of Business Studies, Uppsala University, Doctoral Thesis.

119. **Havemo, Emelie (2020)**, *Den visuella bilden av organisationen: Perspektiv på visualitet i accounting*, Linköping Studies in Science and Technology, Institutionen för ekonomisk och industriell utveckling, Linköpings universitet, Doktorsavhandling.

120. Nyende, Hawa (2020), *Maternal Healthcare in Low Resource Settings: Investigations of IT as a resource*, Department of Applied Information Technology, University of Gothenburg, Doctoral Thesis.

121. Kizito, Michael (2020), *Enacting ambidextrous IT Governance in healthcare*, Department of Applied Information Technology, University of Gothenburg, Doctoral Thesis.

122. Ofe, Hosea Ayaba (2020), *Orchestrating Emerging Digital Ecosystems: Investigating the Establishment of an Open Data Platform in the Swedish Public Transport Industry.*, Department of Informatics, Umeå University, Doctoral Thesis.

123. Kurti, Erdelina (2020), *Institutional Tensions and Complexity in the Digital Innovation of Incumbent Business Models*, Linnaeus University, Doctoral Thesis.

124. Gustavsson, Tomas (2020), *Inter-team Coordination in Large-Scale Agile Software Development Projects*, Karlstad University, Doctoral Thesis.

125. Hedrén, Andreas (2021), *With Lives on the Line: How Users Respond to a Highly Mandated Information System Implementation – A Longitudinal Study*, Department of Informatics and Media, Uppsala University, Doctoral Thesis.

126. Nykvist, Rasmus (2021), *Essays on the Interaction Between Regulation and Technology: Understanding Agency and Context Through Multiple Levels of Inquiry*, Örebro University School of Business, Örebro University, Doctoral Thesis.

127. Geissinger, Andrea (2021), *Platforms in Liquid Modernity: Essays about the Sharing Economy, Digital Platforms, and Institutions*, Örebro University School of Business, Örebro University, Doctoral Thesis.

128. Yang, Ying (2021), *The Arrival of the Tipping Point of Solar Photovoltaic Technology*, Mälardalen University, Doctoral Thesis.

129. Lindeberg, Fredrik (2021), *Coordinating the Internet: Thought styles, technology and coordination*, Linköping University, Doctoral Thesis.

130. **Chatzipanagiotou, Niki (2021)**, *Managers' Cooperative Work Practices in Computational Artefacts-Supported Library Systems*, Linnaeus University, Doctoral Thesis.

131. **Kobusinge, Grace (2021),** *Health Information Systems Interoperability: Towards a Managing as Designing Approach,* Department of Applied Information Technology, University of Gothenburg, Doctoral Thesis.

132. **Arsenovic, Jasenko (2021),** *Proactivity in Service Failure and Service Recovery,* Service Research Center, Karlstad University, Doctoral Thesis.

133. **Borell, Anton (2021),** *In Between Competing Ideals: On the Relationships among Accounting, NPM, and Welfare,* Stockholm Business School, Stockholm University, Doctoral Thesis.

134. **Stojanov, Martin (2021),** *Datafication in Public Health Surveillance: Making Authoritative Accounts,* Department of Informatics and Media, Uppsala University, Doctoral Thesis.

135. **Huisman, Chelsey Jo (2021),** *Transforming the City of Kiruna: Stabilizing Change and Changing Stability,* Department of Business Studies, Uppsala University, Doctoral Thesis.

136. **Svensson de Jong, Ilse (2021)**, *On Innovation Metrics: An Explorative study on innovation measurement*. Department of Design Sciences, Faculty of Engineering, Lund University, Doctoral Thesis.

137. **Velsberg, Ott (2021)**, *In The Age of IoT: Exploring Public Sector Smartness*. Department of Informatics, Umeå University, Doctoral Thesis.

138. **Ryczer-Dumas, Małgorzata (2021)**, *Users' Agencies: Juxtaposing Public Portrayals and Users' Accounts of App-Mediated Cardiac Arrest Volunteer Work in Sweden*. Cermes3, École des Hautes Études en Sciences Sociales, Linköping University, Doctoral Thesis.

139. **Casales Morici, Belén (2022)**, *Acting Entrepreneurially and Strategically in Heavily Regulated Sectors*. Department of Business Studies, Uppsala University, Doctoral Thesis.

140. **Mähler, Viktor (2022)**, *Succeeding Implementation: The Internet of Things as a Digitally Transformative Technology*. Department of Informatics, Umeå University, Doctoral Thesis.

141. Ghita, Cristina (2022), *Technology in Absentia: A New Materialist Study of Digital Disengagement*. Department of Informatics and Media, Uppsala University, Doctoral Thesis.

142. Wadell, Olof (2022), *The Road to Access: On Business Exchanges in the Setting of a Bankruptcy*. Department of Business Studies, Uppsala University, Doctoral Thesis.

143. Sun, Yunchen (2022), *Designing Routines for Industrial Digitalization*. Department of Business Studies, Uppsala University, Doctoral Thesis.

144. Wang, Shujun (2022), *Essays on Mobile Application Performance in the Market*. Department of Industrial Economics, Blekinge Institute of Technology, Doctoral Thesis.

145. Uhlin, Anna (2022), *"You are on mute…"*: *Enabling coming together in digitally mediated meetings.* School of Business Society and Engineering, Department of Organization and Management, Mälardalen University, Doctoral Thesis.

146. Åkesson, Emil (2022), *Business Model Epistemology: Support for a Semi-Structured and Inclusive Approach to Business Modeling in Established Firms.* Department of Design Sciences, Lund University, Doctoral Thesis.

Contact person: Professor Christina Keller, Director of MIT, Uppsala University
christina.keller@im.uu.se
Address: The Swedish Research School of Management and Information Technology, Department of Informatics and Media, Uppsala University, Box 513, 751 20 Uppsala
Web site: www.mit.uu.se

Printed by Media-Tryck, Lund 2022 NORDIC SWAN ECOLABEL 3041 0903

Lund University
Faculty of Engineering
Department of Design Sciences

ISBN 978-91-8039-437-6