Pulling the Plug: The Concept, Process, and Outcomes of Organizational Information System Discontinuance

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Abstract

Information systems (IS) and information technology (IT) are increasingly permeating today's organizations. However, the rapid emergence of new technologies along with organizations’ changing strategic needs make retiring of incumbent systems a phenomenon with growing relevance. As old systems deteriorate or become obsolete, they need to be replaced with new ones. Then again, sometimes even current systems end up getting abandoned, due various reasons that can relate to strategy or operations, for instance. Despite the prevalence of such discontinuance decisions in many organizations, previous research has given scant attention to the topic. Whereas a handful of existing studies have shed some light on the antecedents of organizational IS discontinuance, the underlying mechanics of those decisions and the resulting outcomes remain poorly understood.

The objective of this dissertation is to improve the understanding of organizational IS use discontinuance, specifically investigating the conceptual dimensions of the phenomenon, analyzing the processes of IS discontinuance, and probing its consequences. To this end, I focus on three research questions: 1) What does IS discontinuance mean?; 2) How do organizational IS discontinuance processes unfold?; and 3) What are the outcomes of organizational IS discontinuance decisions? I address these questions in four standalone research papers. Paper I synthesizes the prior literature on IS discontinuance and investigates the different meanings it has given to the term. Paper II reports on a case study of an organization where discontinuing an incumbent legacy system proved insurmountable, representing an IS change outcome of being caught in between old and new IS architectures. Paper III is a case study of an IT service provider where discontinuing an accounting automation software resulted in an organizational disruption. Finally, Paper IV discusses the outcomes of retail self-service technology discontinuance from the consumer perspective.

My empirical studies are among the first attempts to untangle organizational IS discontinuance processes and to probe the consequences of discontinuance decisions. I contribute to the IS literature by conceptualizing IS discontinuance and providing an analytic framework for studying the phenomenon. Moreover, my findings shed light on several phenomena connected to IS discontinuance decisions, including the challenges with modernizing legacy environments and the effects of automation on workers’ skills.

Keywords

IS discontinuance, IS replacement, organizational IS change, change process, process model, legacy system, automation, self-service technology
Tämän viitokirjan päämääränä on parantaa ymmärrystä tietojärjestelmiä ja niiden seurauksien ymmärtämiseksi. Teknologian kehitys sekä organisaatioiden muuttuvat strategiset tarpeet tekevät kuitenkin käytössä olevien järjestelmien alasadosta päivistävän ilmiön. Ajan myötä järjestelmät vanhentuvat, ja niiden toiminnallisuus heikenee, jolloin ne on korvattava uusilla. Toisaalta joska jopa kurantit ja toimivat järjestelmät päädyttävät ajamaan alas, esimerkiksi erinäisissä strategisista tai operatiivisista syistä. Vaikka järjestelmien käytön lopettamispäätökset ovat ajankohtaisia monissa organisaatioissa, niitä on käsitetty hyvin vähän tieteellisessä kirjallisuudessa. Siinä missä koulallinen olemassa olevia tutkimuksia on kartoitettanut alasajoon johtavia tekijöitä, ymmärryksemme alasajoprosesseista sekä niiden seurauksista on edelleen puutteellinen.

Edistän tietojärjestelmätehteen tutkimusta käsittelystämällä tietojärjestelmien alasajo eri ilmenemismuotoja ja rakentamalla analyttisen viitekehynksen, jotka tulevat aihetta käsiteteleät tutkimukset voivat hyödyntää. Löydyksenä tuovat uusia näkökulmia myös muihin, tietojärjestelmien alasajoon liittyvän kytkeytyvien teemoihin, kuten legacy-ympäröityjen modernisoinnin haasteisiin ja automaation vaikutuksiin työntekijöiden osaamiseen.
I started my research career when I was around five years old by examining the behavior of ants and beetles. Little did I know that one day I would write a doctoral dissertation in the field of information systems science – even though an ant hive could arguably be considered as a certain kind of information system. In any case, while I did not expect to take this road, the journey turned out extremely rewarding. This book embodies some of the fruits of my labor from the past four years. However, it goes without saying that I cannot take the full credit of this accomplishment. I have enjoyed the privilege of working with some incredibly great minds, and I have had a wonderful network of friends and family as my support. Thus, it’s about time I dedicated a few words for thanking these people.

First, I want to express my special gratitude to my dissertation supervisor Esko Penttinen. Your positive encouragement gave me the confidence to start this project and your devoted guidance helped me to finish it. The level of commitment and attention you have given to me has been exceptional. I am extremely grateful for this, and I consider myself lucky to have a mentor like you.

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Although research can be a lonely endeavor at times, I have never really felt alone during this journey. This I attribute to my great colleagues and the friendly working atmosphere at Aalto University’s Department of Information and Service Management. I am grateful for the support of all the fellow doctoral students with whom I have shared thoughts and ideas at the university and in conferences. I want to especially thank Aleksandre Asatiani, Bikesh Raj Upreti, David Derichs, Jussi Nykänen, Noora Pinjamaa, and Sanna Tiilikainen for keeping me reminded that life is not only about research – it is also about food, wines, and good times. I am equally grateful to all my friends outside the academic circle who have indirectly contributed to the result at hand, each in their own way.

Finally, I want to thank my family for always encouraging me to pursue my passion, whatever it may be, and for all the love and support you have given me along the way. I am grateful to my parents for doing a commendable job raising me, to my grandparents for providing me with enormous support and wisdom, and to my siblings for bringing joy into my days. Words cannot properly express how thankful I am for having such role models in my life.

When starting this degree, wrapping up a dissertation appeared to me as an end of the line in the world of science. However, my scientific inquiries have informed me that discontinuance is not the endpoint, but related processes are bound to follow it. Consequently, I have updated my perception: to me this dissertation marks merely the first step toward new discoveries and accomplishments in investigating the relationship between humans and technology, whether within the academic sphere or beyond it. Reportedly, Albert Einstein compared life to riding a bicycle: “only when moving can one comfortably maintain one’s balance.”

Thus, the journey continues.

Helsinki, October 2018
Tapani Rinta-Kahila
Contents

List of Original Research Papers.......................................................... vii
Author’s Contribution........................................................................... viii
PART I: SUMMARY............................................................................... 1
1. Introduction....................................................................................... 3
  1.1 The research gap and objectives ................................................. 5
  1.2 Definitions of key concepts ....................................................... 7
  1.3 The structure of the dissertation................................................. 8
2. Previous literature............................................................................ 11
  2.1 The complexity of organizational IS change ......................... 11
  2.2 The discontinuance perspective ............................................... 12
  2.3 The IS discontinuance literature............................................... 13
3. Methodology.................................................................................... 17
  3.1 Assumptions.............................................................................. 18
  3.2 Research approaches............................................................... 18
  3.3 Choice of approach and method................................................. 21
  3.4 Motivations, research contexts, and theoretical background..... 22
  3.4.1 Paper I............................................................................... 22
  3.4.2 Paper II.............................................................................. 23
  3.4.3 Paper III............................................................................. 24
  3.4.4 Paper IV............................................................................. 25
3.5 Collection and analysis of the data.............................................. 26
  3.5.1 Paper I............................................................................... 26
  3.5.2 Paper II.............................................................................. 27
  3.5.3 Paper III............................................................................. 29
  3.5.4 Paper IV............................................................................. 30
4. Findings........................................................................................... 33
  4.1 Paper I....................................................................................... 33
  4.2 Paper II..................................................................................... 34
  4.3 Paper III................................................................................... 36
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 Paper IV</td>
<td>38</td>
</tr>
<tr>
<td>4.5 Summary of findings</td>
<td>39</td>
</tr>
<tr>
<td>5. Discussion and conclusions</td>
<td>41</td>
</tr>
<tr>
<td>5.1 Theoretical implications</td>
<td>42</td>
</tr>
<tr>
<td>5.2 Practical implications</td>
<td>45</td>
</tr>
<tr>
<td>5.3 Limitations and avenues for future research</td>
<td>46</td>
</tr>
<tr>
<td>5.4 Summary of conclusions</td>
<td>48</td>
</tr>
<tr>
<td>5.5 Appendix A</td>
<td>58</td>
</tr>
<tr>
<td>5.6 Appendix B</td>
<td>59</td>
</tr>
<tr>
<td>PART II: THE ORIGINAL RESEARCH PAPERS</td>
<td>61</td>
</tr>
</tbody>
</table>
This doctoral dissertation consists of a summary and of the following research papers which are referred to in the text by their numerals


Author’s Contribution

**Paper I:** Toward a Refined Conceptualization of IS Discontinuance: Reflection on the Past and a Way Forward

Soliman was the lead author of this paper. The research idea was developed by him, and he conducted the initial literature search and developed the theoretical framework. He also designed the research and was responsible for the initial data collection. Rinta-Kahila revised the theoretical framing, conducted additional data collection, and analyzed the data. Together, Soliman and Rinta-Kahila authored the discussion of results in light of data and wrote the overall research narrative.

**Paper II:** Caught in between: How an Organization Became a Prisoner of Its Legacy System after IS Change

Rinta-Kahila was the sole author of this paper.

**Paper III:** When the Black Box Disappears: The Surfacing of Latent Deskilling after IS Automation

Rinta-Kahila was the lead author of this paper. Penttinen discovered the research context and proposed the research topic. Rinta-Kahila developed the data-collection instrument and theoretical framing, with the assistance of Penttinen and Salovaara, and Rinta-Kahila and Penttinen collected the data together. Rinta-Kahila performed the analysis and wrote the paper under Penttinen’s guidance. Soliman, in turn, provided fine-tuning for the theoretical framing and contributed to the positioning of the results relative to other scholarly work. Salovaara and Soliman contributed to improving the quality of the research and the reporting on it in the paper.

**Paper IV:** The Effects of Self-Checkout Service Discontinuance on Customer Response: Evidence from a Natural Field Experiment

Rinta-Kahila was the lead author of this paper. Penttinen proposed the research topic and Kumar came up with the research problem. Rinta-Kahila developed the research design and collected the data under the guidance of Penttinen. Kumar analyzed the data, and Rinta-Kahila wrote the paper under the guidance of Penttinen and Kumar. Kumar and Janakiraman revised the theoretical framing and contributed to the positioning of the results within the existing research.
PART I: SUMMARY
1. Introduction

“No structure, even an artificial one, enjoys the process of entropy. It is the ultimate fate of everything, and everything resists it.”

- The robot Willis
(Galactic Pot-Healer, by Philip K. Dick, 1969)

Recent decades have witnessed unprecedented proliferation of information systems (ISs) and information technology (IT) that has transformed the ways in which we work, spend our leisure time, and interact with the world more generally. As technologies permeate an ever-growing share of life, our behavior comes to revolve increasingly around digital systems rather than other people and the physical world. Yet, in a seeming paradox, this time of increasing technological ubiquity brings with it discarding of incumbent technologies, a phenomenon with growing relevance. On one hand, old systems need to give way to new innovations: most technologies have a limited life span – they deteriorate over time and also become obsolete (Swanson & Dans 2000) – and technological advances guarantee the continuous influx of ever more appropriate contemporary systems to the markets (Furneaux & Wade 2017; Gangadharan et al. 2013). In another manifestation, sometimes individuals and organizations revert to more traditional ways of operating by entirely abandoning their incumbent ISs. This might be manifested in a company revising its service strategy to offer a “more human touch” at the expense of technology-afforded interaction (The Telegraph 2015) or cutting costs by discarding an expensive system (Power & Gruner 2015). Hence, in one way or another, eventually every IS will be replaced or otherwise withdrawn, whatever that system’s purpose or the context of its use. Consequently, organizations are often faced with the decision of whether to continue maintaining their incumbent IS or instead terminate it. Increasing globalization, as it imposes new functionality demands for ISs, accelerates the abandonment of old systems and causes tensions between local and global IT needs to crystallize (Rolland & Monteiro 2002). These considerations highlight the need to understand the process in which ISs get terminated or replaced in response to emerging organizational needs. In general, organizations’ decisions to discontinue an IS can be highly complex and challenging to make and implement, especially when the systems at issue have been deployed for so long that they have become firmly embedded in the core business processes and daily routines of their users. This is why many organizations avoid or postpone the hassle of such a difficult IS change, opting to keep operating with older, even outdated technologies (Hemon-Laurens 2016; TechTarget 2015; Schneider 2013).

One complexity central to the issue of discontinuing an IS’s use is related to the deepening integration between humans and technology (Carr 2015). Although new technologies are malleable at first, they become increasingly resistant to change as they get incorporated into
physical, economic, and social infrastructure (ibid., p. 171). The rise of automation and artificial intelligence has already altered several aspects of societies by transforming our daily behaviors: activities related to organizational work routines, personal social interactions, consumers’ service experiences, and many others (Zaino 2017). These developments have come with the introduction of office automation, social media, self-service technologies (SSTs), and utilization of Big Data, to list only a few examples. With such technologies having become able to handle an increasing repertoire of tasks for us, we are growing more and more accustomed to and dependent on them (Carr 2015; Daily Mail 2013), which binds us more tightly into the socio-technical network we continuously build and expand around us. This trend highlights the potential tensions that could emerge from the conflicting yet mutually consistent flows of increasing IT ubiquity on one hand and rising numbers of IT abandonment instances on the other. Points of conflict between these two simultaneous developments can lead to gaps between the tasks we wish to perform and the means we possess to complete them. Ultimately, such gaps make the potential end-user outcomes of what the literature refers to as IS discontinuance a highly relevant consideration.

Typically, the end users considered most are those employees whose work routines are altered when the management discards the incumbent system – e.g., an intra-organization customer relationship management (CRM) or enterprise resource planning (ERP) system (Furneaux & Wade 2011) or the application of a specified standard for inter-organization invoicing (Power & Gruner 2015). That said, organizations’ IS discontinuance decisions sometimes affect customers too, with pertinent examples being a retailer removing the self-checkout systems previously available to shoppers (The Telegraph 2015; TIME 2013) and a service provider in the software business either “killing” an application it introduced earlier (The Verge 2015) or ceasing support for a particular operating system (BT 2016; ITProPortal 2015). Such decisions are often driven by the incumbent system’s stated “end of life” date, cost considerations, customer feedback, process-compatibility issues, and various other factors (see, e.g., Power & Gruner 2015). However, with the deep and only growing interwovenness of humans and technologies, IS discontinuance decisions can entail many other factors, externalities that, while not always obvious to the decision-making organization, require careful consideration. For instance, withdrawing a system used in employees’ work may have disruptive effects on work processes and reduce worker satisfaction if the discontinuation brings significant changes in the nature of the tasks. At the same time, discontinuing an IS-based service used by customers may bring consequences that extend beyond mere cost considerations, such as lower customer satisfaction with the brand or company (The Verge 2015). This can, in turn, lead to undesirable outcomes such as a surge in negative word of mouth; deterioration in brand image; and, ultimately, loss of customers and market share (Hogan et al. 2003; Lehrer 2015; McDougall & Levesque 2000).

The notion that most systems’ life ends in obsolescence (Furneaux & Wade 2010; Swanson & Dans 2000) resonates with the opening quote from the book Galactic Pot-Healer when applied in the context of organizational IS management. Since entropy is indeed the fate of all things, eventually every IS will be retired. However, it is important too that the technologies being discontinued tend to be enmeshed in socio-technical systems in complex relations (Besson & Rowe 2012; Furneaux & Wade 2011) and, hence, do not invite this process but resist it, in various ways. Moreover, end users’ reactions to disruptions that create discontinuity in their routines of IS use complicate discontinuance, for the human factor can ultimately create the specter of resistance to such decisions long after the systems are retired. While organizations
can consciously facilitate the discontinuance process (Cohn 2016), the embeddedness of ISs exerts a pull against the inevitable entropy, even to the point where that inevitability is called into question. In addition, modern technologies may be exploited to extend the life span of outdated systems, and recent initiatives to advance “antifragile” IS development (Russo & Ciancarini 2016) could call into question the assumptions of IS obsolescence and deterioration. None of this makes understanding IS discontinuance any less relevant. Quite the opposite is true: it further complicates the phenomenon, emphasizing the need for disentangling its many threads.

1.1 The research gap and objectives

Untangling the process of IS discontinuance can shed light on why so many IS change projects result in failure or wind up in the murky area between success and failure. For instance, such efforts can help us to understand why numerous obsolete and outdated legacy systems remain in place even when more agile IS solutions are available and good implementations exist (CRN 2012; Schneider 2013). Moreover, since ISs get discontinued at various stages in their service life, for a whole host of reasons, it is important to understand the impact these discontinuance decisions may have on individual users. For instance, how do employees react when the central system for their work is discontinued? How does this change influence their work performance and, at the same time, their well-being? How can their recovery from any disruptive impacts of IS discontinuance be characterized? As for the second important angle mentioned above, how does withdrawing a service technology from customers affect customer relationships? These questions are relevant for any practitioner faced with the choice of continuing vs. discontinuing an incumbent system, and they hold significant importance irrespective of whether the system is used by employees or customers and of whether the system is an in-house one or from an external party. Despite the clear importance of these questions, IS literature has done little thus far to address them (see Chapter 2).

The objective with this dissertation is to improve on the current understanding of organizational IS discontinuance by investigating aspects of the phenomenon that have received very scant attention in prior literature. Firstly, while academic interest in the topic has seemingly increased this decade, the phenomenon has still received disproportionately little attention, and it calls for better conceptual understanding (Furneaux & Wade 2010; Recker 2016). Secondly, most of today’s writings on the topic discuss individual-level IS discontinuance decisions, leaving organizational decisions sparsely addressed. Also, research on IS discontinuance has been dominated thus far by factor-based studies that focus mainly on the predictors of discontinuance while considering the process through which these translate into discontinuance to be unknown (and unknowable). Accordingly, organizations’ IS discontinuance processes emerged as a potential subject for research (Furneaux & Wade 2010). Finally, although organizational IS discontinuance decisions have been acknowledged as having significant implications (Furneaux & Wade 2010, 2011), virtually no empirical research has examined what these implications are. I set out to address these research gaps by offering a fresh conceptualization of the phenomenon, identifying organizational IS discontinuance processes, and shedding light on the end-user outcomes of decisions in this domain. Against this backdrop, my quest to gain a more comprehensive understanding of organizational IS discontinuance led me to seek answers to three main questions.
Firstly, my search for construct clarity with regard to the dependent variable (i.e., IS discontinuance) resulted in defining and conceptualizing IS discontinuance behavior, with specific emphasis on the meanings previous literature has assigned to it:

**RQ1: What does IS discontinuance mean?**

This question is addressed in Paper I, which provides a compilation and synthesis of the definitions and senses of IS discontinuance adopted in previous IS literature. The work provides as output a conceptualization of IS discontinuance in terms of five distinct behavioral outcomes, occurring in particular stages of the life cycle of ISs’ use. Paper II sheds additional light on the matter by considering complexities related to defining the phenomenon: the findings point to the fact that sometimes IS discontinuance may be actualized only partially.

Secondly, since most of the IS discontinuance research has focused on studying static relationships between variables, we still lack understanding of the process connected with organizational IS discontinuance decisions. Since organization-level systems tend to be large, complex, and integrated with other systems, it is important to understand not just the factors that predict the likelihood of engaging in such projects but also the process in which they are abandoned. Charting this process can help organizations manage the typical caveats associated with complex change projects. Accordingly, I formulated the second question motivating my journey thus:

**RQ2: How do organizational IS discontinuance processes unfold?**

Paper I provides an aggregate-level answer to this question in positing that IS discontinuance takes place through at least five distinct process paths over the course of the use life cycle. Paper II delves more deeply into the discontinuance process in the context of organizations’ legacy systems. It reports on in-depth process analysis via which I uncovered both vertical interactions (links between people managing the replacement project and project workers and between the organization and its environment) and horizontal interactions (connections and path dependencies within the replacement projects), which coexist and shape the outcomes similarly.

Finally, with the consequences or outcomes of IS discontinuance remaining largely uncharted territory, I examined how organizational IS discontinuance decisions affect the host organization and its stakeholders:

**RQ3: What are the outcomes of organizational IS discontinuance decisions?**

Paper II addresses the topic via discussion of the contrasting perspectives of workers and managers on the outcome of partial discontinuance of a legacy system. Papers III and IV focus on this question with regard to two end-user groups: employees and customers, respectively. Paper III reports on a case of an organization wherein discontinuing an accounting system resulted in negative disruptions in processes and work routines. Paper IV presents an empirical case study of discontinuing a service technology available to customers in a retail context. Specifically, removing self-checkout points was found to have negative effects on customers’ purchase behavior and their evaluation of the service.

Figure 1 outlines the prior literature’s area of emphasis and the intended contributions of this dissertation, summarizing the focus related to each and presenting the key questions and type of answers pursued.
1.2 Definitions of key concepts

The following definitions are applied for the concepts most central to the work:

**Information system (IS).** In general terms, any mean of storing, disseminating, and presenting information can be seen as an information system. This extends even to engravings, paintings, papyrus, and books. However, for the purposes of this dissertation, I define the concept as covering computer-based systems that range from the first-generation systems introduced in the 1960s (Kelly et al. 1999, p. 4) to the commercial standardized systems of today (e.g., SAP systems and Salesforce). In an organizational context, an IS can be applied to increase collective efficiency and capability. Information systems comprise various combinations of hardware, software, data, processes, and functions.

**Information technology (IT).** The concept of IT covers the specific technological components of information systems that help humans interact with information systems. For instance, self-checkout machines are an information technology that enables consumers to use the service provider’s information system for the point-of-sale checkout transaction.

**IS use continuance.** An individual’s or organization’s IS use behavior that takes place after IS acceptance and initial use experiences is referred to here as IS use continuance. A conclusion in the acceptance stage that expectations have been met or exceeded, when coupled with high satisfaction with the IS, tends to predict IS use continuance (Bhattacherjee 2001). Among the
dimensions of continued use behavior are duration, frequency, and intensity of use (Venkatesh et al. 2008).

**Legacy system.** Organizational information systems in place that incorporate an earlier business model of the organization, from the time of their implementation, are denoted as legacy systems (Kelly et al. 1999). Often these perform back-end work for mission- or business-critical processes. Many have evolved under a development logic that can be described as evolutionary: functions get layered on top of the existing system architecture with little consideration for the overall architecture (Bannister 2001). Legacy systems are traditionally seen as being based on old or outdated technologies (Kelly et al. 1999, p. 5).

**IS architecture.** Encompassing hardware and software, operating systems, communication networks, data, applications, and work processes, the term “IS architecture” describes how these are organized and related to each other.

**Automation.** Automation is the practice of implementing technology to execute a process or task previously carried out by a human (Parasuraman 1997, p. 231). This can be achieved through combining several technologies, as with combinations of mechanical, hydraulic, and electronic devices. Control devices and interfaces are often implemented for humans’ supervision and control of the automated process. Automation has been a significant source of productivity improvements in developed societies.

**IS automation.** Automation enabled by IS implementation is called IS automation, often referred to also as office automation in an organizational knowledge-work context (McLeod & Jones 1987). It frequently involves automating knowledge-work processes. Some examples of IS automation are intelligent decision aids (Arnold & Sutton 1998), robotic process automation (Lacity & Willcocks 2016), knowledge-management systems (McCall et al. 2008), and ERP systems (Sayed 2006).

**Self-service technology (SST).** SSTs are technological interfaces or devices that allow customers to produce services without the direct involvement of a service employee (Meuter et al. 2000, p. 50), thereby replacing or diminishing the face-to-face interaction between customers and workers – e.g., automatic teller machines (ATMs), ticket-vending machines, retail self-checkouts (SCOs), and e-banking. Self-service technologies, which can be viewed as a type of automation, have been found to enable significant cost savings for the implementer and also greater convenience and time savings for customers (Collier & Kimes 2012; Meuter et al. 2005). However, some customers are disenchanted with the replacement of the human touch by a machine, experience difficulties with using the service, and even express concerns about SSTs taking jobs from human workers (Nijssen et al. 2016). Moreover, SSTs have been criticized for widening the digital divide, since they sometimes render services less accessible to people who cannot use them without assistance.

1.3 The structure of the dissertation

The dissertation is divided into two main parts.
Part I provides a summary of the research conducted to address the main questions outlined in Section 1.1. After the introduction provided in Chapter 1, I position my research against current IS literature in Chapter 2. With Chapter 3, I move on to discussing my research methodology, including philosophical assumptions, the approaches taken in the research, theoretical background, and the data-collection and analysis methods. Chapter 4 is devoted to reporting on the findings described in each of the four research papers, and in Chapter 5 I discuss the resulting implications for theory and practice, address the limitations of my work, and suggest areas for future research. The works cited and appendices are provided at the end of Part I.

Part II is composed of the four original research papers that provide full accounts of the research projects conducted for this dissertation.
2. Previous literature

In this chapter, I position my research in the body of work on related topics, by discussing the complexities of organizational IS change and how the IS discontinuance perspective can inform such research. Then, I review the current literature on organizational IS discontinuance.

2.1 The complexity of organizational IS change

Organizational IS discontinuance decisions represent an aspect of organizational IS change, one in which the organization’s technological components are altered, typically in response to the obsolescence of the IS (Furneaux & Wade 2017) or to environmental pressure (Boukef & Charki 2014; Power & Gruner 2015). However, such change is not easy: several organizational factors discourage, inhibit, and constrain the execution of major IS changes (Besson & Rowe 2012; Furneaux & Wade 2011, 2017; Rezazade Mehrizi & Módol 2012; Rinta-Kahila et al. 2016). Resource constraints, typically limits to monetary, time, and human resources, can render organizations economically inert and discourage them from conducting risky IS change projects. While such resource rigidity can be overcome when action must be taken in the face of a serious threat, it is much harder to overcome routine rigidity, “failure to change the organizational processes that use those resource investments” (Gilbert 2005, p. 741). This may be linked to organizational actors’ fear of change and reluctance to learn or to general norms and values in the organization that encourage inertia (Besson & Rowe 2012), manifested as management inability to initiate changes and/or as worker resistance to change (Lapointe & Rivard 2005).

Furthermore, the degree of embeddedness of technology in today’s organizations (Volkoff et al. 2007) makes embarking on bold IS changes especially daunting. Large-scale legacy systems tend to involve high levels of technical integration: components of the system are connected to each other by sophisticated linkages (Furneaux & Wade 2011). Similar dependencies can exist in the wider socio-technical environment of an organization, where work systems may be closely tied in with various other systems, processes, and people (Besson & Rowe 2012; Rowe et al. 2017). Hence, changing one system affects multiple elements in the organization’s socio-technical network, making controlled discontinuance of large, integrated systems immensely challenging. Finally, political factors can impede IS changes, through the power dynamics between the organization and its external stakeholders (suppliers, customers, and public institutions), as well as those between departments and teams within the organization (Besson & Rowe 2012; Rezazade Mehrizi & Módol 2012). Political cul-de-sacs can become especially prevalent in complex matrix organizations that have numerous affected systems and stakeholders.

Very often, IS discontinuance projects entail the implementation of a new IS to replace the old one (Furneaux & Wade 2011). While the outcomes of IS discontinuance have not received
much attention in the literature, researchers of IS change have found that sometimes the implementation of a new IS has disruptive (Davis & Hufnagel 2007) and even destructive (Drummond 2008) effects on the implementing organization. Such unanticipated effects have occurred when the IS has significantly altered work content and routines, which in more extreme cases has also translated into a worse service experience for customers (ibid.). Indeed, IS implementation failures are common and come in many forms (Lyytinen & Hirschheim 1987). It has been proposed that, rather than learning from failures, organizations are, in fact, learning to fail, by constructing myths that perpetuate short-term optimization, favoring expediency over making required transformations (Lyytinen & Robey 1999). In their fear of implementation failure, organizations strive to maintain the status quo and accommodate their existing practices when implementing new ISs, often justifying this with deterministic views of how they should operate (Arvidsson et al. 2014). Such determinism was salient in the case of a paper mill discussed by Arvidsson et al. (ibid.), wherein the IS implementation in itself was a success but the mill failed to reap the expected benefits. The parent company’s strategic intent for the IS change was mistranslated at the mill level, with the result that the mill entrenched itself in its old practices and failed to strategically reengineer the processes. The authors argued that organizations may fall into strategic blindness when the system implementation and alignment between strategic intent and IT capacities is not followed by realization of the strategic intent in practice (ibid.). Poon and Wagner (2001) described a similar situation, wherein one of their case organizations succeeded with some aspects of an IS implementation but failed at others. The result was an “unresolved” case of IS success. The picture gets even murkier when one considers the views held by the organization’s stakeholders, which can be mutually contradictory. In one example, of views of a completed IS change project (Newman & Robey 1992), the project was significantly late and went over budget but was still seen as a success by managers. In another case, a technically successful implementation came at the expense of marginalizing and overruling the system’s end users (Lyytinen & Newman 2015). These examples highlight the complexity of conducting IS change – of which IS discontinuance tends to be a part – and call for a more nuanced understanding of IS change outcomes. While the focus in IS change literature has largely been on implementing new ISs, the process and outcomes of IS discontinuance are most likely no less multifaceted.

2.2 The discontinuance perspective

The field of IS research has been criticized for exhibiting pro-adopter bias: technology discontinuers are typically under-studied (Rogers 2003), and this could limit our understanding of the IS discontinuance phenomenon. While organizational IS replacement decisions have received considerable attention in the literature (e.g., Chau & Tam 2000; Teo et al. 2003), the focus has tended to be solely on implementation of a new IS. Furneaux and Wade (2010, 2011, 2017) have argued that the focus on adoption conflates the incumbent system’s life cycle with that of its replacement. Accordingly, it is argued that focusing on adoption yields relatively limited insight into the discontinuance of incumbent systems and, thereby, even the outcomes from the new IS’s implementation. Recently, Power and Gruner (2015) showed that explicitly studying why some organizations choose to terminate a previously implemented IS can cast new light on such decisions. In addition, the assumption that innovation diffusion follows linear adoption patterns has been challenged, since organizations sometimes “go backward,” scaling back their IT implementation (ibid.) or the extent of IS automation (Rinta-Kahila et al.
In addition, scholars of IS change have often applied the implicit assumption that implementation of a new system automatically leads to (or is preceded by) the termination of an old one. However, the practical difficulties in trying to kill off old legacy systems illustrate that this is often not the case (CRN 2012; Hemon-Laurens 2016; Schneider 2013). Hence, some systems survive far beyond their expected “expiration dates,” sometimes even continuing to live alongside their intended replacements as duplicate systems. This situation, paralleling Turel’s (2015a, p. 3) notions about ambivalence in individual-level IS use intentions (i.e., “difficulty to choose between two conflicting actions”), points to the potential of conflicting organizational intentions coexisting: a strong intention to discontinue the system and a strong intention to keep maintaining it. Overall, both research and practice indicate that considering the discontinuance perspective can significantly inform academic inquiry into complex IS change processes and their outcomes.

### 2.3 The IS discontinuance literature

The body of research on IS discontinuance is still limited, but the topic has begun to attract significant attention since the start of this decade (see Figure 2). This surge of interest can be attributed to increasing academic interest in post-adoptions and post-usage IS behaviors as well as to the soaring popularity of social networking systems (SNSs) that have transformed the ways people interact with each other. With regard to the former, while the IS adoption and continuance research streams have reached maturity, they have been argued to provide only limited insight with regard to IS discontinuance behavior (Power & Gruner 2015; Turel 2015a), in shifting academic interest toward explicitly addressing IS termination decisions (as opposed to more extensive processes). As for SNSs, immoderate use has been found to create social and technical overload for users, leading to alleviation of the burden by ceasing SNS use (Luqman et al. 2017; Maier, Laumer, Eckhardt, & Weitzel 2015; Maier, Laumer, Weinert, & Weitzel 2015; Ravindran et al. 2014; Turel 2015a, 2016; Turel & Qahri-Saremi 2016; Zhang et al. 2016). This phenomenon has contributed to the SNS becoming a prominent research context also in the domain of IS discontinuance research.
Most studies of IS discontinuance concentrate on individuals’ decisions to discontinue use. Traditionally, individual-level IS discontinuance studies have examined either employees ceasing their use of work systems (Aggarwal et al. 2015; Cooper 1991; Recker 2016) or consumers abandoning systems designed either for utilitarian purposes (Prendergast & Marr 1995) or for entertainment (Danaher 2002; Parthasarathy & Bhattacherjee 1998). Dissatisfaction with system performance, incompatibility with the user’s needs, finding a more suitable IS for the application, and change in life situation all have been found to play a key role in users’ discontinuance decisions (Hand et al. 2009; Parthasarathy & Bhattacherjee 1998; Spiller et al. 2007). As discussed above, SNS discontinuance and SNS switching represent another prominent, currently trendy research stream.

Their practical significance notwithstanding, organization-level IS discontinuance decisions have received far less attention. Current literature on this topic is relatively scarce, and what does exist focuses heavily on the antecedents to organizational IS discontinuance. Organizations’ IS replacement decisions represent a quintessential example of this discontinuance and typically involve discontinuing an incumbent legacy system in favor of a more modern system (Furneaux & Wade 2010; Gangadharan et al. 2013). Swanson and Dans (2000) suggest that managers seek balance between the maintenance effort of an old system and its remaining life. They found that large and complex systems receive more maintenance effort and that systems’ remaining life expectancy decreases with system age. Sometimes managerial decisions on aging IT infrastructure can turn the sustaining-motivated maintenance efforts into conscious repair-to-decay by actively furthering the end of life of the old infrastructure (Cohn 2016). Furneaux and Wade (2011, 2017), who investigated key factors influencing IS replacement intentions, concluded that shortcomings in system capability lead to greater replacement intentions, while replacement risk, availability of system support, and levels of technical integration reduce them. Loss of human skills needed for supporting legacy systems represents another factor that may motivate or force an organization to discontinue its incumbent systems (Sandborn & Prabhakar 2015). On the same note, switching-related costs of IT operations, personnel replacement, and in-house learning have been found to affect firms’ willingness to discontinue.
their current IT outsourcing contract or switch outsourced-service provider (Whitten et al. 2010).

Others have studied organizations’ decisions to terminate the use of incumbent ISs entirely, without bringing in corresponding new systems in their place. For instance, Power and Gruner (2015) identified various reasons for organizations paring back their IT implementation by discontinuing their inter-organizational sales invoicing system. Some of the motivations were costs related to regulatory compliance or the system itself, disadvantages that such a system incurs for operations, and uncontrollable changes within the organization and in its environment. Moreover, systems’ complexity and incompatibility with needs have been found to cause organizations to prematurely abandon already implemented systems (Tully 2015). Taking another tack, Fürstenau et al. (2016) studied why organizations discontinue their unofficial shadow systems, finding that small and non-business-critical shadow systems are likely to face the threat of elimination particularly when challenges arise with the system or its use context. Finally, examining unethical use of ISs in particular, Boukef and Charki (2014) ascertained that organizations may end up ceasing controversial online reverse-auction use if it becomes harmful for their business or when the law so dictates. Correspondingly, Charki and colleagues (2017) have proposed that legal intervention would cause organizations to limit or discontinue their related unethical IT use, and that this effect is exacerbated by increased complexity and perceived risk of using that IT.

Although some individual-level studies (e.g., Cho 2015; Hogan et al. 2003; Lehrer 2015) reach beyond the antecedents to IS discontinuance in attempts to reveal its consequences, the literature remains largely silent on the consequences of organizational IS discontinuance. To the best of my knowledge, this facet has been discussed only in connection with our case study of an organization that replaced its highly automated accounting system with a less automated one (Rinta-Kahila et al. 2018). This change had disruptive effects on the accountants and their organization because relying on the automation for years had eroded these workers’ professional expertise. Paper III provides a more detailed description of the case.

Given the prevalence of organizational discontinuance decisions in various industries, it is surprising that they have received very little consideration in the literature and that virtually no research has paid attention to the outcomes of such decisions. Moreover, although some researchers recognize the topical practical problem of killing off old legacy systems (Furneaux & Wade 2011, 2017), they tend to address the issue through models with a simple factor-based design, which rarely capture the multiple levels, time-embeddedness, and contextual nature of such endeavors. Achieving a better understanding of the phenomenon calls for process-oriented research approaches. Hence, this dissertation is focused on understanding organizational IS discontinuance from the process perspective – i.e., on unpacking the interactions of events and states that lead to abandoning incumbent IT. Moreover, to extend our understanding of the outcomes of those processes and to open a new prospective research area, I examine the effects of organizational discontinuance decisions on both the organization itself and the end users of the systems: workers and consumers.
3. Methodology

A researcher’s methodological choices should always be guided by mindful consideration of the underlying assumptions about reality and knowledge. As Morgan and Smircich (1980, p. 491) put it, “the choice and adequacy of a method embodies a variety of assumptions regarding the nature of knowledge and the methods through which that knowledge can be obtained, as well as a set of root assumptions about the nature of the phenomena to be investigated.” Therefore, both ontological assumptions about the nature of reality and one’s epistemological stance on what knowledge is and on the means that suffice for obtaining it largely determine the methods appropriate for studying a given phenomenon. Mainstream IS research operates largely under two main epistemologies, positivism and interpretivism (Wynn & Williams 2012), which are mutually contradictory in their focus – on objectivity and subjectivity, respectively. The IS research field was heavily positivist in its early days, typically relying on surveys and laboratory experiments as the main research methods (Orlikowski & Baroudi 1991). Positivism in IS research has been criticized for excessive scientism: prioritizing objectivity and precision of method over the relevance of context (Klein & Lytinen 1985). In the end, the social reality is not easily quantifiable, and it is often argued that purely quantitative explanations cannot capture some of the highly complex phenomena central to IS research (Wynn & Williams 2012). Thus, criticism leveled at positivism as “the natural-science model of social science” (Lee & Baskerville 2003, p. 229) has, alongside the introduction of principles for conducting rigorous interpretive research (Klein & Myers 1999), facilitated embracing interpretivism as a viable and much-needed research orientation in the IS field. In one attempt to reconcile the juxtaposition between the two schools of thought, Lee (1991) has proposed an integrative approach wherein the contrasting perspectives are seen as distinct levels of understanding that inform each other. Yet it has been argued that understanding complex phenomena such as organizational IS change requires going beyond the conventional positivist and interpretivist paradigms to develop “in-depth causal explanations for the outcomes of specific sociotechnical phenomena that take into account the breadth of information technology, social, organizational, and environmental factors which may have played a causal role in their occurrence” (Wynn & Williams 2012, p. 787). To this end, critical realism (Bhaskar 1975, 1989) has been advanced as a viable philosophical lens for IS research (Williams & Karahanna 2013; Wynn & Williams 2012). For instance, Volkoff et al. (2007) have demonstrated critical realism’s potential for acting as a more suitable lens for study of technology-mediated organizational change than purely interpretive approaches. Accordingly, in this dissertation I take a critical realist approach to the research problems. Below, I will discuss the corresponding philosophical assumptions that underpin my research approach and methods, before addressing the research approach chosen and, then, the theoretical background and methods applied for the four papers included in this dissertation.
3.1 Assumptions

Overall, my philosophical assumptions and research principles reflect those of critical realism (CR) as explicated by Wynn and Williams (2012).\(^1\) In its purest form, CR posits that social structures and systems exist and operate independently of our conception of them, constituting an objective reality (Bhaskar 1975). Therefore, CR asserts, science should be based not purely on what we can empirically prove but on discovering the latent mechanisms that produce causal effects. However, human ability to access the latter reality tends to be limited, and our interpretation of it is often flawed. Positivism addresses this issue by disregarding the underlying mechanisms acting between causes and effects, while interpretivism maintains that reality is not objective but constructed by individuals or socially. At the core of CR, in contrast, is the assumption that reality is composed of three nested domains: real, actual, and empirical. The domain of the real encompasses reality and causal mechanisms that exist independently of our perception of it. The actual, in turn, is nested within the domain of the real. It is here that the events resulting from the causal powers of reality take place, whether they are observed by humans or not. Finally, the empirical domain, nested within the domain of the actual, encompasses the events that humans can experience through perceiving or measuring. A key aspect of CR is its attention to potential lack of synchrony among these domains of reality: an event may occur in any of them, and sometimes a mechanism translating it into another domain is not activated or is counteracted by other mechanisms. This explains why perceptions or observations do not always match the actual events.

One of the fundamental principles of critical realist research is explicit accounting for the structure and context of the phenomenon and for their relations and emergent changes. Moreover, critical realist research aims for the identification, empirical corroborations, and fleshing out of causal mechanisms, with the endeavor being to find the best explanation for the phenomenon that occurs. With regard to methodology, CR encourages triangulation since the use of multiple data-collection and analysis methods is often advisable. The aim throughout is to uncover as much of the objective reality as possible. For our purposes, one key advantage of the critical realist approach is that, precisely by embracing multimethod and multilevel approaches, it is able to yield richer and more robust causal analysis, which can result in a better understanding of IS change outcomes (Wynn & Williams 2012, p. 788).

These philosophical considerations are crucially important, because they inform my research approach and methodological choices, along with the interpretation of my findings and assessment of their implications. Overall, a critical realist stance calls for capturing multiple aspects and levels of the phenomenon of interest through extensive collection of rich data and triangulation of findings.

3.2 Research approaches

One important choice in efforts to explain complex IS change is related to the intellectual strategy applied in studying the topic: the extent of “closed-boxing” or “open-boxing” of the change

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\(^1\) In the IS field, the critical perspective has been applied primarily in research with emancipatory purposes — i.e., for exercising fundamental criticism of prevailing social structures while embracing certain value propositions at the heart of the research that align with seeking to improve life for human actors (see Myers & Klein 2011). However, this is just one approach to applying the CR paradigm, and CR can be a useful philosophical foundation for organizational research in general. With this dissertation, I strive to improve the level of IS theory via a solid general approach to the critical realist perspective that is consistent with the treatise on the topic by Wynn and Williams (2012).
process – i.e., the underlying mechanisms between causes and effects (Lyytinen & Newman 2008). Factor-based models tend to keep the IS change process in a closed box, offering only a cross-sectional glimpse of the antecedents to and outcomes of the change, limited by the characteristics of the theory that is being tested (ibid., p. 608). Because factor-based models assume variation in the outcome to be explained by variation in its predictors, they often do not explain the causal mechanism (how and why the outcomes are related to the predictors); the connection is only assumed (Newman & Robey 1992, p. 250). Moreover, many functional factor models require omitting some potentially relevant variables that are impossible or difficult to measure. Weick (1984) argues that by not considering a variable relevant to the phenomenon under investigation, the researcher assigns it a value of zero, which is the only value it cannot have. That being said, developing and testing factor models can still be immensely valuable: it may yield useful and generalizable conclusions about the inter–relations of various relevant factors. Moreover, while factor- and process-oriented models should not be combined, they can be operationalized in a complementary and mutually informative manner (Newman & Robey 1992, p. 251). My intention, then, is by no means to dispute the value of applying factor models – in fact, I took such an approach myself with Paper IV. Still, I champion the use of more open-boxed approaches especially for unraveling the complexity of phenomena such as organizational IS change. This is especially vital when the researcher is asking questions such as how and why a certain phenomenon occurs. In addition, when testing a factor model is considered appropriate, I advocate methodological triangulation and the use of additional robustness checks to strengthen the causality claims and to shed more light on the underlying mechanisms.

At the opposite end of the continuum are entirely open-box approaches. One manifestation is detailed stories, typically based on raw data gathered through highly involved ethnographic or action research and entailing very little a priori theorizing (Lyytinen & Newman 2008, p. 608). Such narratives can be used to lay out a rich history of IS change as interpreted by the researcher, but they tend to be thick and relatively unstructured explanations since they consider every minor and random event a potentially significant factor in change (ibid.). Thus, the two poles of approaches present researchers with tradeoffs related to generalizability, simplicity, and accuracy of explanation (ibid., p. 609). A process perspective has been proposed as a useful middle-of-the-road strategy, for capturing the underlying mechanics and interactions of change while maintaining the possibility of a priori theorizing and structured explanations (ibid.; Newman & Robey 1992). In general terms, process theories explain how things develop and change over time via emergence of events, states, and interactions (Markus & Robey 1988). Using process models allows one to capture these events, states, and interactions in context, and doing so can aid in achieving understanding of how an organization shifts from one state of being to another. Indeed, it has been argued that process thinking has already enhanced our understanding of complex IS change (Ahmad et al. 2011). Since organizational IS discontinuance decisions tend to be complex and have diverse externality effects, process models have an edge against factor-based models in their ability to shed light on how organizations navigate through such difficult and time-consuming change. The differences between factor and process models are illustrated in Figure 3.
Methodology

<table>
<thead>
<tr>
<th>Factor model</th>
<th>Process model</th>
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</thead>
<tbody>
<tr>
<td>Relationships between independent and dependent variables, assumed causality</td>
<td>Sequence of events, activities, choices, and their interactions leading to outcomes</td>
</tr>
</tbody>
</table>

**Figure 3.** Factor and process models, per Langley (1999) and Newman and Robey (1992).

Process data tend to be messy and disorganized, so the dataset must be translated into a compelling and understandable form so as to provide better explanations of the phenomena subject to study (Langley 1999; Pentland 1999). Therefore, Langley (1999) has outlined several strategies for making sense of process data. These strategies vary in their accuracy, simplicity, and generality in such a way that each choice of strategy represents a tradeoff: high accuracy comes with the cost of losing simplicity and generality, and *vice versa*. The most commonly applied strategy is to build a detailed narrative from the data, whether it represents the main output of the research effort, an analysis tool, or merely a stepping stone for building a chronology of events that are to be further analyzed. Of the possible strategies, the narrative yields the most accurate process description, while quantification represents the other end of the spectrum, at which complex process data get reduced to a quantified form that can be analyzed with statistical methods. Between these two extremes lie several other strategies. For instance, visual mapping represents a more moderate method of data reduction and synthesis than quantification: process data get distilled into a graphical presentation. Closely related to this, temporal bracketing groups the data by successive time periods, giving the dataset a sequential structure (Pentland 1999). This strategy is often applied in combination with visual mapping.

While I argue that the process perspective is an immensely valuable yet underutilized approach for studying organizational change, factor models may be preferable if the context and purpose of the study point to this. For instance, in the context of consumer services it could be more relevant for managers to understand the aggregate effects of altering their IT services than to consider the unique experiences of individual customers. Accordingly, the work for Paper IV employed a positivist-oriented natural experiment wherein we captured consumers’ reactions to discontinuance of retail self-service technology via longitudinal survey data. This approach dovetails with the purposes of the study: with survey-based data, one can reveal the aggregate impact of SST discontinuance and its extent, for informing the managerial decision-making. While that addresses the organizational perspective, which is the focus of this dissertation, the statistical analyses are supported with qualitative evidence gathered both from consumers affected by SST discontinuance and in an interview with the relevant store’s manager, in the spirit of my critical realist stance. I believe that triangulating the findings and reconciling
contrasting perspectives lends considerable credibility to our propositions in that it allows us to part the curtains that shroud the domains of real and actual. This renders them ever so slightly more accessible.

### 3.3 Choice of approach and method

Wynn and Williams (2012) identify the case-study method as especially suitable for conducting critical realist research aimed at yielding causal explanations for complex phenomena (p. 788). Since my philosophical assumptions are close to those of CR and my research is focused on the multi-faceted process and outcomes of organizational IS change, I find the case study a highly appropriate research method for my purposes. Moreover, generating explanatory process theories is highly appropriate under the CR paradigm: rather than predicting or describing events, these explain them by identifying the mechanisms that generate the observed events in the empirical domain (Volkoff et al. 2007). In keeping with the recommendations by Wynn and Williams (2012, p. 805), each of the dissertation’s constituent empirically oriented papers is an attempt to identify and explicate those generative mechanisms at multiple levels of analysis. My realist stance is especially apparent in papers II and III: both report on case studies in which I conducted process analysis of an organizational IS change. This approach allowed me to gain a rich understanding of critical events and interactions in their organizational and environmental context. Also, in the methodological sense, I attempt to reconcile and triangulate the perceived realities of different organizational actors and entities to discover the objective reality behind those perceptions. The PSIC model (see Subsection 3.4.2), applied as a sensitizing device for Paper II and as a source of inspiration for Paper III’s process model, is rooted in realist assumptions in that it constitutes an effort to construct an objective understanding of a socio-technical process by accounting for socio-technical and context-situated entities’ horizontal (single-level) and vertical (multiple-level) interactions both (Lytyinen & Newman 2008, p. 601). Still, the model invites the use of interpretive analysis for understanding the actions and perceptions of organizational actors within their context (ibid.). In a similar vein, while I exploited moderate interpretivism for understanding the role of automation and the manifestation of “deskilling” for Paper III, with the analyses I sought to discover the mechanisms that operate in the domain of the real and get translated into events in the domain of the actual, regardless of the realities formed by individuals and socially. It is inherent to the multimethod nature of CR that the objective reality can be accessed through both quantitative and qualitative methods, which may be used to complement each other. This view is salient for Paper IV: although we performed a rather positivist-oriented statistical analysis of survey data, we triangulated the findings by collecting and examining qualitative data from two levels of analysis (individual customers and store manager). We also employed difference-in-differences analysis to account for the limitations of survey-based factor models and capture the causality between IT discontinuance and its consequences. Moreover, we controlled for alternative explanations through supplementary analyses and qualitative triangulation. While Paper IV reports on not a case study but a survey-based consumer study, it nevertheless presents a particular case of organizational IT discontinuance and consequences thereof.
3.4 Motivations, research contexts, and theoretical background

Each paper included in the dissertation and dealt with in this synthesis presents a standalone study situated in a distinct research context. Hence, I have applied numerous theories, depending on the research question and the study's context. I will now present the research questions and framework for each study, along with why these are appropriate devices for understanding IS discontinuance.

3.4.1 Paper I

For Paper I, we set out to gather and study current work on IS discontinuance to find answers for the following question: what does IS discontinuance mean? For this purpose, we developed an analytical framework based on Pettigrew's (1985) contextualist approach. Contextualism was developed as a mode of analysis for studying organizational change, which Pettigrew suggests to involve an interplay of context of change, process of change, and content of change, combined with regulation of relations among all three (p. 62). We found the notions of context, process, and content to represent particularly strong potential as sensitizing devices (Gregor 2006) with regard to the IS discontinuance phenomenon, so we anchored our analysis in these three key aspects. Here, a process is a “sequence of actions and events which is being used to explain the origins, continuance, and outcome of some phenomena” (Pettigrew 1985, p. 64).

Applying this sense of the term, we considered the archetypal IS use life-cycle process, which starts with exposure, advances to adoption and continued use, and ends with discontinuance. We drew on the diffusion of innovations theory (Rogers 1962, 2003), the model of IS continuance (Bhattacherjee 2001), and the user transformation model (Maier, Laumer, Weinert, & Weitzel 2015) to bring further nuance to the accounting for process. Specifically, we addressed knowledge, persuasion, and decision (Rogers 2003) as relevant steps the IS user may take during the exposure stage. Next, implementation and confirmation represent important steps occurring in the adoption stage (ibid.; Bhattacherjee 2001). If the initial use experience fulfils the user’s expectations of the IS, the user moves on to the stage of continued use in the IS use life cycle, which eventually ends with the termination of IS use (Maier, Laumer, Weinert, & Weitzel 2015). Secondly, content reflects concrete outcomes of the change process. While literature on continued IS use has distinguished among qualitatively distinct aspects of IS use such as frequency, duration, intensity, and comprehensiveness of use (Turel 2015b; Venkatesh et al. 2008), we strove to uncover the content of IS discontinuance behavior as it is presented in the literature. This involved considering how the nature of IS discontinuance is presented and whether this involves intentions or actual behavior. Finally, considering context highlighted relevant aspects of the IS use environment that shape (and are shaped by) the process and content. To this end, we considered three dimensions – namely, system type, the system’s immediate use context, and the level of analysis. For characterizing the system types presented, we applied the traditional utilitarian–hedonic division (van der Heijden 2004) on the basis of the system’s primary use purpose as reported for each study (Wu & Lu 2013). We captured the immediate use context and level of analysis by distinguishing, respectively, between organizational and non-organizational use environment and between organization- and individual-level analysis.
3.4.2 Paper II

With Paper II, I wanted to delve more deeply into the process of IS discontinuance from the organizational point of view and explain ambiguous IS discontinuance outcomes in cases of complex organizational IS change, specifically in the context of replacing legacy systems with a modern IS. Therefore, I investigated the following question: how does an organization get caught in between old and new system architectures when conducting IS change? To this end, I took an immersive look at a multinational organization that had executed a major IS change at one of its factories in Finland, which I refer to as EngineShop. The organization had revised its strategy by shifting from single-country manufacturing toward international collaboration between factories, and this brought a need for centralized ISs for the global organization. For EngineShop, this entailed discontinuing an old legacy system (“DG”) and replacing it with modern off-the-shelf systems. The dismantling of DG began with replacement of its product-data management (PDM) and ERP functions by well-known commercial systems: Teamcenter and an SAP system, respectively. Though the ensuing IS change project resulted in deployment of two new systems, the factory was unable to entirely kill off its legacy system. In fact, DG is in operation even today, eight years after the IS change project. The background offered by the IS discontinuance perspective (Furneaux & Wade 2011, 2017; Power & Gruner 2015; Swanson & Dans 2000; Turel 2015a) helps to explain why the IS change was left half-done. The case study was informed by previous research on organizational IS life-cycle management, IS discontinuance, and IS replacement decisions.

Further theoretical grounding was provided by Lytinen and Newman (2008), who proposed a Punctuated Socio-Technical Information System Change (PSIC) model as a structured but flexible theoretical sensitizing device for producing rich yet generalizable process-oriented explanations of organizational IS change. The PSIC model is able to address IS change at several levels of analysis, with the most relevant ones being the work-system level (the level of current work processes in the organization), the building-system level (involving the resources and activities assembled for conducting the IS change), and the context-linked levels of IS change: the elements of the organization (e.g., the top management) and its environment (e.g., the economy and competition). The model draws from Leavitt’s (1964) socio-technical theory (also known as Leavitt’s Diamond), wherein organizational socio-technical systems are made up of four interrelated components: actors, tasks, structure, and technology. In the PSIC model, IS change occurs through both incremental and punctuated changes in the interrelationships of these components, with oscillation between spans of stability and radical upheavals, creating socio-technical balances and imbalances. For instance, a work-system-level imbalance may arise through a gap between technology and actors if employees resist the organizational IS or lack the skills to use it, or a building-system-level imbalance might emerge through a gap between structure and tasks if the top management fails to allocate sufficient resources for implementation of the new system.

A key benefit of the PSIC model is its ability to simultaneously account for horizontal and vertical interactions – i.e., to consider the horizontal temporal dynamics of socio-technical systems’ work- and building-system balances throughout the change while also addressing how these vertically interact with the organizational and environmental states and events. In addition, the model enables taking historical developments as the starting point for IS change, by examining its antecedent conditions at several levels of analysis. While the PSIC model offers a readymade structure, it remains inclusive and flexible, allowing one to extend and modify it in accordance with the characteristics specific to the change process under investigation. This
can be done by adding or omitting particular levels of analysis and applying various theoretical lenses (e.g., Lyytinen et al. 2009).

### 3.4.3 Paper III

Paper III was motivated by a desire to explore the consequences of organizational IS discontinuance decisions from the perspective of automation and “deskilling,” discussed below. The case study was conducted at “AccComp,” an IT service provider that had discontinued its fixed asset management (FAM) system, called “FamSyst”, in one part of a larger accounting-system replacement. Since the company’s accountants had become used to relying on FamSyst’s automated features, the transition to a less automated IS architecture led to malfunction in accounting processes and to disruptions in accountants’ daily work. By exploring this context, we sought also to advance theoretical understanding of the connections among automation, deskilling, and organizational IS implementa-tion practices. We set out to investigate the following research questions: 1) how does organizational automation implementation lead to deskilling of knowledge workers?, and 2) how may an organization cope with deskilling?  

Typically, IS implementation entails a certain degree of task-automation. While automation can result in significant performance improvements, its effect on worker skills is a source of concern. Specifically, it has been suggested that automation tends to mask the logic and mechanics behind work processes, thereby causing workers to lose fundamental understanding of the underlying principles. Implementing automation such that it gets seen as a “black box” that conjures up results could turn the professionals who had been in charge of manually performing the operations into mere outside observers. The notion of deskilling is often applied to describe this process wherein reliance on automatic actions erodes operators’ skillset. These concerns have salience in the theory of technology dominance (Arnold & Sutton 1998), according to which, in the example context of auditing, use of intelligent decision aids could lead to deskilling of auditors. The theory suggests that, overall, effective automating of complex tasks leads to over-reliance on automation, which ultimately results in skill erosion first at the level of individuals and later for the profession as a whole. Deskilling due to IS automation has been witnessed with such contexts as accounting systems (Rinta-Kahila et al. 2018), knowledge management systems (McCall et al. 2008), and the aforementioned decision aids in auditing (Dowling et al. 2008). Then again, literature on automation bias (Parasuraman & Manzey 2010; Parasuraman et al. 1993) suggests that there is an additional critical factor behind the ill effects of automation, one related to complacency, a “feeling of calm satisfaction with your own abilities or situation that prevents you from trying harder” (Cambridge Dictionary 2018). It is possible that operators’ complacency and reliance on automation could encourage skill erosion, especially in contexts wherein high task complexity provides incentives for implementing highly reliable automation. While there has been academic interest in the effects of automation on human workers, the process in which organizational automation implementation causes deskilling of knowledge workers has not been studied.

In the ideal case, organizations would implement IS automation in their processes mindfully, in such a manner that the employees retain their expertise in the process that has been

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2 The literature uses the term “deskilling” to refer to two parallel but distinct phenomena (Orlikowski 1991): an occupation or industry not requiring as advanced a set of skills as before (e.g., in response to the introduction of technology, resulting in cost savings from hiring less skilled labor; see Braverman 1974) and a person becoming less skilled (e.g., on account of over-reliance on technology; see Arnold & Sutton 1998). From an organization’s perspective, the former effect is often intentional while the latter effect tends to be an unintended side-effect. In Paper III, we employ the concept in the latter sense.
automated but also gain more holistic understanding of its larger context since they no longer have to reserve a portion of their cognitive capacity for handling the process manually. A process of upskilling could ensue, with employees elevating themselves to a wholly new level of understanding without losing the essential practical know-how (Gallie 1991; Orlikowski & Barley 2001; Zuboff 1988). For instance, accountants have been found to mitigate the potential deskilling effect of ERP system implementation by learning new skills and redefining their work roles (Sayed 2006).

Ultimately, the manner in which systems are implemented has a direct impact on the sense-making of their users (Griffith 1999) and, hence, on how the users eventually react to their discontinuance. Indeed, the deskilling perspective puts IS discontinuance decisions in a new light: when IS implementation has caused skill erosion, the consequences of the system’s discontinuance are potentially more severe if absence of adequate technology creates a gap between users and their work tasks. One would expect this to create disruption not only for the users but also for the processes in which the users and the IS participate. If users have been deskilled, they and their organization will probably need to address a gap between task and skills (Agniew et al. 1997). The coping model of user adaptation (Beaudry & Pinsonneault 2005) is a useful framework for studying user adaptation to such disruptive IT events. The model suggests that after becoming aware of the IT event, users will appraise it as either an opportunity or a threat. This assessment is followed by secondary appraisal wherein the users evaluate the extent to which they have influence over three components with regard to the event: work, self, and technology. These assessments determine their selection of a coping strategy, which may entail (under opportunity appraisal) benefits’ maximizing / satisficing or (under threat appraisal) disturbance-handling and self-preservation. When the event involves automation being decreased through IS discontinuance, deskilled users would presumably form a threat appraisal and apply a specific coping strategy on the basis of the extent they may alter themselves (e.g., relearning), their work (e.g., forming new routines), and the technology (e.g., influencing the features of any new system).

3.4.4 Paper IV

The objective behind Paper IV was to investigate the impact of technology discontinuance on customers in the context of a specific retail self-service technology: self-checkout units. We set out to investigate the following research question: what are the effects of retail SCO service discontinuance on customer response? We were especially interested in changes in purchase behavior and service evaluation. Purchase behavior, which reflects the practical aspects of customer response, was captured in terms of a) basket size, a relevant and frequently cited metric for it (Bell & Lattin 1998; Liu 2007), and b) level of preference for paying in cash, which shapes consumers’ spending behavior (Hirschman 1979). Service evaluation represents customers’ overall experience and relational outcomes of SST use through a) customer satisfaction with the service (Meuter et al. 2000) and b) customers’ enjoyment of their shopping (Dabholkar & Bagozzi 2002; Koufaris 2002).

In the context of consumer service technologies, Scherer et al. (2015) suggest that people who rely on a single method of delivery of services (be they human- or technology-delivered services) are less loyal to the service provider than are those who use multiple means of service delivery. Accordingly, changes that result in narrowing of the range of service-delivery options (e.g., discontinuance of a service technology) may be detrimental – in an effect opposite that whereby augmenting a service environment with a technology may benefit customer
Methodology

relationships. This draws attention to the need to capture the end users’ beliefs related to the discontinued IT and the service environment. To this end, one can apply belief elicitation to capture the constellation of people’s salient beliefs and experiences associated with a given subject (Holden & Karsh 2010). This approach is embodied in the belief-adjustment model (Hogarth & Einhorn 1992), which has been successfully utilized in prior service research examining how consumers form opinions of changing service environments on the basis of their existing beliefs and new information (Dagger & Danaher 2014; Vanhoof et al. 2005). The model expresses the postulate that people update their beliefs by introducing new information to their existing belief set through a process of anchoring and adjusting, wherein an older belief or perception serves as an anchor in terms of which people judge when adjusting upon exposure to the new information. Thus, the resulting service estimations are highly influenced by the initial anchoring beliefs. This suggests that customers, when exposed to service changes, evaluate the new service environment against the backdrop formed by their anchor beliefs from before the change, creating adjusted estimations in accordance with their perceptions of the change. Since discontinuing an IT can be seen as downgrading the service environment, customers’ perceptions of the new situation may involve estimates below the anchor’s reference value, rendering their overall evaluation less favorable than the earlier one. Proceeding from this model and its applications in consumer research (e.g., Dagger & Danaher 2014), I posit that customers form their beliefs about an IT service through an anchoring and adjusting process when they are subjected to new information and experiences related to that service. I consider SST discontinuance as a source of new information that customers incorporate into their set of beliefs. The assimilation of new knowledge with existing beliefs translates into updated customer beliefs about the service in its new form and, thereby, into the end-user reactions to the IT discontinuance.

3.5 Collection and analysis of the data

Next, I discuss the methods of data-collection and analysis employed for the four papers.

3.5.1 Paper I

Since the objective for Paper I was sensitization to the various meanings IS literature has given to IS discontinuance, the study reported upon was a purely conceptual one based on a disciplined and comprehensive review of the literature (Paré et al. 2015) on the topic. The data were gathered through review and analysis of the current literature on it in line with the approach of Webster and Watson (2002). We commenced the project in October 2015 and conducted several rounds of literature searches, with the final one taking place in November 2017.

Data collection. We performed the initial search by using the following query for the Scopus database: (TITLE-ABS-KEY (“IS” or “Information Systems” or “IT” or “Information Technology”) AND (“Discontinuance” or “Discontinue” or “Discontinued Use”))). All told, this yielded 7,542 results. We then limited the search results to the English language and also excluded subject areas beyond the scope of our interest (e.g., medicine, biochemistry, and the environment). The subsequent search produced 473 results. Examining abstracts for the search items returned led to omission of studies that were irrelevant to the topic at hand. This left, in total, 72 studies to be analyzed in more detail. From that pool of studies, a further 39 in all were filtered out because either a) they did not actually address the IS discontinuance phenomenon, instead referring to it only in passing, or, b) although there was a claim of insight
into IS discontinuance, their focus was entirely on explaining continued IS use. Accordingly, the first search stage resulted in discovery of 33 studies that specifically addressed IS discontinuance. To complement this search, we performed the same query with Google Scholar, and it yielded two additional studies, which we hence added to the sample. In the second stage, we executed backward and forward citation reviews (ibid.) for the 35 studies identified in our search procedure. As we investigated these studies, we found references to additional potentially relevant papers, which our search queries had not captured. After this, we scanned our own academic libraries in search of other studies that might be eligible for consideration. Thus, the second stage resulted in adding 27 studies to our corpus. Finally, four further pieces were filtered out, because they were found to represent incomplete work: they were research-in-progress papers. The final sample from the search procedure consisted of 54 articles.

**Data analysis.** We compiled a conceptual matrix (ibid.) covering all 54 studies, wherein we compiled the information extracted on their methods, theory, empirical context, unit of analysis, and main findings, along with the IS characteristics considered. We also analyzed how the researchers defined, conceptualized, and operationalized IS discontinuance in their studies. Moreover, we tabulated the independent and dependent variables reported upon in the studies, to obtain a good overall sense of what kinds of constructs and relationships were investigated in those studies. Our elaboration of a contextualist analytical framework (Pettigrew 1985) guided this stage of the process, in which we focused on discriminating the paths IS discontinuance takes (i.e., process) and characterizing the meaning of discontinuance behavior (i.e., content) within that context.

### 3.5.2 Paper II

For Paper II, I conducted an in-depth case study taking a realist approach (Lyytinen & Newman 2008) to ascertain how the factory became “caught in between” the old and the new IS architecture.

**Data collection.** I collected the data for this study in three stages (see Table 1). Firstly, to gain general understanding of the situation and specify a research question, I conducted a group interview with the key IS managers at the factory. The second stage involved a series of semi-structured interviews with key personnel identified in the group interview. I formulated an interview protocol, using earlier literature on organizational IS change and IS discontinuance as a sensitizing device. The main themes for the protocol were the following: the informant’s perception of and relationship with the legacy system, his or her perceptions as to the decision to transition from the legacy system, and the complexities of the transition. When doing so was relevant, I allowed the interviews to make even substantial deviations from the interview outline. I took notes during the interviews and also allowed the informants to illustrate the process and system architectures on paper and via a flipchart. The process utilized snowball sampling: at the end of each interview, I asked whether the informant was aware of anyone else in the organization who could shed light on the topics of interest. This led to the identification of four additional individuals for subsequent interviews in this stage. Then, in the third stage, I conducted four more interviews. Two of these were follow-up interviews with second-round informants, and the other two were with new informants identified in the previous stage. This time, I took a more detailed look at the events that had led to the current IS architecture situation at EngineShop. To this end, I produced a new interview protocol, guided by the levels of analysis and socio-technical components in the PSIC model (ibid.). Applying the logic of temporal bracketing (Langley 1999), I organized the protocol in terms of three
periods: the time of the antecedent conditions from when the change was initiated (~2000–2005), that of the IS implementation projects and their context (2006–2010), and the time of subsequent system-development efforts and new replacement initiatives (2011–2018). All interviews were recorded and transcribed. In awareness that the IS change was perceived as a divisive issue in the organization and also that many of the events related to it had occurred quite some time in the past, I employed measures recommended by Klein and Myers (1999) and by Huber and Power (1985) to improve the data’s reliability. For instance, I requested to interview such people as would be especially knowledgeable about the topic and those who had held or were currently in relevant positions with respect to the events of interest. To offset the effect of potential informant biases, I asked to interview people who held contrasting perspectives or who knew about differing aspects of the topic. Furthermore, I assured the informants of the interviews’ anonymity and confidentiality, stressing that I would not disclose any information they did not wish to be recorded or reported. In all, the three data-collection stages yielded 147 pages of transcribed interview data, eight pages of fieldnotes, and various physical and digital exhibits related to the IS change.

**Table 1.** The data-collection stages for Paper II.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Month</th>
<th>Job titles of interviewees</th>
<th>Interview length</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE I: Orientation via a group interview</td>
<td>November 2017</td>
<td>Application Manager, Application Specialist, Factory Business Engagement Manager, Head of Engineering Applications, and Teamcenter Application Owner</td>
<td>40 minutes</td>
</tr>
<tr>
<td>STAGE II: One-on-one interviews</td>
<td>December 2017</td>
<td>Business-Unit Manager</td>
<td>54 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Head of Engineering Applications</td>
<td>58 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product-Group Engineering Tool and Process Manager</td>
<td>63 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Teamcenter Application Owner</td>
<td>64 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Country IS Manager</td>
<td>60 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Product-Group Product Development Manager</td>
<td>27 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factory Business Engagement Manager</td>
<td>45 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application Specialist</td>
<td>50 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchasing Manager</td>
<td>47 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Application Manager</td>
<td>42 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Business-Unit Product Manager</td>
<td>54 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factory Production Manager</td>
<td>52 minutes</td>
</tr>
<tr>
<td>STAGE III: Follow-up interviews</td>
<td>March 2018</td>
<td>Product-Group Product Manager</td>
<td>100 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Country IS Manager</td>
<td>81 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Project Manager</td>
<td>105 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Factory Business Engagement Manager</td>
<td>78 minutes</td>
</tr>
</tbody>
</table>

**Data analysis.** My goal was to build a process model of IS change at EngineShop that would explain how the IS change in question resulted in the factory getting caught in between old and new IS architectures. Therefore, I conducted a PSIC process analysis (Lyytinen & Newman 2008) using the ATLAS.ti software application. The PSIC model supports use of various strategies for making sense of process data (Langley 1999; Pentland 1999). Building a detailed narrative grounded in longitudinal process data is at the core of PSIC analysis, but the model extends further, offering readymade frames for visual mapping and temporal bracketing of
process data (Langley 1999) that can be helpful for transforming complex and disorganized data into more digestible material.

I began by familiarizing myself with the data – reading the transcripts and taking notes. This work was followed by constructing an overall narrative of EngineShop’s IS change, wherein I coded individual statements and paragraphs in the data that indicated critical events. Then, I built a more structured change description on top of the critical events through distinguishing the building-system (BS) and work-system (WS) narratives. Here, I identified gaps and balances between the components of Leavitt’s (1964) socio-technical model. On that basis, I coded the critical events to identify which socio-technical components they involved: task (T), actors (A), structure (S), or technology (Te). I examined the components’ mutual relationships and deemed them either to be balanced or to show gaps (e.g., a gap between technology and task in a work system is denoted as “WS: Te–T”). Moreover, I studied whether the resulting developments led to filling of the gaps or instead to the gaps persisting or even new gaps emerging. I then identified vertical interactions in the change process by connecting organizational and environmental events and conditions to the work- and building-system events, and I examined the antecedent conditions that formed the backdrop for the IS change. Finally, I created a graphical map of the IS change process (see Appendix A). The coding process was messy and iterative: I kept returning to the data after reflecting on and writing up the findings. I validated each event and assessed its impact by comparing and evaluating the informants’ reports (Lyttinen & Newman 2008). Furthermore, I applied some degree of interpretive analysis (Klein & Myers 1999) to reconcile the informants’ occasionally sharply contrasting perspectives.

3.5.3 Paper III

The objective with Paper III was to shed light on consequences of IS discontinuance for the discontinuing organization and its employees. For this purpose, we conducted a revelatory case study (Yin 2009) at AccComp, which had discontinued its highly automated accounting system.

Data collection. Data were collected in three stages between November 2016 and June 2017 (see Table 2). In the first stage, we conducted 13 initial interviews with accountants at AccComp, to understand their work tasks, how automation affected them, and how the employees perceived automation. We used a semi-structured interview protocol rooted in prior literature on accounting and automation. The discussion was allowed to flow naturally and to deviate from the outline if the informant wanted to elaborate on interesting issues. One such deviation led to the identification of our research topic: the downgrading of an IS from a fully automated system to a semi-manual one, along with the resulting effects. In the second stage, our objective was to gain better understanding of the context – the specific accounting process that previously has been automated and the type of IS used to automate it. For this, we conducted two interviews at “FamComp,” the company that had developed FamSyst and was its vendor. Our goal was to understand 1) precisely what makes the process so complicated that there is market demand for software specifically designed to automate it and 2) how FamSyst renders it automated. In the third and final stage, we returned to AccComp for follow-up interviews with those accountants who had used both the old (more automated) system and the new (less automated) one. We formulated a new interview protocol, based on the outcomes from the first two data-collection stages and the literature on automation and deskillling. The protocol was structured in terms of a timeline with the following stages: 1) the introduction and continued use of FamSyst at AccComp; 2) the discontinuance of FamSyst (including the
Methodology

decision and reactions); and 3) post-discontinuance events (coping/recovery methods). To gain managerial perspective on the events, we interviewed the head of Finance Process Services (FPS) at the company and, after this, discussed our early-stage findings with her. In total, the three stages of data collection resulted in 249 pages of transcribed interview data.

Table 2. The data-collection stages for Paper III.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Company</th>
<th>Interviewees</th>
<th>Interview length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AccComp</td>
<td>13 accountants (incl. accountants 1 &amp; 2)</td>
<td>45–90 minutes/interview</td>
</tr>
<tr>
<td>2</td>
<td>FamComp</td>
<td>Sales manager</td>
<td>30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEO/owner</td>
<td>25 minutes</td>
</tr>
<tr>
<td>3</td>
<td>AccComp</td>
<td>Accountant 1</td>
<td>55 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accountant 2</td>
<td>51 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accounting manager</td>
<td>48 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Head of FPS</td>
<td>46 minutes</td>
</tr>
</tbody>
</table>

**Data analysis.** The collection and analysis of data were iterative and overlapped throughout the stages, with each stage always informing the subsequent one. In our analysis of the data, we applied open thematic analysis (Boyatzis 1998) in the ATLAS.ti software. The process involved familiarizing ourselves with the data by reading and taking notes, then systematically working through the data to inductively assign codes to the sections of the dataset that tied in with our research questions — e.g., material on automation, deskilling, coping, and automation’s discontinuance. Again, the process was iterative: we kept returning to the data and the codes after reflecting on the emerging themes and their relationships. We assigned both semantic and latent codes, added new relevant codes, combined existing codes into more appropriate ones that emerged, and split existing codes that were found to have more than one dimension or meaning. The emergent themes and their patterns were further analyzed and revised. For instance, we investigated the causal and temporal interdependencies among the perceived reliability of automation, trust, complacency, reliance, and deskilling. Finally, we reexamined the interview data to ensure that the final themes accurately represented the informants’ accounts.

3.5.4 Paper IV

For testing the causal relationship between SST discontinuance and customer response, we conducted a natural field experiment using three waves of survey with customers of two national retail chains: Retailer 1, which maintained its SCO implementation, and Retailer 2, which discontinued its SCOs.

**Data collection.** The first survey wave was in January 2013, after both retail chains had introduced SST. A link to an online questionnaire was e-mailed to a sample randomly selected
from among those customers who used their loyalty cards in the stores where the SCO service had been introduced (two Retailer 1 stores and one Retailer 2 store). This instrument identified the primary retailer for the customers in the sample, along with their background information. We conducted a follow-up round, with the same respondents, in May 2013, then another in October 2013, after the Retailer 2 store’s SST discontinuance. The second and third survey waves thus captured customers’ purchase behavior and service evaluation pre- and post-discontinuance, with the same set of questions. In addition, the form always included a section where the respondents could give free-form feedback related to SCOs, the survey, or any other topic of their choosing. In the final round there were 972 responses, for a response rate of 63.2%. After removal of duplicate responses (some respondents were in customer-loyalty programs with both retailers and had visited outlets of both during the sampling period so received the form from both retailers) and of forms from subjects who exhibited random or dishonest response behavior (e.g., giving the same response for every question), we ended up with a usable sample of 719 loyal customers from Retailer 1 and 173 from Retailer 2 who took part in all three rounds of the survey. We divided these customers into two groups: treatment-group customers, who had experienced the intervention effect of SST discontinuance (i.e., Retailer 2 customers), and control-group customers, who had not (i.e., Retailer 1 customers). Customer e-mail addresses were used as the key to connect the responses from a given individual across questionnaire rounds. The timeline of the foregoing events is presented in Figure 4. The final data-gathering event was to interview the manager of the Retailer 2 store that had discontinued SCOs. This interview was recorded and transcribed.

![Timeline of events and data-collection activities in Paper IV.](image)

**Data analysis.** We used a two-period difference-in-differences (DID) model specification (Huang et al. 2012; Shi et al. 2017) to capture the causal effect of SCO service discontinuance with regard to the change in customer response within the treatment group. For instance, for basket size, we performed the following modeling for customers from both the treatment and the control group:

\[
BsktS_{zt} = \alpha_0 + \alpha_1 Treat_{zh} + \alpha_2 ScoD_{zh} + \alpha_3 (Treat_{zh} \times ScoD_{zh}) + AX_{zh} + \epsilon^{BsktS}_{zh}
\]

In this equation, \(BsktS\) is the variable corresponding to basket size, \(h\) represents the customer (from either the control or the treatment group), and \(t\) denotes the time period. \(Treat_{zh}\)
is a dummy variable that takes the value 1 for treatment-group customers, and \( ScoD_{ht} \) is a dummy variable that refers to discontinuance of SCO service and has a value of 1 or 0, for the “post-” and “pre-” period, respectively, for customer \( h \). \( X_h \) is a vector of customer demographics, and \( A \) is the corresponding coefficient. The error term \( \varepsilon_{ht} \) is distributed normally. The main parameter of interest is \( \alpha_3 \), because it captures the change in the response of treatment-group customers post-SCO-discontinuance relative to the response of control-group members, whose focal stores did not discontinue SCO service. Thus, \( \alpha_3 \) captures the causal effect of SCO discontinuance on the basket size of the treatment-group customers between the pre- and post-SCO-discontinuance spans (as contrasted against the basket size of the control-group customers). The statistical model included corresponding equations for all four variables of interest – namely, basket size, amount of preference for using cash for payment, customer satisfaction, and shopping enjoyment. In addition, we performed supplementary analyses to rule out effects of any confounding factors. For this, we developed an alternate model with a sample consisting of random pairs of a control- and a treatment-group customer. Secondly, from these we selected a subsample of treatment- and control-group customers who were similar to each other in background variables by using the propensity score matching technique, then tested our statistical model with this sample. Finally, we evaluated the extent to which the customer feedback in our survey and our interview with the store manager support the statistical results.
4. Findings

In this chapter, I present the empirical findings reported in each paper featured in the dissertation. Then, in the final section, I summarize the results as a whole.

4.1 Paper I

The objective with Paper I was to provide construct clarity (Rivard 2014) with regard to the IS discontinuance phenomenon by sensitizing to the meanings it has been given in the IS literature. Our review and analysis of 54 studies showed IS discontinuance to be manifested as various, qualitatively distinct behaviors. We synthesized these behaviors into a conceptualization of IS discontinuance wherein five outcomes occur, each in a distinct stage in the IS use life cycle: rejection, regressive discontinuance, quitting, temporary discontinuance, and replacement. This conceptualization was then represented in a diagrammatic model of the IS use life cycle (shown in Figure 5). Rejection represents discontinuance behavior in the exposure stage: the user decides at the outset to reject the IS instead of adopting it. These rejection decisions tend to be based mostly on preconceptions and assumptions, in the absence of actual interaction between the technology and its potential adopter. The second behavior, regressive discontinuance (or the acceptance–discontinuance anomaly (Bhattacherjee 2001) occurs when the user has adopted the IS but decides to abandon it shortly after the implementation and initial usage. Expectation (dis)confirmation theory (Oliver 1977; Oliver & DeSarbo 1988) has been applied to explain this behavior: regressive discontinuance occurs especially when the actual IS use experience does not meet the user’s expectations formed prior to adoption. Quitting differs from both of these forms in that it involves bringing an end to a relatively long time of stable IS use, wherein use had become routinized to a certain extent. Next, in temporary discontinuance, the IS user takes a break or “vacation” (York & Turcotte 2015) from the IS by ceasing its use while intending to resume use sometime in the foreseeable future. The final behavior, replacement, typically involves a comparison between the incumbent IS and an alternative IS in the user’s environment. This form reflects the end of the incumbent IS’s use life cycle and the beginning of an alternative one. Despite the distinctive nature of each of these IS discontinuance outcomes, the literature was found to conflate them frequently, in some cases even treating them as interchangeable measures of the same theoretical construct.

Overall, our analysis suggests that considering the content, the process, and the context that shape the origins and outcomes of IS discontinuance decisions is crucial for gaining comprehensive understanding of the phenomenon. Content is embodied in the distinct forms that IS discontinuance takes, with each form representing a separate kind of behavior. In turn,
variation in the temporal occurrence of the forms is linked to the processual aspect of the behavior. Finally, the IS use context describes the IS artifact and the accompanying use conditions and motivations. For instance, mainly hedonic systems tend to create an immersive and satisfying user experience that can culminate in excessive use of the system and, ultimately, discontinuing use in order to improve one’s well-being (Ravindran et al. 2014; Turel 2016) – a situation very different from one wherein an employee abandons a work-routine system that is perceived as not efficient (Recker 2016). At the same time, unpredictable individual-specific, environmental, and organizational influences too can unexpectedly trigger discontinuance. Among these are major life events related to the IS user’s health or family situation (Hand et al. 2009) and sweeping economic and organizational changes that affect companies’ IS implementations (Power & Gruner 2015). In addition to acknowledging these factors, we address implications for theory, methods, and practice.

![Figure 5. The IS use life-cycle model.](image)

### 4.2 Paper II

For Paper II, I embarked on investigating the complexity of organizational IS discontinuance by digging deeply into the process and outcomes of replacing a major legacy system with commercial systems. My investigation revealed that case company EngineShop had become trapped between two IS architectures: it was unable to discontinue its legacy system in spite of having implemented two replacement systems. My process analysis uncovered sequences of events connected to the two local IS implementations as well as larger, organization-wide change programs that contributed to the factory’s state at the time of the study. Firstly, I found that horizontal factors (i.e., interactions within a single level) shaped this outcome on both work- and building-system level: decisions made both before and during the implementations determined the emergence of gaps in work and building systems. Some informants reported that, while some key systems had been modernized, the process reengineering potential of the change was not realized. Accordingly, operational needs to maintain the incumbent structures and processes while moving over to new systems resulted in several tradeoffs, wherein the new systems were modified to accommodate the existing processes and IT architecture. In addition, zero-sum-game interactions between the two new implementations shaped the outcome, with the SAP implementation sucking resources away from Teamcenter development. Thereby, the
performance of the latter suffered, and its integration was unsatisfactory. Secondly, vertical interactions across levels of analysis played a major role in the IS change: the top management defined the implementation goals and moderated project resources, in a pattern that continued after the implementations, stalling further development of Teamcenter. The environmental context too affected the outcome: while a slump in customer orders that arose from economic stagnation made it easier to implement new systems, the global economic climate at the same time imposed constraints on future IS development projects. This supported the legacy system remaining in place indefinitely. The process in its entirety is illustrated in Appendix A.

Overall, the IS change that had been expected to simplify and modernize EngineShop’s IS architecture actually rendered it more complex, produced less integration, and was accompanied by performance decreases. Since data did not flow as smoothly between systems as with the monolithic legacy system, the amount of manual work increased, since users now had to record the same data in numerous places. This created strong and persistent dissatisfaction among EngineShop’s workers. Still, from the perspective of the top management, the change was a success because it was considered a step toward realizing the global strategy, in that manufacturing of products could now be globally coordinated and division of tasks across geographical locations had been facilitated. These contrasting perceptions led me to extend the PSIC model with multiple interpretations of socio-technical systems, which depend on the level of analysis. This is illustrated in Figure 6, which takes the aggregate model shown in Appendix A further by unpacking the work-system events for each level of analysis. In the illustrations (Figure 6 and the diagram in Appendix A), gaps between the socio-technical components technology (Te), actors (A), task (T), and structure (S) are depicted as gray boxes connected by dotted arrows, whereas balances are shown via white boxes connected with solid arrows. Deepening of gaps or emerging of additional gaps between sets of socio-technical components is illustrated with a darker shade of gray in Appendix A. Figure 5 depicts differing socio-technical interpretations of the PDM work system before and after its replacement. The IS change was initiated by the global management, which saw that the incumbent legacy IS structures were not aligned with the new, globally oriented structures and strategy (S–Te gap). In contrast, the main concerns of IS managers at EngineShop were related to the legacy system’s end-of-life issues: the maintainability of the aging technology (T–Te gap) and the disappearance of expertise as older employees near retirement (A–Te gap). Yet, from the engineers’ and some other managers’ standpoint, DG was an efficient and well-functioning system with strong future maintenance and development potential (balanced socio-technical system). Once the replacement system Teamcenter had been implemented, the global management deemed the work system to be balanced enough and did not assign any further development resources for Teamcenter, while, on the ground, engineers at EngineShop were struggling with poor performance (T–Te gap), low integration (S–Te gap), and resistance to change (A–Te gap). Hence, success in the Teamcenter and SAP implementations came with the cost of Teamcenter end users’ marginalization (Lyytinen & Newman 2015).

In sum, this case study uncovered complexities of organizational IS discontinuance that had not been fully captured in previous IS literature. Because the replacement systems implemented at the case factory had not been able to take over certain critical processes, the factory ended up caught in between the two system architectures. Taking advantage of the PSIC model, I identified the events that had led to this situation. I found that horizontal and vertical interactions throughout the process of discontinuing DG and implementing the SAP and Teamcenter ISs shaped this outcome greatly. The interaction and tug-of-war for priority
between the two implementation projects affected the success of the overall IS change. Opening the work system level of analysis to inspection assists in gaining deeper understanding of the multifaceted outcomes of legacy systems’ discontinuance.

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<th>Aggregate View</th>
<th>Detailed View: Stakeholders’ Perspectives</th>
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<td>Factory end-users</td>
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Figure 6. Various socio-technical perspectives on EngineShop’s PDM system change.

4.3 Paper III

The motivation behind Paper III was a desire to examine the effects of organizational IS discontinuance from the angle of automation and its effect on worker know-how. Our case study laid bare the process by which deskilling develops and causes disruption when automation is discontinued, thereby necessitating active coping. We found that the deskilling that occurred while automated operations were in place remained unacknowledged by the workers and their organization over those years. Consequently, the organization was not prepared for disruptions that discontinuing the automation could cause. The discontinuance forced the latent deskilling to surface in the individual and organizational consciousness as it became apparent that the workers could not handle manual execution of the accounting tasks that previously had been automated. Disruptions to accounting processes ensued (see Figure 7).

We found that two key concepts connected to conducting a work task – control and execution of the task – help to make sense of our findings. Control reflects the supervisory part of workflow and has traditionally been discussed in terms of managerial supervision of workers’ performance (Anderson and Oliver 1987; Challagalla and Shervani 1996). However, here we applied the concept to analyze how workers govern their own work tasks. Different types of control include activity control that refers to the specification and monitoring of work-task activities, capability control that deals with maintaining and developing one’s skills and abilities, and output control that relates to monitoring the output quality (Challagalla and Shervani 1996). Execution, on the other hand, reflects carrying out the work task – the concrete execution of its procedures. Without control, it is impossible to conduct a work task, as one would not what activities it involves, which abilities it requires, and what are its desired outputs. We found that although the purpose of implementing FamSyst was to automate task execution while leaving human workers in control, the accountants gradually handed off task control too
Findings

They relinquished **activity control** as they felt no need to understand what was happening under FamSyst’s “hood”; they gave up **capability control** as they stopped maintaining and developing their FAM know-how; and finally, they even loosened **output control** as they blindly trusted in FamSyst’s outputs and were later unable to manually produce tax reports on fixed assets. Thus, the task control slowly slid from workers to the automation software and its provider. We analyzed this process on multiple levels: environment level, organization level, and the cognitive level of individual workers. Regarding environmental factors, we found that implementing effective and reliable automation in a context of high task complexity created conditions favorable for deskilling. Organizational implementation practices had a key role in the process: AccComp allowed human workers to relinquish the task control to the automation to the extent that this became institutionalized, and the company never introduced effective measures of skill maintenance. At the individual level, workers’ firm trust in FamSyst contributed to the cycle of reliance and complacency, thereby leading to further skill erosion over time. Although FamSyst had a feature that exposed the logic of its functions, thereby allowing the accountants to maintain their understanding of the process, this feature was rarely used. The accountants described feeling relaxed about relying on FamSyst and found no compelling reasons to maintain or develop their related knowledge – a clear sign of automation complacency. The multilevel process described here is illustrated in Appendix B.

Furthermore, by examining the later events through the lens of coping theory (Beaudry & Pinsonneault 2005), we analyzed how the organization overcame the disruption. Our results included identifying a coping process – wherein coping emerged during and after the automation’s discontinuance – at the levels of individual workers, their team, and the organization. Prior to the actual discontinuance, the accountants saw the replacement of the automation-rich accounting system as an opportunity. They felt optimistic about it. During the transition, the accountants tried to communicate their wishes related to features for the new system, indicating that they envisioned having influence over **technology**. However, many of the requested features were not implemented, and the accountants became aware (at least by the post-discontinuance stage) that the new system would not be as automated as FamSyst and that they could not affect this. With that realization came a shift from optimism to perceiving the IS transition as a threat that had to be coped with. While emotion-focused coping was produced, in the form of complaining and passive acceptance, the accountants engaged in problem-focused coping too, since they could still alter their **self** and **work** to a certain extent. They adapted their work by reverse-engineering FamSyst’s logic into an Excel spreadsheet, exploited the old FamSyst interface to access the data still in that system (historical customer data), and spent more of their work time on manually performing the previously automated processes. Moreover, they adapted with regard to self by relearning the forgotten skills, principally by studying the FamSyst manual and tax-reporting legislation. At team level, the accountants collaborated and shared knowledge to overcome the emerging difficulties. Finally, at organization level, the AccComp management organized extensive training courses for the accountants after becoming aware of the deskilling that had occurred. The managers also applied changes in knowledge-distribution practices, designed to guarantee everyone’s adequate understanding of the processes. In this way, the organization recovered its FAM knowledge in response to the disruption caused by deskilling and the discontinuance of automated operations.
The paper presents a case of IS discontinuance wherein a latently developed “dark side of IS” phenomenon (Tarafdar et al. 2015), unintended deskilling of knowledge workers, became apparent in consequence of IS discontinuance. We showed how environmental context (task complexity and the IS effectiveness and reliability) and the organizational surroundings of the IS implementation (work roles and implementation practices) allowed that deskilling to take place and how the IS being discontinued made that deskilling manifest, with negative outcomes for the organization resulting in the short term. We also shed light on how the organization coped with the outcomes.

![Diagram of IS discontinuance](image)

**Figure 7.** The surfacing of deskilling after discontinuing of automation.

### 4.4 Paper IV

In the work described in Paper IV, we investigated the effects of SCO discontinuance on customer response. Overall, we found support for two of our hypotheses (Figure 7 presents the results). Firstly, the discontinuance had a significant ($p \leq 0.01$) negative effect on customers’ basket size, which may be related to inhibition of purchase behavior arising from a lower level of perceived service convenience. Secondly, we found that SCO discontinuance led to a significant decrease in customer satisfaction, which can be explained in terms of the process of belief-updating as characterized earlier in the thesis. Specifically, customers reassess the service by anchoring their new beliefs in relation to those formed when the SCO service was still available, and the evident contrast leads to a lower appraisal. Robustness checks performed with an alternative sampling technique and propensity score matching of demographic factors corroborate our findings. Moreover, qualitative evidence collected from customer feedback and our interview with the store manager lend support to our conclusions. To our knowledge, no internal or external events apart from the SCO discontinuance occurred that could explain the changes observed in customer behavior. In addition, our analysis indicates that continued SCO utilization brings rewards: we found increases in customers’ basket size and willingness to choose a payment card over cash within the control group (i.e., among the customers who did not experience SCO discontinuance).

Paper IV illustrates the effects of IT discontinuance in the context of retail self-service technology. Our empirical analysis demonstrates that customers react negatively to downgrading of their retail servicescape (Bitner 1992). From a theoretical standpoint, ours was the first study to explore the causal effects of IT discontinuance with regard to customer behavior. It has
practical relevance also: it is important that service providers account for potentially disruptive effects of IT discontinuance on their customers.

![Diagram](image)

**Figure 8.** The effects of self-checkout discontinuance on customer response.

### 4.5 Summary of findings

Overall, the findings highlight the multifaceted nature of the IS discontinuance phenomenon and the complexity of organizational IS decisions. Each empirically oriented paper emphasizes the significance of multiple, contradicting perspectives on both IS implementation and IS discontinuance. These may vary greatly between an organization’s stakeholders. Collectively, the papers demonstrate well that organizational IS discontinuance decisions tend to have outcomes that come as a surprise after the discontinuance, with negative disruptions ensuing. The studies hence highlight the need for taking the aforementioned perspectives into account in organizational decision-making.

The “shape” of the body of work as a whole can be described thus: Paper I conceptualizes the IS discontinuance phenomenon by focusing on the meanings of the discontinuance outcome (the dependent variable). It also proposes generic process paths that IS discontinuance may take in the course of the IS life cycle. Paper II provides a thorough analysis of a legacy-system discontinuance process, and it offers in-depth discussion of a particular kind of organizational IS discontinuance outcome that reflects failed or partial discontinuance (an outcome I refer to as getting caught in between two IS architectures). Thus, papers I and II address organizational IS discontinuance in the conceptual sense and identify the processes in which the phenomenon occurs. In addition, Paper II ventures beyond the discontinuance event itself, for investigation of post-discontinuance processes that shed light on the complexity of discontinuing the legacy system in its entirety. Processes after the discontinuance itself are relevant also for Paper III, which examines the consequences of organizational IS discontinuance from a process perspective. In addition to explaining the process of automation deskilling the IS operators, it
identifies and unpacks a process in which deskilling that had remained latent surfaces after IS discontinuance, and it describes a subsequent coping process of overcoming the resulting disruption. Papers II and III thus examine the outcomes of IS discontinuance from the process perspective. Finally, Paper IV applies a variance-based approach to investigate the aggregate outcomes of organizational IT discontinuance from the customer angle. It reports on research that applied robust methodology to unravel causal relations between SST discontinuance and customer behavior.
5. Discussion and conclusions

The overall contribution of this dissertation is to identify and address important but frequently overlooked elements at the core of the IS discontinuance phenomenon. As output of taking these as research areas, the four papers included in the dissertation offer several specific theories, representing a broad spectrum in Gregor’s (2006) typology, that all could be employed in IS research to advance our understanding of both IS discontinuance and various related phenomena. Paper I provides an analytical Type-I theory: its purpose is to answer a “what is...” question by analyzing and describing scholars’ current understanding of IS discontinuance. Papers II and III, in turn, present building of Type-II theories to explain the phenomenon of interest. Such explanatory theories tell “what is, how, why, when, and where” without presenting any testable propositions. Finally, Paper IV proposes a Type-IV theory for explanation and prediction of the relevant phenomenon; i.e., it provides predictions, testable hypotheses, and causal explanations. Taken together, the four papers lay out a Type-I theory for high-level understanding of the phenomenon – namely, an analytical framework for IS discontinuance (depicted in Figure 9). Covering the research areas identified and the contributions of each paper, it provides a general description of the nature of (organizational but also generic) IS discontinuance and what it encompasses as a phenomenon. Specifically, IS discontinuance has antecedents that can lead to multifaceted actualization of discontinuance behavior through various processes. As IS discontinuance takes place, outcomes emerge through post-discontinuance processes. The theories proposed in the individual papers sit within this high-level framework. The model yields a more nuanced understanding of the IS discontinuance phenomenon, upon which future research can build. With this general framing outlined, I can now proceed to discuss my contributions to theory and practice in more detail.
Discussion and conclusions

5.1 Theoretical implications

In a theoretical sense, with this dissertation I have attempted to draw together the somewhat fragmented research on the topic of IS discontinuance by improving the related construct clarity (Rivard 2014). This is important because, if we wish to stimulate and improve discussion and debate within this research field, it is paramount that the actors operating in the domain continuously strive to develop a shared understanding of the central concepts and related terminology. This can be achieved by means of clear conceptual definitions for the constructs (ibid., p. vii). While the term “IS discontinuance” has been applied for various distinct behaviors, on both individual and organization level, the theory-focused literature review (Paré et al. 2015) reported on in Paper I compiled the findings from prior research under a single, inclusive framework in which IS discontinuance can take five main forms over the IS use life cycle. Moreover, the dissertation serves this project by more fully illuminating the process of organizational IS discontinuance through disentangling the threads of complex IS change processes from the discontinuance perspective. Finally, I have probed the outcomes of organizational IS discontinuance by examining its effects on organization-internal and consumer IS end users (i.e., workers and customers both). The research presented here is the first to explore how IS discontinuance may result in disruption of day-to-day work in organizations and to establish a causal effect of IT discontinuance on customer behavior. In doing so, it should serve as a significant reference point for future research into the consequences of organizational IS discontinuance. As a whole, the dissertation proposes a coherent analytical theory of IS discontinuance (see Figure 9) that covers the salient aspects of the phenomenon with a single framework that can be used for both positioning further studies and pointing to areas for additional research on the topic.

The findings from the four studies in the dissertation project make a strong case for considering the IS discontinuance perspective when one is examining organizational IS transitions. Understanding the challenges and outcomes of discontinuing incumbent systems may have a key role in explaining IS implementation outcomes. More generally, my work taken alongside previous IS discontinuance literature suggests that the IS discontinuance perspective can be of
assistance in studying various IS use phenomena, whether at the level of individual users’ behavior or in organizations’ decision-making, be the application of the technology in question for utilitarian or for hedonic purposes. Hence, I found support for a dual-factor conceptualization of IS continuance and IS discontinuance (Turel 2015a) wherein contradicting intentions and behaviors may coexist. The case study reported upon in Paper II exemplifies the utility of this approach. The case organization had persistent intentions to discontinue the legacy IS architecture and even regularly undertook initiatives to follow through on those intentions, yet the organization was unable to realize the discontinuance and even exhibited ambivalence as to what should be done with the legacy system. Accordingly, accounting for both continuance and discontinuance intentions and behaviors simultaneously is necessary when one is attempting to explain the corresponding IS outcomes. Paper III similarly demonstrates how concentrating on IS discontinuance in our research helped us understand how the discontinued IS had affected worker skills, shedding more light on the outcomes of IS implementation. Had we simplistically considered only the implementation of the new system, we would have been left with only limited insight as to the process that led to the unanticipated effects. The increasing ubiquity of technologies suggests that understanding IS discontinuance will only grow in importance – the higher the rate of new systems’ introduction and integration, the greater the need to discontinue incumbent systems will become. Rising complexity of socio-technical networks could complicate evaluation of the possible externality effects of IS discontinuance. On the other hand, it might transpire that the systems of the future are increasingly modular, in a deviation from the more traditional evolutionary approach. Such development could make it easier to dismantle incumbent IS architectures in a controlled manner (Serrano et al. 2014). In any case, it is clear that enhancing theoretical understanding of IS discontinuance remains an important area for research.

Overall, my findings suggest that the role and the meaning given to IT/ISs in an organization is an important consideration, for it is closely connected to the relationship between humans and technology, and thereby to the future we are headed toward. This is illustrated well in Paper IV, whose discontinued system is unlike the information systems presented in papers II and III in that it is a physical IT. When its plug was pulled from the wall, customers lost a tangible technological tool that used to mediate their interaction with the retail organization. While loss of a tangible tool can cause disruption, the negative consequences may be no less severe in cases of intangible systems that are visible “merely” as interfaces on a computer screen. This boils down to the questions of what the IS does for its users and what meanings the users assign the IT. Considering such questions is rapidly becoming more relevant in light of the growing interwovenness of humans and technology in systems. Paper III illustrates the perils of treating accounting automation as a black box by charging the system with the associated process while not ensuring the preservation of human skills: the organization and its accountants set themselves up for eventually facing the consequences of eroding knowledge capital. The paper provides novel analytical tool for examining the interplay between human workers and automation through dividing the workflow activities into control and execution of the task. The case demonstrates that while using IS automation for mindless task execution can be justified, it can turn out dangerous if human workers choose to relinquish mindful task control as well. Zuboff (1988, 1991) discussed this dilemma in terms of a contrast between using IT to “automate” and to “informate,” arguing that IT has a unique capacity to “informate” its users by translating the tacit knowledge embedded in the automated process into explicit textual information. This resonates with the discussion of organizations’ use of IT as a
Discussion and conclusions

A substitute for human labor vs. a complement to it (Hitt & Snir 1999). In a purely substitutive implementation of knowledge-work automation, workers are likely to outsource much of their cognitive load to the automatic IS, whereas a complementary implementation is focused on the opportunity for upskilling of workers. This points to an immensely important question: how to prevent erosion of skills when automating knowledge work. While automating physical work can make the heretofore tacit aspects of the work processes explicit and allow the operators and their organization to become informed (Zuboff 1988, 1991), knowledge work is already informed by definition. Therefore, combating the negative effects of automation is likely to present a mounting challenge as the percentage of knowledge-work-dominated occupations rises. End users’ automation-related complacency and tendency toward mindless reliance on automation is likely to exacerbate this dilemma, since these users are likely to resist returning to manual modes of operation after having “tasted” the irresistibly light load from outsourcing their thinking to the technology. Such a phenomenon is strikingly visible in Paper III, where we describe the accountants’ negative reactions to withdrawal of automation as reverse Luddism. Instead of fearing that machines would “steal their jobs,” these knowledge workers invited the automation to take care of the cumbersome and inconvenient work tasks. Unfortunately, this came with the cost of gradual loss of their procedural knowledge of the now-automated task.

Another important implication that can be highlighted is related to process theorizing from case studies (Langley 1999). My work demonstrates that a process perspective is sorely needed for understanding complex IS change, including IS discontinuance. The benefits of process theorizing are especially apparent in the complex case described in Paper II: capturing all relevant factors with factor-based models would have been next to impossible, while building a purely interpretative and subjective story from the case would have severely limited the conclusions that one could draw from the work. The PSIC model (Lyytinen & Newman 2008) and particular process theorizing strategies (Langley 1999; Pentland 1999) helped me to obtain a more objective, well-structured understanding of the case without losing much of its richness and interesting nuances. I showed how using the model does not need to be limited to describing the IS change process alone – it can also capture relevant post-implementation or post-discontinuance processes. In a similar vein, Paper III demonstrates how simultaneous consideration of multiple levels of analysis can yield a far richer understanding of the phenomenon of interest than focusing on events occurring at just a single level.

Papers II and III are especially noteworthy for offering a novel treatment of socio-technical theory (Leavitt 1964) as the cornerstone of the PSIC model. Paper II shows the PSIC approach’s socio-technical model in a new light, in that the findings suggest that the model could be extended to account for various alternative perspectives on socio-technical system stabilities. In fact, such extension is proposed in that paper, where the work system level is disaggregated into three sublevels that represent individual alternative interpretations of socio-technical balance. Open-boxing of this sort yields richer understanding of the IS change process and its outcomes, revealing any vertical misalignments that might get in the way of IS change. Interestingly, findings from the case study discussed in Paper III lead to a similar insight when reflected upon in terms of the socio-technical theory. Specifically, a gap had emerged between actors and task in the work system: the accountants, by relying on automation, lost the skills required for conducting FAM. The organization was not aware of the gap, however. It became apparent only when discontinuing the automation revealed latent deskilling. Even then, the accountants themselves refused to see this gap for what it was – they interpreted it as a gap
between task and technology. In their view, the new system was insufficient and not fit for purpose. Therefore, I suggest that future research on complex IS change processes should consider whether diverging interpretations of socio-technical systems play a role in explaining IS change processes and their outcomes.

Finally, with this dissertation I have taken a critical realist approach to IS research. By doing this, I have sought to answer calls “to create generalizable theories explaining precisely why an IS phenomenon occurred in a particular setting” (Wynn & Williams 2012, p. 805). The case studies conducted for papers II and III provide rich and detailed accounts of the occurrence of the respective IS phenomena of interest in the form of process theories. Moreover, the empirical consumer study for Paper IV serves as an attempt to overcome the usual shortcomings of positivist factor-based models, by exemplifying methodological triangulation that illuminates the causal mechanisms of a phenomenon and supports robustness of the model’s results. These research efforts demonstrate the benefits of taking a critical realist stance. Accordingly, I hope that my work will further facilitate the acceptance of critical realism as a useful epistemological and methodological approach in the realm of IS research.

5.2 Practical implications

From the managerial perspective, it is vital to understand that users and organizations may discontinue a core (or supporting) IS at any of several stages in its use life cycle, with the motivations and triggers for discontinuance varying with the content, process, and context of the discontinuance-oriented IS use behavior (Pettigrew 1985). The characteristics specific to the system, its use environment, and the stage in the IS use life cycle can each contribute greatly to how decisions to discontinue are shaped. Awareness of this is vitally important for any organization that wishes to understand the landscape related to the ISs it provides, preclude their premature discontinuance, or fully consider how best to discontinue an incumbent system.

Another important aspect is that of the consequences of IT/IS discontinuance decisions for workers, business processes, customer relationships, and customer behavior. In this dissertation, I have probed the types of responses that discontinuance may elicit from the employees and customers of an organization. The findings provide concrete input that can support managers’ decision-making on whether to continue or discontinue a given system and on the factors to take into consideration.

I have looked at the effects of IS discontinuance in three distinct contexts: resource-planning, design, and production systems’ implementation at a manufacturing company; use of accounting software within an IT service organization; and self-service technology in grocery retailing. My findings from all of these contexts highlight the importance of organizations’ implementation practices. Among the more important outcomes from examining the discontinuance decisions in my empirical work is outlining of problematics uncovered in relation to the earlier implementation of the technologies that were discontinued. These implications can further inform managers. Among the dilemmas revealed are treating IT / an IS as a substitute for vs. complement to human labor and the customization of systems to accommodate existing processes vs. strategic process-reengineering. While self-checkout facilities can be seen as IT that automates the work of cashiers, accounting software automates knowledge work in the organizations in such a way that tacit knowledge once possessed by the employees becomes embedded in the software’s code. The discontinuance cases I have presented demonstrate that the manner in which the IT’s role is communicated to customers or embedded in work roles and
Discussion and conclusions

routines shapes the end-user reactions to its eventual abandonment. Another of the considerations is one connected with operation- and process-related aspects of IS implementation, calling into question whether the organizational processes and structures should be shaped around the core IS of the organization or, rather, the IS implementation should always be subordinate to existing and emerging structures. This dilemma gains salience when the IS has grown so large and embedded that it starts to shape the organization and not the other way around.

Through detailed accounts of organizations that have encountered and struggled with the issues and tradeoffs discussed above, I have uncovered the factors, interactions, and consequences that I present in readily digestible form here for decision-making managers’ consideration. In essence, my dissertation supplies a collection of previously untold stories about IS change in organizations (Ramiller & Pentland 2009), specifically concentrating on IS discontinuance and IS replacement processes, along with their outcomes. These stories can help managers to understand reasons behind unexpected and disruptive outcomes of IS discontinuance, thereby aiding them in preparing and equipping their organization to prevent or mitigate the potential negative effects.

5.3 Limitations and avenues for future research

This work brings with it certain limitations that must be acknowledged. The first is related to the conceptualization of IS discontinuance. Paper I provides a very generic treatment of the phenomenon. The model for the IS use life cycle proposed in the paper does not explicitly account for behaviors that fall into the gray area between continuance and discontinuance, such as neglect of use or the partial discontinuance described in Paper II. However, the model is not intended to do this; its purpose is to serve as a generic framework for making sense of the current IS discontinuance literature, one on which further research can build in examining distinct IS discontinuance behaviors in depth.

Secondly, whereas this dissertation is among the first forays into research charting the outcomes of organizational IS discontinuance decisions, it sheds light on those outcomes mostly in the short term. While Paper II does provide insights also into long-term effects of IS discontinuance, papers III and IV are limited to investigation of the effects with a relatively short time horizon, so they give only suggestions as to some degree of persistence of the observed effects. Hence, it would be enlightening to gather evidence on whether the disruptive effects of discontinuing technologies such as the ones considered in the dissertation endure or wane over time, and which conditions affect this.

Also, papers II and III represent single-case studies. This could limit generalizability. Specifically, the mechanisms identified (whether related to oscillations in socio-technical balances of IS implementation projects, deskilling, coping, or something else) may not exist in other kinds of organizations. An interesting continuation from this research, then, would be to conduct comparative case studies examining the phenomena surrounding large legacy systems and office automation in terms of how the embeddedness of those systems shapes the respective organizations. Examples are cross-organization comparison of the realization and outcomes of dismantling legacy IS architectures, where the organizations may be either similar or different, and research into long-term effects of automation on skills in two or more comparable organizations that have used the same software for automating operations. Moreover, a more in-
depth look at managers’ practices in implementing automation at knowledge-work organizations could inform as to how deskilling might be prevented.

The case studies are limited also in terms of the temporality of the events at the case companies. While the events discussed in Paper III were relatively recent at the time of the data-collection, a large share of those reported on in Paper II were 8–12 years in the past when the interviews were conducted. It is possible that informants did not recall all events that significantly influenced the discontinuance processes and their outcomes. As always in such work, some informants might have displayed personal biases in how they recollected and interpreted the events. While I made conscious efforts to offset such potential sources of bias (e.g., by interviewing various organizational stakeholders, at multiple levels in the companies), informant biases nonetheless could have affected the findings. However, I believe that any such effects have not led to significant distortion. Overall, this temporal consideration with papers II and III represents a tradeoff between gaining accurate, timely access to the events while they are taking place and capturing the long-term effects of those events.

In an ideal scenario, one would conduct a longitudinal case study by collecting data along the entire timeline of relevant events contemporaneously with their occurrence. For instance, with Paper IV it would have been interesting to start collecting data related to customer behavior before the SCO systems were introduced. However, such research settings tend to be difficult to set up. Still, scholars could attempt to tap into organizations’ IS discontinuance processes when they are first mooted and then track subsequent developments to capture their long-term effects. This could yield a more detailed and accurate picture of how such decisions may shape and disrupt organizations and their stakeholders. Along similar lines, a fundamental limitation with Paper IV is that we had to rely on self-reporting for data on customers’ purchase behavior. Accurately reporting basket size might be a difficult task for the average consumer – arguably, more reliable conclusions could be drawn from actual sales data. While we could not gain access to such data, future research could investigate the effect of IT service discontinuance on purchase behavior by looking at stores’ sales data.

Finally, the complex structures of today’s organizations pose a challenge for any researcher attempting to comprehend the logic systems within which they operate. In each of the empirical studies, the discontinuance events were outcomes of organizational decision-making that took place at several levels in the company. For instance, the global matrix structure of Paper II’s case organization when coupled with the complex IS infrastructure rendered interpreting the interactions and outcomes of contextual factors and the IS change projects especially challenging. A similar issue presented itself with regard to papers III and IV: the gulf between the organizational unit doing the decision-making and the part of the company where the decision was executed and given concrete form increased the complexity of assessing the outcomes and implications in both cases. Ascertaining and accounting for the significance of the multilevel nature of modern organizations in conditions of IS change calls for the development of novel theoretical tools. One such attempt was made with Paper II, wherein I proposed an extension to the PSIC model.

My empirical work demonstrates well that, although the concept of organizational IS discontinuance often ties in with a process in which something better or more advanced replaces the incumbent system (Furneaux & Wade 2010, 2011), it can equally represent divestment or outsourcing of activities or downgrading of IS architecture. Some particularly interesting paths for research involve examining how such divesting or downgrading is going to affect technology assimilation more broadly. Will it facilitate larger-scale acceptance of IS-enabled real-time
Discussion and conclusions

solutions by pruning out less useful systems, or might discarding such systems contribute to stalling of the overall progress made? While that is for future research to address, the dissertation has offered a starting point for the discussion.

5.4 Summary of conclusions

In this dissertation, I have drilled down into an under-researched information-system-related phenomenon, IS use discontinuance, with the primary objective of improving the understanding of organizational IS discontinuance decisions. This quest was guided by three main research questions: 1) What does IS discontinuance mean?; 2) How do organizational IS discontinuance processes unfold?; and 3) What are the outcomes of organizational IS discontinuance decisions? These questions were addressed in the four studies presented: one conceptual inquiry and three empirical investigations. The findings from those studies indicate that IS discontinuance is a multifaceted phenomenon and that we have taken only the first steps toward reaching comprehensive understanding of it. The model of IS discontinuance in Figure 9 gives a general overview of what IS discontinuance involves and identifies the core components for consideration in study of this phenomenon. Regarding the overall meaning of IS discontinuance, I identified at least five distinct forms that discontinuation behavior can take over the course of the IS use life cycle. Moreover, I call attention to a manifestation in which discontinuance occurs only partially, thereby leading the discontinuing entity to implement a new system while mired in simultaneously maintaining an old one. When examining the process leading up to an organization's IS discontinuance, I saw how complex the network of interacting events, activities, decisions, states, and surrounding context can be, clearly requiring nuanced explication of the process. This indicates that taking a process approach to studying organizational IS discontinuance can deepen both theory- and practice-oriented understanding of the phenomenon. My final conclusions stemmed from illuminating examinations of the outcomes of organizational IS discontinuance in which I unbundled the effects of discontinuing legacy system components, automated accounting systems, and self-checkout facilities. The results indicate that such discontinuance decisions have primarily harmful effects that create disruption for the IS end users. However, it is highly significant that perceptions of these effects may depend on the stakeholder and the level of analysis. Moreover, in the case of “rolling back” IS automation, an organization can channel the disruptive effects into positive developments through organizational learning. With insights in these areas, this dissertation offers a more nuanced understanding of organizational IS discontinuance and of IS discontinuance behavior in general. Thereby, it sows the seeds for further work to advance our understanding of various other phenomena connected with IS use.


References


References


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Appendices
Customers need after-sales services for EngineShop.

Global economic recession limits resources but gives leeway for consolidating implementations due to decreases in customer orders. Customary needle-seller services for EngineShop's long-lived product, creating needs for integrating new systems with old legacy data.

Antecedent conditions

Environmental factors
- Business function
  - Increasing
  - Globalizing
  - Environmental

Organizational factors
- Business unit: PDM/consolidation project
- Strategic needs to consolidate IS architecture
- Pre-existing IS features: SAP's capabilities
  - Project scope narrowed to consolidate IS

IS change narrative: PDM
- SAP chosen as new ERP globally
- OSE program surfaces in EngineShop's PDM
  - SAP implemented with Indian consultant teams
  - SAP Project not as expected, cannot setup EngineShop's process without tailoring

IS change narrative: ERP
- SAP integrated with EngineShop's new PDM
- Teamcenter is back up
- Teamcenter's development and deployment issues most of the available resources
- New systems not as expected, cannot setup

Decision-makers in the global network want new DG replace initiatives due to insufficient payback.

Appendix A

OUTCOMES
Positive:
- More effective PDM consolidation within the global Business Unit
- Some extent of global ERP consolidation achieved

Changes support the overall strategic objectives of the global organization.

Negative:
- Remains of DG still exist in various forms (configurations, document mediation), causing hidden costs and inhibiting the potential to operate globally.

Various integrations between old and new systems make the IS architecture complex and difficult to manage.

The problems with aging legacy architectures still not solved.

Low PDM efficiency with Teamcenter compared to DG, SAP potential not fully exploited due to tailoring.


WS1 WS2 BS2 BS3 BS4 BS5 BS6 BS7 BS8 BS10 BS11 BS12 BS13 BS14 BS15 BS16 BS17 BS18 BS19 BS20 BS21 BS22
The process of deskilling, disruption, and recovery.

**Figure 11**. The process of deskilling, disruption, and recovery.