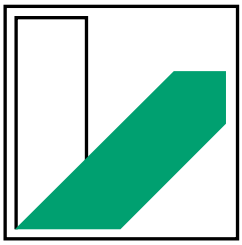

UNIVERSITÄT
BAYREUTH

On the Interaction between Business Process Management and Digital Innovation

Dissertation

zur Erlangung des Grades eines Doktors der Wirtschaftswissenschaft

der Rechts- und Wirtschaftswissenschaftlichen Fakultät

der Universität Bayreuth

Vorgelegt

von

Thomas Kreuzer

aus

Dasing

Dekan:	Prof. Dr. Prof. Dr. André Meyer
Erstberichterstatter:	Prof. Dr. Maximilian Röglinger
Zweitberichterstatter:	Prof. Dr. Michael Rosemann
Tag der mündlichen Prüfung:	01.02.2024

'If I have 1,000 ideas and only one turns out to be good, I am satisfied'

(Alfred Nobel)

Es ist ein seltsames Gefühl, mein Promotionsende mit dieser Dissertation einzuläuten. Ich bin stolz auf jeden Artikel darin. Trotzdem fühlt es sich so an, dass das Gelernte weit darüber hinaus geht. Es sind die Erkenntnisse, die man auf dem Weg sammelt – über Forschung, Arbeit, das Leben, aber auch sich selbst – die die Promotion zu so einer besonderen, lehrreichen Zeit machen. So wie die verschiedenen Artikel durch meine Dissertation mehr als die Summe ihrer Teile werden, ist es das Miteinander mit anderen, das mir so viel beigebracht hat und mich täglich Neues lernen lässt:

Liebe Anna, lieber Max, lieber Herr Buhl: *Vielen Dank für Eure Unterstützung über all die Jahre, dem kein Titel gerecht wird. Ihr seid Mentor:innen, helfende Hand, Sparrings-Partner:innen, Freund:innen – immer das, was man gerade braucht. Ihr liebt, was Ihr tut, weil es für Euch kein Job und keine Last ist. Danke für Euer beständiges Vertrauen, Euren Rat in jeder noch so verzwickten Situation, aber auch die gestellten Herausforderungen, die zu Höchstleistungen anspornen. Dazu zählt auch die Zeit in Brisbane, die mir so viele neue Erfahrungen geschenkt hat….*

*…**Lieber Michael**: Hier möchte ich mich auch besonders bei dir bedanken. Ich habe so viel von dir und deiner Art gelernt, immer über das besondere, spannende, manchmal kontra-intuitive in neuen Beobachtungen und Erkenntnissen nachzudenken. Das hat die Zeit in Brisbane zu etwas wirklich Einzigartigem gemacht.*

***Liebe Freund:innen, Co-Autor:innen und Kolleg:innen**: Ich danke euch für die Zusammenarbeit, die intensiven Projekt- und Forschungs-Sessions, und die vielen tollen Reisen und Events. Ihr seid es, die diesen Laden für mich zu etwas Besonderem machen – wo ich auch nach über 11 Jahren jeden einzelnen Tag gerne bin und bleiben werde.*

***Lieber Leon:** Selbstverständlich schließt dieser Dank dich ein, der mich überhaupt erst auf diesen Weg gebracht. Vielen Dank für die gemeinsamen Jahre als Studien- und Arbeitskollege, Mitbewohner, und Kickerpartner, die Rockyabende und tiefgehenden Diskussionen. Ich hätte mir keinen besseren Freund am ersten Studiumstag wünschen können.*

***An meine Familie Gerhard, Inge und Lisa**: So viele Dinge, die ich von euch lernen durfte, sind Grundlage und Teil dieser Arbeit. Sei es deine, lieber Papa, beständige Wissbegierde, Begeisterungsfähigkeit, und dein Tüftlergeist; deine, liebe Mama, Ausdauer, Widerstandsfähigkeit, aber auch Fürsorge in allen Lebenslagen; oder dein, liebe Lisa, so offener, kommunikativer, und alle einbeziehender Charakter. Diese und andere Eigenschaften machen euch seit über 30 Jahren zu meinen Vorbildern. Ihr habt mir immer alle Möglichkeiten gegeben, mich zu entfalten und ich selbst zu sein. Dafür danke ich euch von ganzem Herzen. Ich kann mir keine bessere Familie vorstellen.*

***Zuletzt an meine Partnerin Tanja**: Es wäre untertrieben zu behaupten, dass es diese Dissertation ohne dich nicht gäbe. Es würde mich - so wie ich heute bin - nicht geben. Egal wie anstrengend und fordernd, manchmal sogar überfordernd, alles war, du warst immer an meiner Seite und hast mir das nötige Verständnis, Zuversicht, Freude und Kraft gegeben. Wir sind in den letzten 10,5 Jahren so sehr gemeinsam gewachsen, haben von- und miteinander gelernt, und uns Herausforderungen gestellt, die allein zu schaffen für mich nicht vorstellbar gewesen wäre. Ich bin unendlich dankbar, dich als Begleiterin an meiner Seite zu haben - bis zum Ende und darüber hinaus.*

Ihr alle seid der Grund, warum ich meine Promotion nun erfolgreich abschließen darf.

Aus diesem Grund widme ich euch diese Dissertation!

Copyright Statement

The following sections are partly comprised of content from the research papers included in this thesis. To improve the readability of the text, I omit the standard labeling of these citations

Abstract

In the digital age, it is becoming increasingly difficult for organizations to balance the need for persistent structures and processes with the ambition for continuous innovation and transformation. Digital technologies thereby offer not only a well of possibilities to strengthen stability via automation and standardization, but also generate novel digital opportunities and drive unpredictable change in the internal and external environment. The domains of Business Process Management (BPM) and Digital Innovation (DI) have set themselves the goal of investigating phenomena related to digital technology. BPM focuses on the design, implementation, and improvement of business processes interwoven with digital technology to ensure consistent outcomes and capitalize on potentials for improvement. In turn, DI leverages the generative and convergent characteristics of digital technology to create, adopt, and exploit modular and easily scalable digital products, services, or business models. At first glance, the desire of BPM for consistency and stability seems to conflict with the focus of DI on change and flexibility. However, companies such as Amazon, Google, or Apple show that competitive advantage emerges from synergies between the consistent sensing of digital opportunities through structures and processes, and the ability to quickly transform those opportunities into a well-integrated DI. This doctoral thesis therefore takes an opportunistic stance on the intersection between BPM and DI and aims to unfold how both can interact for mutual benefit. To do so, it takes an *isolated*, *interdependen*t, and *integrated* view on interactions between BPM and DI facilitated by digital technology. Therin, this thesis applies different theoretical lenses (e.g., opportunity recognition, dialectic theory) and methods (e.g., taxonomy development, case study), and studies various contexts with differing levels of analysis (e.g., higher education, crisis).

In taking an isolated view, this thesis focuses on the classification and categorization of knowledge to enhance a foundational understanding of the digital technology construct, BPM, and DI. Research article #1 presents a taxonomic theory that allows to classify individual digital technologies through their diverse purposes. Building on a taxonomy, it derives nine purpose-related archetypes of digital technology and analyses how these have evolved over time. Research article #2 addresses the problem that organizations still struggle to adopt BPM on the enterprise level. It develops a taxonomy of BPM governance setups, highlights the tensions that organizations face when designing such setups, and discusses how different designs relate to BPM purposes such as innovation or regulatory alignment. Research article #3 examines organizational DI responses in times of crisis. Building on the literature and data from the COVID-19 pandemic, the results are four patterns of DI that encapsulate how a sense of urgency and ambition lead to exploitative and explorative DI.

Taking an interdependent view, this thesis explores how digital technology fosters beneficial interactions between BPM and DI. To do so, research article #4 presents and explains six effects of digital technology on opportunity recognition. The effects show that there is a growing number of possibilities to initiate and develop

DI, which requires structured approaches to exploit available resources and market needs, and a redesign of traditional processes, e.g. those to recognize opportunities. Research article #5 acknowledges that many of the effects favor an outward-facing perspective that prioritizes customer needs. In the digital age, customers can easily compare products, decide how to interact with companies, and therefore place high demands on digital processes. As a response, the article presents and evaluates a decision model that allows BPM practitioners to select a portfolio of process improvement projects from a customer-centric perspective by considering the impact of each project on customer satisfaction. Last, research article #6 focuses on digital transformation, which is a long-term process of change that integrates BPM as well as DI activities. Focusing on higher education as a specific context with high societal relevance, it studies how digital transformation affects the logics underlying teaching and learning. The article finds that three shifts in the traditional logics of teaching and learning occurred throughout the digital transformation, each relating to novel educational services, processes, and work practices that were enabled by digital technology.

The integrated view considers BPM and DI as 'two sides of the same coin' that complement and empower each other. Research article #7 addresses the observation that existing research at the intersection of BPM and DI leans towards a focus on how DI affects BPM. It therefore investigates the benefits of BPM for DI by analyzing the DI process at a public university using mature BPM knowledge as a theoretical lens. As a result, a set of drivers and barriers for the successful execution of the DI practice is presented. Research article #8 combines and aggregates many of the insights that have been generated through the other articles to understand how BPM and DI can empower each other. Taking a dialectic view on interactions between BPM and DI, it first structures challenges that both domains face in terms of digital process innovation and the DI processes. Thereafter, the article derives and details eight empowering effects of BPM and DI capabilities to address these challenges. The results also show how the dialectic theory can foster sensemaking at the intersection of BPM and DI by helping us better understand conflicts between both domains and propose associated solutions.

In sum, this thesis investigates how BPM and DI can interact for mutual benefit. It proposes three perspectives that research can take to contribute to the intersection between both domains and better understand their digital technology-facilitated interactions. Through eight research articles, this thesis highlights the value of each perspective and takes them to generate descriptive (e.g., via a taxonomy), explanatory (e.g., via effects and rationales), and prescriptive (e.g., via a decision model) knowledge.

Table of Contents

I. Introduction

1. Motivation

The desire for stability and change have always been two seemingly opposing and difficult-to-balance forces in organizations (Danneels & Viaene, 2022; Sun & Zhang, 2018). While the former lets organizations strive to establish persistent structures and processes, the latter drives organizations to innovate and adapt to a shifting internal and external environment. Over the past 20 years, the unprecedented speed and scale of evolving digital technology (DT) has further exacerbated the tension between stability and change (Salmimaa et al., 2015; Soh et al., 2023). Organizations of all sizes face challenges and opportunities related to a hyperconnected world with changing market conditions, industry-spanning competition, and new potential for partnerships (Ciriello et al., 2018; Yoo et al., 2010). Those who succeed in this digital age, e.g., BigTech companies such as Amazon, Google, or Apple, do not see stability and change as opposing but as highly synergetic (Oberländer et al., 2021; Song & Pan, 2021). More precisely, competitive advantage emerges from: (1) structures and processes specifically targeted towards the consistent sensing and seizing of digital opportunities (Grisold et al., 2021), and (2) the ability to quickly transform those opportunities into novel digital products, services, or business models that are well integrated into organizational structures and processes (van Looy, 2021).

There is extensive literature that examines the tension between stability and change from an organizational and management perspective (Michel, 2014; Tsoukas & Chia, 2002), e.g. regarding the continuous change of organizational structures and routines (Mendling et al., 2020). For some time now, these efforts have been complemented by the Information Systems (IS) research field, which studies all phenomena related to DT. At its core, a DT is a digital object, i.e., a technical, nonmaterial, or hybrid object that incorporates one or more bitstrings, which has been given a social purpose (Faulkner & Runde, 2019; Hund et al., 2021). The purposes of DT range from infrastructural uses such as connectivity or platform provision to more complex application fields like analytical insight generation or augmented interaction. The key characteristics that let purposes of DT drastically expand compared to what we traditionally understood as IT are threefold (Yoo et al., 2010): re-programmability (i.e., separation of functional logic and physical embodiment); homogenization of data (i.e., the transition from analog to digital content); self-referential nature (i.e., novel DT building on existing DT). Based on these characteristics, DT provides many opportunities to strengthen stability in organizations (e.g., via automation, standardized interface, or interconnection of processes), whereby its generative capacity also makes DT a driver of unpredictable change and innovation in the internal and external environment. Within the IS field, the domains of Business Process Management (BPM) and Digital Innovation (DI) are two of the most important contributors to the body of knowledge on the dynamics between DT, stability, and change.

BPM is "the art and science of overseeing how work is performed in an organization to ensure consistent outcomes and to take advantage of improvement opportunities" (p. 1) and relates to all the capabilities needed to "identify, discover, analyze, redesign, execute, and monitor business processes" (p. 6) (Dumas et al., 2018). This involves capabilities for strategically aligning BPM, setting up governing structures and roles for BPM activities, improving processes based on sound methods and technology, developing BPM literacy among employees, and establishing a process-oriented culture (Kerpedzhiev et al., 2021). BPM generally encompasses both managerial and technical topics (Klun & Trkman, 2018). From a managerial perspective, the primary question is how organizations can adopt BPM on the enterprise level (Rosemann & vom Brocke, 2014), mature related capabilities (Kerpedzhiev et al. 2021), and improve their business process orientation (Škrinjar & Trkman, 2013). Technical BPM topics have gained considerable interest as DT has become more advanced and interwoven with business processes (Mendling et al., 2020). Thereby, process technologies can nowadays support and enhance all BPM activities, e.g., by enabling the usage of large amounts of data for process improvement (Kratsch et al., 2017), or via robotic process automation (Egger et al., 2021).

In contrast to BPM, DI evolved as a new phenomenon alongside the emergence of DT (Nambisan et al., 2017) and refers to the "creation or adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) through the incorporation of digital technology" (Hund et al., 2021, p. 6). By building on the unique characteristics of DT, the input, process, and output of DI differ from traditional innovation (Ciriello et al., 2018; Yoo et al., 2012). There are now a growing number and variety of actors in the market offering access to novel digital resources (e.g., on digital platforms) that can be recombined for DI (Oberländer et al., 2021; Piccoli et al., 2022). Therefore, organizations can draw on multiple different input sources for the discovery and creation of digital opportunities (Ciriello & Richter, 2015; Lokuge et al., 2019). The corresponding process of DI is often conceptualized as highly iterative as it requires the recombination of internal and shared resources, short feedback loops with customers, and quick adaptation to a changing environment (Kohli & Melville, 2019; Oberländer et al., 2021). Last, the output of this DI process differs from traditional innovation primarily in terms of its convergence and generativity (Yoo et al., 2012). Convergence means that separate technological components of a DI can be (re-)combined to produce a new DI, while generativity refers to the ability of DI to create unprompted change as it is indefinitely expandable, e.g., through new features that are added to a digital platform.

On the surface, BPM and DI "may appear as the opposite ends of the performance spectrum ranging from operational efficiency to generative capacity" (Mendling et al., 2020, p. 209) and can even be considered as conflicting in their desire for stability (BPM) and change (DI) (Baiyere et al., 2020). Consequently, they have been treated as separate domains in the IS field for a long time (Grisold et al., 2021). Nevertheless, due to arising challenges in both domains, discussions in BPM and DI research have naturally started to gravitate

towards each other. On the one hand, advances in DT have brought to light shortcomings in prior BPM research and practice. Most importantly, many studies emphasize the need for a higher opportunity-driven mindset in BPM (Kerpedzhiev et al., 2021; Rosemann, 2014) as innovative process technologies emerge and customer expectations for digital processes rise. This has led to new research topics in BPM. For example, ambidextrous BPM describes the strategy of pursuing and balancing both exploitative BPM, i.e., incremental improvement of processes, and explorative BPM (Rosemann, 2014), i.e., exploration of novel opportunities for innovative process designs (Grisold et al., 2022). On the other hand, due to the flexibility needed in and around DI (Baiyere et al., 2020), many organizations struggle to institutionalize DI into a business process that can be consistently steered, monitored, and repeated. Consequently, DI becomes a coincidental result of scattered initiatives rather than the output of deliberate design and execution of DI actions (Hund et al., 2021; Mousavi Baygi et al., 2021). Another problem arises from the generative and modular nature of DI (Yoo et al., 2012; Yoo et al., 2010). Existing structures and processes rarely offer the adaptability needed for a quick and seamless integration of a new DI (Baiyere et al., 2020). Employees may try to resist the quickly emerging deep structural changes of DI, infrastructure could lack interoperability and modularity, or traditional governance mechanisms might put DI at a disadvantage when it comes to strategic decision making (Haskamp et al., 2021).

Given these challenges, many scholars have argued that BPM and DI should no longer be seen as separate, but rather as complementary and highly beneficial when interacting with each other (Ahmad & van Looy, 2020; Grisold et al., 2021; Mendling et al., 2020; van Looy, 2018, 2021; van Looy & Poels, 2019). DI embraces the exploration of digital opportunities and provides corresponding capabilities (Buck et al., 2021) which are much needed in the improvement of business processes (Mendling et al., 2020). Therefore, one example of a beneficial interaction between both domains is to integrate DI actions in BPM initiatives to support an opportunity-driven and customer-centric redesign of business processes that leverages DT (Grisold et al., 2021; van Looy & Poels, 2019), often referred to as digital process innovation (Lohoff, 2022). Further, DI can help organizations create novel digital resources (Piccoli et al., 2022) that foster flexibility of the technical infrastructure that underlies business processes (Baiyere et al., 2020). In turn, BPM offers a rich and mature body of knowledge on process design, implementation, and improvement, which lets organizations build and manage a consistent and repeatable DI process (Grisold et al., 2021). This includes, for example, the design of governance structures for the DI process that take its rather iterative and flexible nature into account, or establishing a process-oriented mindset among actors that spans from the initiation of DI towards the scaling and exploitation of its output (Kerpedzhiev et al., 2021; Kohli & Melville, 2019; Teece et al., 2016). Last, the ability of BPM skills, tools, and methods to build stable structures and processes might be key for organizations to consistently sense digital opportunities and transform existing internal logics of organizing and value creation alongside the integration and exploitation of a DI (Baiyere et al., 2020; Grisold et al., 2021).

Against this background, it becomes evident that research and practice should strive to understand, detail, and exploit synergies that stem from interactions between BPM and DI (Grisold et al., 2021; Mendling et al., 2020). Such an endeavor is not without its hurdles as existing research at the intersection of BPM and DI highlights many potential conflicts between the domains. For instance, Mendling et al. (2020) discuss how BPM and DI challenge each other's fundamental assumptions and Baiyere et al. (2020) outline how some fundamental logics of BPM crumble in contexts of DI and digital transformation. However, although many values that underly BPM and DI seem opposing and conflicting at first glance, e.g., the desire for stability or change, both domains' knowledge can ultimately empower each other. This is why the doctoral thesis at hand follows in the footsteps of preceding studies and takes an opportunistic stance on the intersection between BPM and DI. Therefore, it addresses the fundamental research question: *How can BPM and DI interact for mutual benefit?*

2. Structure of the Thesis and Embedding of the Research Articles

This doctoral thesis is cumulative and consists of eight research articles that contribute to the maturing bodies of knowledge on BPM, DI, and their emerging intersection. The approach to examine the research question is based on four learnings from the existing literature: (1) Interactions between BPM and DI are multifaceted and can be considered beneficial when they create added value for research (e.g., in terms of new knowledge) or practice (e.g., economically) (Mendling et al., 2020; Baltuttis et al. 2022). On the one hand, beneficial interactions can refer to skills, methods, and capabilities related to one domain complementing and enhancing activities of the other one (Grisold et al., 2021). Benefit is thereby created through the added value of overcoming challenges that usually accompany these activities (e.g., a lack of explorative mindset in BPM) or from improving the quality of the outcome (e.g., a well-integrated digital service). On the other hand, beneficial interactions can refer to drawing on established knowledge or methods in the literature of one domain to analyze data or concepts related to the other one. Mendling et al. (2020), for example, highlight the potential value of using process mining to develop theories and test hypotheses in the DI domain. Benefit is thereby created through the added value of new insights generated from so far unexplored data pools and perspectives. (2) We need to consider that BPM and DI are two large domains with a rich history in research and practice (Grisold et al., 2021; vom Brocke et al., 2014). Despite their separate nature, prior discussions in the BPM and DI literature were and still are important 'deep dives' that should continue to inform research at their intersection (Mendling et al., 2020). In other words, there is no need to fundamentally rethink all that we know about BPM and DI or slow down research at the core of both domains as we continue to study their interactions. (3) Existing research at the intersection of BPM and DI leans towards a focus on how DI affects BPM, e.g., Baiyere et al. (2020), Ahmad and van Looy (2019), or van Looy (2021). Going forward, we need to consider interactions in both directions as BPM knowledge is also of great value to DI (Distel et al., 2023; Mendling et al., 2020). (4) The effects and implications of constantly evolving DT are one of the main drivers of an

increasing need to identify and exploit beneficial interactions between BPM and DI (Grisold et al., 2021; Mendling et al., 2020; Nambisan et al., 2017). Hence, we should also put effort into advancing a foundational understanding of the DT construct to derive implications for further research on BPM and DI.

Considering these learnings, the research articles in this thesis belong to one of three views on DT-facilitated interactions between BPM and DI (Figure 1): *isolated*; *interdependent*; *integrated*. The articles address the fundamental research question by applying different theoretical lenses (e.g., ambidexterity, opportunity recognition, and dialectic view) and methods (e.g., taxonomy development, design science, case study). Further, the articles draw on a variety of empirical evidence from multiple contexts with different levels of analysis (e.g., higher education, financial services, times of crisis).

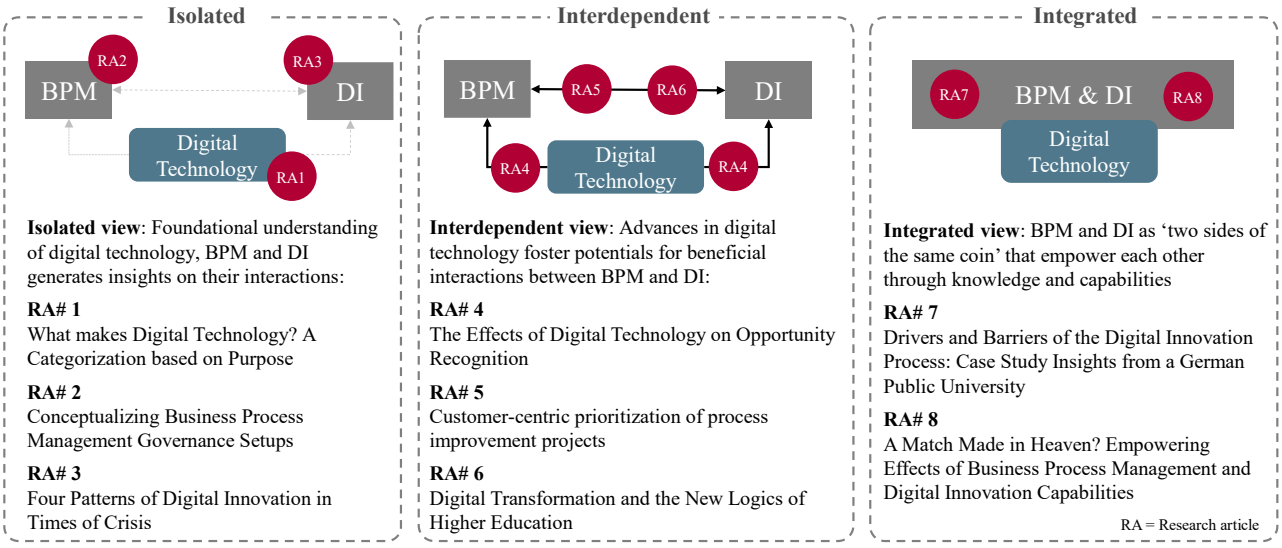

Figure 1. Three views on DT-facilitated interactions between BPM and DI

First, it remains important to inform research at the intersection of BPM and DI with knowledge that is derived from taking an *isolated view* on both domains and DT (Section II – including research articles #1, #2, and #3). Article #1 thereby contributes to a foundational understanding of the DT construct. Building on a taxonomy, the article structures and details the different purposes of DT, and analyses how these have evolved over time. Article #2 acknowledges that BPM can only take the role of a driver of operational excellence and DI if it is well adopted by organizations. Consequently, a taxonomy of BPM governance setups is developed to structure how BPM can be institutionalized. Based on that, different setups are discussed in terms of their enabling role for purposes such as technology integration, DI, or regulatory alignment. Article #3 focuses on the DI domain and uses data collected during the COVID-19 pandemic to study how organizations develop DI in times of crisis. The primary results are four patterns of DI that describe how a sense of urgency and ambition leads to exploitative and explorative DI. Many exemplary cases are provided that showcase the unprecedented speed with which organizations developed DI during the pandemic and built stable structures around them.

Second, taking an *interdependent view*, this thesis explores how DT increases the interdependency between BPM and DI, fostering potential for beneficial interactions (Section III – including research articles #4, #5, and #6). To do so, research article #4 identifies and details the effects of DT on opportunity recognition. The effects show that organizations face a plethora of new possibilities to initiate and develop DI, which however also requires rigid structure and processes to understand and exploit available resources and market needs. Further, it demonstrates that traditional processes, e.g., to recognize opportunities, need to change to keep up with the effects of DT. Research article #5 builds on these findings and addresses how BPM, in particular process improvement, can become more explorative in the digital age. An important step on this journey is to shift from an inside-out towards an outside-in perspective on process improvement that focuses on customer centricity through the integration of DT. To do so, a decision model for project portfolio selection is proposed and evaluated that accounts for the effects of process improvement projects on customer satisfaction. Research article #6 concludes this view by taking a broader perspective on how DT induces change for organizations. More precisely, it focuses on digital transformation, which is a long-term process of change (Vial, 2019) that is initiated by or encompasses multiple BPM and DI activities (Baiyere et al., 2020; Hinings et al., 2018). Targeting the context of higher education, article #6 illustrates how digital transformation relates to shifts in the logics that an organization applies to the ways it organizes and creates value through processes.

Third, this thesis ends with two articles that take an *integrated view* on BPM and DI, where the two domains are seen as "two sides of the same coin" (Mendling et al., 2020, p. 2015) (Section IV – including research articles #7 and #8). Considering that existing research leans towards a focus on how DI affects BPM, research article #7 studies the benefits of BPM for the DI process. It draws on mature knowledge of BPM as a theoretical lens to examine the DI process at a public university and identify a set of drivers and barriers for its successful execution. Last, research article #8 combines and further develops many of the insights that have been gathered during the development of the other articles. Its core assumption is that BPM and DI capabilities should take a vital role in shaping the synthesis of both domains. Hence, eight empowering effects of BPM and DI capabilities on digital process innovation and the DI process are derived and detailed based on the existing literature and secondary case data. The article also explores how the dialectic theory (Benson, 1977; van de Ven & Poole, 1995) can foster sensemaking at the intersection of BPM and DI by helping us better understand conflicting values and challenges between both domains and propose associated solutions.

Thereafter, this doctoral thesis concludes in Section V with an outlook on future research and concluding remarks. Section VI comprises the publication bibliography, and Section VII includes additional information on all research articles (1), my individual contributions (2), and the research articles themselves (3 - 10).

II. Isolated View: Foundational Understanding of Digital Technology, Business Process Management, and Digital Innovation

Recognizing BPM and DI as distinct yet synergizing domains that study DT-related phenomena, isolated discussions in their respective literature provide valuable foundations for ongoing research at the intersection. To offer such foundations, research articles #1, #2, and #3 of the isolated view focus methodologically on the classification and categorization of knowledge. Classification and categorization schemes have a long history in IS research and support the description, understanding, and analysis of existing and novel phenomena (Kundisch et al., 2021; Nickerson et al., 2013). Due to their descriptive nature, they are often the necessary first step to generate explanatory or prescriptive knowledge (Gregor, 2006). Research articles #1 and #2 adopt the widely used taxonomy development approach (Kundisch et al., 2021; Nickerson et al., 2013) to study the DT construct and BPM governance setups. Research article #3 concludes the isolated view by categorizing organizational DI responses to exogenous shocks into four patterns of crisis-driven DI.

1. The Diverse Purposes of Digital Technology

Today's world is unimaginable without DT as it drives technological and economic transformation in our society (Legner et al., 2017; Vial, 2019). Given DT's central role in the (re-)shaping of BPM and DI (Baiyere et al., 2020; Yoo et al., 2010), understanding its nature is of crucial importance for research and practice, and a critical foundation to this thesis. The DT construct has evolved from a rich research history on the nature of technology and sociotechnical systems. Most importantly, technology has always been at the heart of the IS discipline (Hirschheim & Klein, 1989; Klein & Hirschheim, 1989; Orlikowski, 1992) where IT represents the central component of information systems (Davis, 2000). IT refers to technology as a collector, storage, processor, and transmitter of information and covers a digital and physical perspective (i.e., soft- and hardware) (Boaden & Lockett, 1991). Starting as a mere tool separated from individuals and their work (El Sawy, 2003), over time, IT has evolved into an integral component of products, services, and individuals' lives, which broadened the understanding of IT putting more emphasis on its digital characteristics (Kallinikos & Mariátegui, 2011; Tarafdar & Tanriverdi, 2018). As a result, the term DT emerged referring to technology that is embedded in products and services and can hardly be disentangled from the underlying IT infrastructure (Henfridsson & Bygstad, 2013; Yoo et al., 2010).

Since then, DT has become one of the core constructs in multiple IS research streams that focus on phenomena such as digital transformation (Vial, 2019) or DI (Ciriello et al., 2018). Hund et al. (2021) thereby refined the definition of DT outlining that a "[…] digital object becomes a digital technology when it is assigned a meaning, namely a purpose for applying it […]" (p. 5), whereby purpose relates to the social positioning of a

DT within a sociotechnical system, e.g., related functions, and associated rights and responsibilities (Faulkner & Runde, 2019). Following this definition, it becomes obvious that understanding the nature of DT is closely related to understanding its different purposes. Owing to its embeddedness in products and services, DT is associated with manifold purposes today, such as data collection, insight generation, and interaction (Bharadwaj et al., 2013; Pavlou & El Sawy, 2010).

To avoid being overwhelmed by the growing number and high diversity of DTs, researchers and practitioners would benefit from a classification of DTs through their purposes (henceforth: purpose-related classification). On the one hand, a purpose-related classification enables to abstract from individual DTs when studying digital opportunities and to focus on selected types of DTs sharing the same purpose. On the other hand, a purpose-related classification would support managers in the structured assessment of the growing number of DTs. However, existing classifications do not account for the variety of DT purposes in a way that (1) has been rigorously developed, (2) accounts for the characteristics of DT, (3) is sufficiently concrete to appropriately reflect the diverse purposes DT, and (4) is sufficiently abstract to be persistent (over a reasonably long period of time). Thus, research article #1 asks the question *'how can DTs be classified through their purposes?'*. To address this question, it presents a taxonomic theory (Gregor, 2006) for DT that enables its classification through its diverse purposes. More precisely, two artifacts are developed in line with McKelvey's (1982) 'organizational systematics' paradigm: (1) A taxonomy of DT and (2) purpose-related DT archetypes.

First, the taxonomy development process (Nickerson et al., 2013) built on a sample of 92 real-world DTs compiled from the Gartner Hype Cycle (GHC) for emerging technologies as a primary data source (years 2009 to 2017). As a result, a multi-layer taxonomy is developed that helps to categorize individual DTs (Table 1). The layers of the taxonomy were derived from Yoo et al.'s (2010) layered architecture of DT, i.e., *device*, *network*, *content*, and *service*. The *device* layer accounts for devices that allow DTs to perform their functions. Broadening the focus on physical devices (Benkler, 2006) through the inclusion of logical capabilities, Yoo et al. (2010) divide this layer into physical machinery and logical capabilities. The taxonomy therefore includes the role of technology and its scope regarding the physical and the digital world as dimensions. The *network* layer refers to the socio-technical interactions of DTs. Yoo et al. (2010) characterize networks as structures of physical transport and logical transmission. The taxonomy hence includes the direction of information flow and the number of entities involved. The *content* layer refers to the key resource of DTs, i.e., received and provided data, and specifies how data is processed. Finally, the *service* layer addresses the usage of DTs by referring to their functionality (Arthur, 2009) in terms of the extent of human involvement.

Second, the taxonomy is used to inductively extract nine purpose-related archetypes of DT (Ross, 1974; van der Valk et al., 2021). These purpose-related DT archetypes reflect combinations of DT characteristics typically co-occurring in practice (Figure 2). Providing an additional overarching structure that supports

intuitive classification, the DT archetypes are further categorized into *infrastructure* technologies and *application* technologies. Infrastructure technologies enable efficient data and information sharing among various parties involved. Thereby, they provide the (cyber-) physical foundation that application technologies need to build on. Infrastructure technologies include c*onnectivity & computation*, *platform provision*, and *personal mobile communication* technologies. *Connectivity & computation* includes DTs with the purpose of efficient data processing or exchange, which are mainly characterized as 'infrastructure' and by 'passive usage'. *Platform provision* comprises DTs that serve the purpose of providing unified access to data or digital services. Last, *personal mobile communication* covers DTs that serve the purpose of enabling personal, location-independent access to and use of digital data through portable hardware components.

Table 1. Multi-layer taxonomy of DT

Layer	Dimension	Characteristic					Exclusivity[1]
Device	Role of Technology	Application		Infrastructure			ME
	Scope	Cyber		Cyber-Physical			ME
Network	Multiplicity	One-to-One	One-to-Many	Many-to-Many			ME
	Direction	Uni-directional		Bi-directional			ME
Content	Data Treatment	Collection	Aggregation	Analysis	Execution	Transmission	NE
	Input	Digital		Physical			NE
	Output	Digital		Physical			NE
Service	Human Involvement	Active Usage		Passive Usage			ME

Three types of application technologies, i.e., *bridging*, *intelligence*, and *interaction*, directly engage with end-users to be applied for various purposes. First, *bridging* technologies, i.e., *sensor-based data collection* and *actor-based data execution*, transform digital input into physical output, or vice versa, bridging the gap between the virtual and the physical world. *Sensor-based data collection* encompasses DTs with the purpose of collecting real-world data and their transformation into digital data. *Actor-based data execution* covers DTs that serve the purpose of transforming digital data into physical actions or artifacts. Second, *intelligence* technologies, i.e., *analytical insight generation* and *self-dependent material agency*, provide advanced analytical or cognitive features. *Analytical insight generation* covers DTs that serve the purpose of analyzing digital data to support knowledge creation and decision-making. *Self-dependent material agency* covers DTs that serve the purpose of collecting and analyzing both digital and physical data to enable self-dependent action in the physical world. Third, *interaction* technologies, i.e., *augmented interaction* and *natural interaction*, facilitate novel forms of communication and interaction with humans. *Augmented interaction* relates to DTs with the purpose of analyzing digital data and presenting them in a physical form. *Natural interaction* covers DTs with the purpose of enabling human-machine interfaces to be perceived as natural by humans.

[1] ME = Mutually exclusive; NE = Non-exclusive

		Purpose-related DT Archetypes	Relative Frequency	Device		Network		Content			Service	Examples
				Role of Technology	Scope	Multiplicity	Direction	Data Treatment	Input	Output	Human Involvement	
Infrastructure		**Connectivity & Computation**	15.2%	Infrastructure (100%)	Cyber (93%)	Many-to-Many (100%)	Bi-Directional (100%)	Transmission (100%)	Digital (100%)	Digital (100%)	Passive Usage (100%)	802.11ax, Quantum Computing
		Platform Provision	10.9%	Infrastructure (100%)	Cyber (100%)	One-to-Many (80%)	Bi-Directional (100%)	Transmission (100%)	Digital (100%)	Digital (100%)	Active Usage (100%)	(Mobile) Application Store, Cloud/Web Platform
		Personal Mobile Communication	5.4%	Infrastructure (100%)	Cyber-Physical (100%)	One-to-One (100%)	Bi-Directional (100%)	Collection / Transmission (100%)	Digital / Physical (100%)	Physical (100%)	Active Usage (100%)	E-Book Reader, Media Tablet
Application	Bridging	**Sensor-based Data Collection**	12.0%	Application (100%)	Cyber-Physical (100%)	One-to-One (100%)	Uni-Directional (100%)	Collection (91%)	Physical (100%)	Digital (91%)	Active Usage (100%)	Gesture Recognition, Smart Dust
		Actor-based Data Execution	6.5%	Application (100%)	Cyber-Physical (100%)	One-to-One (100%)	Uni-Directional (100%)	Execution (83%)	Digital (100%)	Physical (100%)	Active Usage (100%)	3D Printing, 4D Printing
	Intelligence	**Analytical Insight Generation**	17.4%	Application (100%)	Cyber (100%)	One-to-One (100%)	Bi-Directional (94%)	Analysis (75%)	Digital (100%)	Digital (100%)	Active Usage (100%)	In-memory Analytics, Machine Learning
		Self-dependent Material Agency	2.2%	Application (100%)	Cyber-Physical (100%)	One-to-Many (100%)	Bi-Directional (100%)	Col. / Ana. / Exe. / Tra. * (100%)	Digital / Physical (100%)	Digital / Physical (100%)	Active Usage (100%)	Autonomous Vehicle
	Interaction	**Augmented Interaction**	13.0%	Application (100%)	Cyber-Physical (100%)	One-to-One (100%)	Bi-Directional (100%)	Transmission (92%)	Digital (100%)	Physical (100%)	Active Usage (100%)	Augmented Data Discovery, Virtual Personal Assistant
		Natural Interaction	17.4%	Application (100%)	Cyber-Physical (100%)	One-to-One (100%)	Bi-Directional (100%)	Collection (100%)	Physical (100%)	Digital (69%)	Active Usage (100%)	Conversational User Interface, Natural-language Question Answering

For each dimension, we illustrate the relative frequency of the characteristic which occurs most frequently
* Col. / Ana. / Exe. / Tra.: Collection / Analysis / Execution / Transmission

Figure 2. Purpose-related DT archetypes

The reliability, validity, and usefulness of the taxonomy and purpose-related DT archetypes are evaluated via the Q-sort method (internal and external) (Nahm et al., 2002) and a longitudinal analysis covering the GHC from the years 2000 to 2020. During the external Q-sort, the practitioners confirmed the understandability and applicability of both artifacts, highlighting their benefit to stimulating and structuring strategic discussions among organizational stakeholders, e.g., Chief Technology or Digital Officers, product and process designers, or technical solution architects. The longitudinal analysis offered new insights regarding the emergence of the DT construct and its diverse purposes. It reflects the evolution of the DT construct from a rather concentrated to a more balanced and purpose-diverse distribution.

In sum, the taxonomic theory (Gregor, 2006) consolidates many years of profound discourse and data on DT. It exceeds existing technology classifications by being the first that (1) has been rigorously developed, (2) considers the nature of DT, (3) is sufficiently concrete to reflect the diverse purposes of DT, and (4) is sufficiently abstract to be persistent. Further, it reinforces the importance of discussing the purpose of DTs by shifting from a purely technical to a purpose-related perspective that considers the interplay of technology, task, and human (Zigurs & Buckland, 1998). Last, the taxonomic theory comprises easily applicable mechanisms to categorize established and emergent DTs (Laycey et al., 2019) based on their purpose.

Concluding, research article #1 offers a valuable foundation for this thesis by enhancing our understanding of DT as a central construct of the IS field in general, as well as the domains of BPM and DI (Faulkner & Runde, 2019; Kallinikos et al., 2013; Mendling et al., 2020). Before this thesis unfolds in more detail the role of DT within interactions between BPM and DI (Sections III and IV), research articles #2 and #3 provide further foundations by taking isolated views on BPM (Section II.2) and DI (Section II.3).

2. Business Process Management Governance

The BPM domain has been flourishing in the past few decades (Bruin & Rosemann, 2007; Goni & van Looy, 2022; Kerpedzhiev et al., 2021; Klun & Trkman, 2018; vom Brocke, Mendling, & Rosemann, 2021). In recent years, it has become even more important due to its interplay with digital transformation and DI (Fischer et al., 2020; van Looy, 2021), and the increasing availability of process data renders process mining a key technology in the digital age (Grisold et al., 2020). Nevertheless, the development of BPM capabilities on the enterprise level still represents a key challenge for organizations, where the establishment of an effective BPM governance (BPM-G) is one important factor (Spanyi, 2015; vom Brocke et al., 2022).

BPM-G encompasses the roles, structures, and methods that organizations implement to provide guidance, boundaries, and continuity for their BPM activities (Hammer, 2015; Kerpedzhiev et al., 2021; vom Brocke et al., 2014). Research thereby highlights the importance of formal roles (e.g., process owners), dedicated BPM units, and strategic support for driving operational excellence and DI through BPM (Danilova, 2019; Grisold et al., 2021; Hernaus et al., 2016; Schmiedel & vom Brocke, 2015). Existing studies find that there is a plethora of options for designing BPM-G setups (Santana et al., 2011; vom Brocke et al., 2022). These setups can build on decentralized roles, a BPM center of excellence (i.e., the central provision of services) (Arsanjani et al., 2015; Dyer et al., 2013; Rosemann & vom Brocke, 2014), or business development units that integrate BPM next to other managerial capabilities. How an organization combines these design options in its BPM-G setup largely depends on context factors such as the overarching strategy, targeted purpose of BPM, and corporate environment (vom Brocke et al., 2021; vom Brocke et al., 2016).

To design a BPM-G setup that is appropriate for its context, organizations need to be able to consider relevant dimensions and characteristics that are available to them (vom Brocke et al., 2021). However, a comprehensive conceptualization of BPM-G setups is still missing. Compared to other BPM success factors such as methods and IT (e.g., Grisold et al. (2022)), BPM-G is even rather understudied from a holistic perspective as prior research focuses on individual elements of BPM-G, e.g., process ownership (Hernaus et al., 2016). Hence, it remains unclear which dimensions constitute BPM-G setups, which characteristics can be chosen and combined (e.g., a mix of decentralized roles with a centralized unit), and which rationales organizations apply when designing their BPM-G setup. Generating such fundamental knowledge is highly relevant for the academic community as it enables the systematic description and analysis of BPM-G setups to contextualize research or to develop more mature theories about the effects of specific setups (Gregor, 2006; Gregor & Hevner, 2013). Moreover, knowledge about the conceptualization of BPM-G setups is also relevant to practitioners when adopting BPM on the enterprise level as it supports clear-headed decisions regarding its success factors. Thus, research article #2 asks the question *'how can BPM-G setups be conceptualized?'*.

To address this question, a taxonomy of BPM-G setups is developed (Kundisch et al., 2021; Nickerson et al., 2013) based on interviews with BPM practitioners as well as justificatory knowledge from the BPM-G and organizational design literature. The resulting taxonomy (Table 2) is structured along three organizational tensions as layers: *Centralization vs. decentralization* (Siggelkow & Levinthal, 2003), *exploration vs. exploitation* (Smith & Tushman, 2005), and *standardization vs. flexibilization* (Howard-Grenville, 2005). These tensions were continuously mentioned in the interviews as something that practitioners needed to consider when deciding between two or more alternatives for characteristics of their BPM-G setup (Gaim et al., 2018). It is one goal of the taxonomy to concretize what these alternative characteristics are and identify rationales for how different organizations decided to address the organizational tensions in their BPM-G setup.

Table 2. Dimensions and characteristics of the taxonomy of BPM-G setups

Tension	Dimension	E/N	Characteristics				
Centralization vs. decentralization	Organizational anchoring	N	BPM team in a dedicated department	BPM team in non-dedicated department(s)	BPM community of practice	Individual BPM practitioners	
	BPM ownership	N	Senior management	BPM team	BPM community of practice	Not defined	
	Financial resources	N	Global BPM budget	Project-based BPM budget	Process-based BPM budget	Not defined	
	Leading activities	N	Design & modeling	Monitoring & control	Improvement & innovation	Program & project management	None
	Supporting activities	N	Design & modeling	Monitoring & control	Improvement & innovation	Program & project management	None
Exploitation vs. exploration	Institutionalization of ambidexterity	E	Separated	Integrated	None		
Standardization vs. flexibilization	Process ownership	E	Pre-defined for all processes	Pre-defined per process (type)	Flexible		
	Data ownership	E	Pre-defined for all processes	Pre-defined per process (type)	Flexible	Not defined	
	Role allocation	N	Per business department(s)	Per BPM activity	Per end-to-end process	Flexible	
	Standards & methods	E	Pre-defined for all processes	Pre-defined per process (type)	Flexible		
E = exclusive; N = non-exclusive							

The layer *centralization vs. decentralization* comprises five design dimensions. *Organizational anchoring* describes the unit, team, department, or group of people primarily practicing and engaging in BPM. *BPM ownership* refers to the organizational unit or role that has authority and guidance over an organization's BPM (Boer et al., 2015). This includes, for instance, aligning BPM with the organization's overall strategy or deciding on improvement actions for the BPM-G setup. The next dimension addresses how an organization allocates *financial resources* for BPM (Kirchmer, 2010), e.g., via a global BPM budget that the BPM team can freely use or one central budget. The last two dimensions of this layer, i.e., *leading activities* and *supporting activities*, focus on the responsibilities of an organization's BPM for the activities of the BPM lifecycle. Within the layer *exploitation vs. exploration*, organizations can choose whether and how they want

to implement ambidextrous activities in their BPM via the dimension *institutionalization of ambidexterity*. Organizations can implement ambidexterity in BPM via separate teams, each focusing on exploitation or exploration, or one team that executes both. Further, some organizations do not explicitly consider ambidexterity in their BPM. The third layer, *standardization vs. flexibilization*, comprises four dimensions and addresses the ownership of processes and (process) data. *Process ownership* refers to how an organization assigns the process owner role. For instance, the BPM owner can assign process ownership to the same responsible unit for all processes, such as assigning the role to the business department most involved in each process. Considering the increasing importance of data in BPM, *data ownership* (Kerpedzhiev et al., 2021) describes how an organization assigns this role. Going in a similar direction, the dimension *role allocation* refers to how an organization allocates roles for BPM activities. For example, organizations can allocate corresponding roles per business department, e.g., one member of the BPM unit being assigned to take care of processes for Human Resources. The last dimension refers to the implementation of *standards and methods* (Kerpedzhiev et al., 2021) and whether and how organizations pre-define those for their processes, e.g., providing a portfolio of methods and tools that stakeholders use when conducting BPM-related activities.

For evaluation, research article #2 also applies the taxonomy. Most importantly, it is applied to three illustrative cases (Kundisch et al., 2021; Limaj & Bernroider, 2022) to gain an in-depth understanding of the BPM-G setup in each case and of the rationales that underly design decisions. Overall, the taxonomy is found to be a useful tool for understanding BPM-G setups as well as a structuring guideline for discussion around BPM adoption. It is shown that organizations address the three tensions surrounding BPM-G differently based on their organizational context and thus differ in the rationales they apply to the design of their BPM-G setup. For example, the rationales can be inward-facing when a need for strong management support, autonomy, or employee acceptance drives the design of a BPM-G setup. They can also be outward-facing when the focus is on competitiveness, shifting customer behavior, or DT trends. Other rationales can relate to the presence or absence of a process-oriented mindset and an end-to-end view of business processes. In organizations with high compliance demands, a subset of regulated processes can lead to a very narrow focus of BPM as part of an organization's quality management. For these regulated processes, the BPM team centralizes and standardizes the design and modeling, while being less involved in more explorative BPM activities for other process types. In contrast, organizations can give BPM a higher strategic relevance as a driver of DI. The BPM-G setup can support this purpose by drawing on a centralized BPM ownership in senior management (e.g., C-level), intensifying the team's involvement in all BPM-related activities, and by building on an end-to-end view of business processes. When regulation is less of an issue, roles, and responsibilities are designed to be more flexible to incentivize continuous improvement and DI.

Concluding, research article #2 offers many foundational insights relevant to the interaction between BPM and DI. In times when new DT continuously challenges organizations' way of working, adopting BPM at an enterprise level is more important than ever to be able to rapidly adapt on the process level (Baiyere et al., 2020). Most importantly, building an appropriate BPM-G setup offers guidance, boundaries, and continuity for any activities of process improvement and innovation. At the same time, however, BPM-G is an often overlooked and understudied success factor of BPM (Kerpedzhiev et al., 2021). The multitudes of design options for BPM-G setups are subject to a common phenomenon in organizational design, i.e., competing demands (Gaim et al., 2018). To understand and address the resulting organizational tensions, it is vital to problematize them and understand their relation to the dimensions and characteristics of BPM-G setups. Against this drawback, the developed taxonomy of BPM-G setups contributes to the descriptive knowledge of BPM in general and BPM-G in particular. As a theory for analyzing (Gregor, 2006), it offers a high-level abstraction and conceptualization and thus enables a systematic description and analysis of BPM-G setups. In doing so, it is a valuable tool to study different BPM-G setups, e.g., in terms of their ability to empower digital process innovation or quickly integrate a novel DT as part of DI.

3. Digital Innovation in Times of Crisis

COVID-19 has caused one of the biggest global challenges since World War II. Due to the massive restriction of physical contacts, organizations faced adverse market conditions and changing customer demands. However, what separates organizations' innovation responses to survive the COVID-19 crisis and/or to enable post-crisis growth from previous comparable crisis (Bar Am et al., 2020; Krogh et al., 2020) is today's high accessibility and maturity of DT and increased digital literacy in society. As a result, many crisis responses centered around DI emerged in the form of novel processes, products, services, and business models (Nambisan et al., 2017; Yoo et al., 2010). Beyond somewhat predictable DIs, e.g., virtual wine tastings (Adarkar et al., 2020), the pandemic also produced entirely new DI activities. An interesting and rather counterintuitive reaction can be seen in the cosmetic retailer Lin Qingxuan. The organization impressively leveraged its situation of urgency (i.e., the closure of 40% of its stores and a 90% drop in turnover) to explore new means of customer service and sales activities (Reeves et al., 2020; Spencer et al., 2020). Lin Qingxuan equipped its quarantined salespeople with advanced DT to enable them to become social media influencers. Through individualized customer services, the organization was able to attract more than six million followers and fill 60,000 person large-scale live-stream shopping events (Alibaba Clouder, 2020; Reeves et al., 2020).

Although the academic literature acknowledges the growing opportunities of DI (Berghout, 2020; Chen & Roldan, 2021), there is a lack of rigorously developed and well-structured understanding of crisis-driven DI responses (Carugati et al., 2020). While the IS literature provides a mature body of knowledge on the nature

and implementation of DI (Ciriello et al., 2018; Kohli & Melville, 2019; Yoo et al., 2010), crisis-driven DI has hardly been covered from a theoretical perspective. However, such an understanding is fundamental to ensuring that organizations have valid grounds for decision-making and guidance for immediate DI implementation decisions in future crisis situations. As the example cited indicates, organizations use the far-reaching and often unexpected possibilities of DI to counter the effects of a major crisis. Thus, research on DI and crisis management needs a foundation to better understand DI-related response options and dependencies for organizations when confronted with unexpected crisis. Against this background, research article #3 asks the question *'what DI patterns are emerging in response to exogenous shocks such as the COVID-19 crisis?'*.

To answer this question, research article #3 builds on the crisis management and organizational ambidexterity literature to present four patterns of crisis-driven DI accounting for the drivers of DI (Baumbach et al., 2020; Cordes & Rosemann, 2020; Kotter, 2008) as well as the DI focus (He & Wong, 2004; Jansen et al., 2006; March, 1991). The patterns consider whether an organization had to respond to the crisis because of a *sense of urgency* (e.g., a new regulation forced the closure of physical retail stores), or chose to respond to new opportunities emerging with the crisis with a *sense of ambition* (e.g., by identifying new customer demands arising from citizens being in enforced isolation). Regarding the DI focus, it is distinguished between *exploitation* (i.e., DI actions and outcomes that refine existing offerings associated with certainty and low organizational effort) and *exploration* (i.e., DI actions and outcomes that create radically new offerings associated with uncertainty and high organizational effort). To evaluate and refine these patterns, secondary data from 43 organizations implementing DI during the COVID-19 crisis is analyzed to concretize each pattern's emerging properties, i.e., core actions and attributes. Each pattern is named according to the respective overarching theme that is identified during its development (Figure 3).

The (I) *defend* pattern relates to *urgency-driven exploitation*, describing DI cases that were developed from a *sense of urgency* (as organizations could not operate their daily business as intended) aiming at the digitalization or digital enhancement of existing offerings for short-term survival. The (II) *compensate* pattern describes *urgency-driven exploration*, where the *sense of urgency* was transformed into the exploration of radically new ways of dealing with the crisis. The (III) *scale* pattern describes *ambition-driven exploitation*, characterizing DI cases that were developed from a *sense of ambition* with the aim to incrementally enhance and scale existing digital offerings. The (IV) *diversify* pattern describes *ambition-driven exploration*, targeting novel crisis-related opportunities beyond existing offerings.

The four patterns enhance our understanding of DI in times of crisis, laying the foundation for researchers and practitioners to design crisis-driven DI. The results of article #3 add to the intensive discussion on how organizations react to crisis (Blume et al., 2020; Davidsson et al., 2018; Sarkar & Osiyevskyy, 2018) by categorizing organizational innovation responses into clearly defined patterns. The emerging properties of the

patterns provide initial (i.e., nascent) explanations of how and why DI emerged in some particular real-world situations (Gregor, 2006) (i.e., the context of the COVID-19 crisis). Last, it is found that the four patterns of crisis-driven DI reveal new questions for research. Building on the introduced patterns of crisis-driven DI, a set of four propositions is derived that provides directions and stimulus for further research.

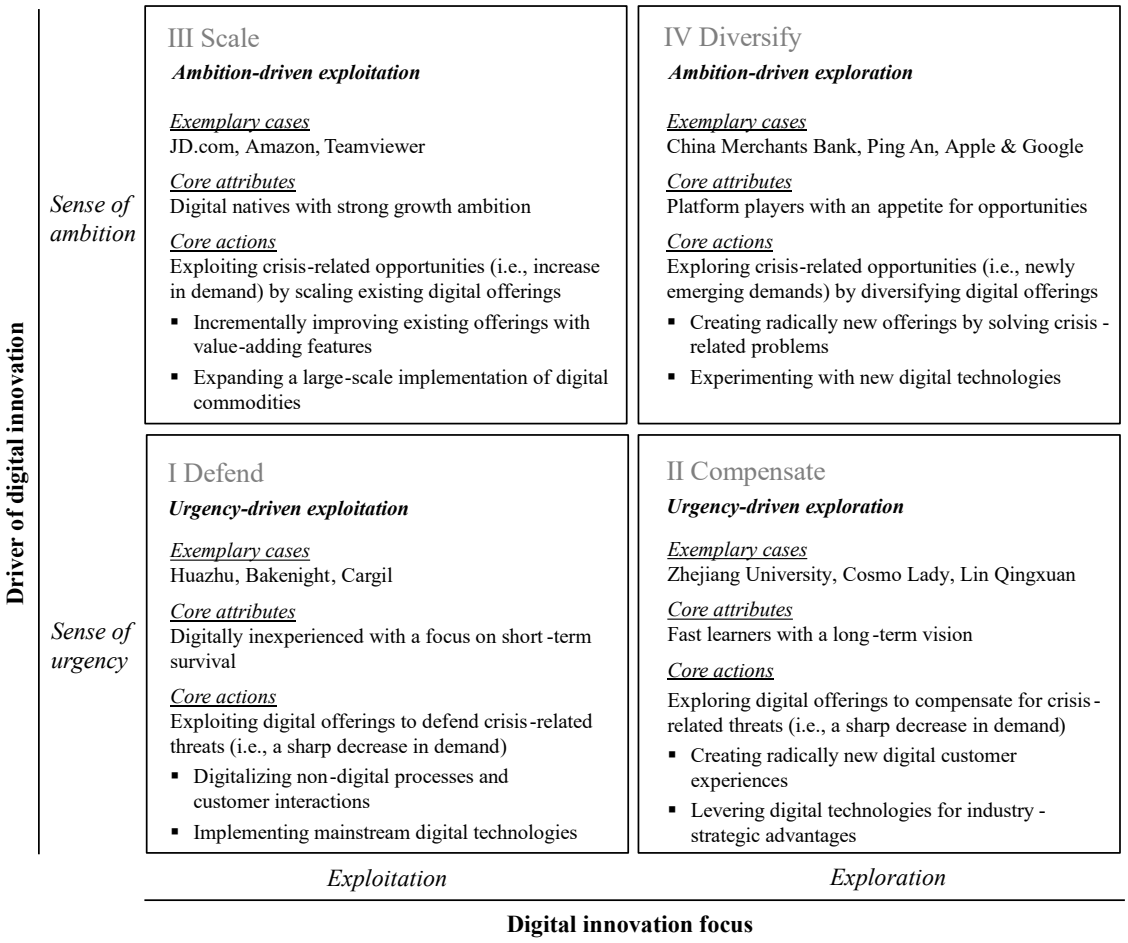

Figure 3. Patterns of crisis-driven DI and their emerging properties

In sum, crisis such as the COVID-19 pandemic highlight the importance of engaging in DI in today's world to defend against disruption and to create competitive advantage through digital opportunities. Given the sudden nature of the effects of the pandemic, it is striking how fast many of the 43 analyzed organizations in research article #3 were able to follow one of the four patterns. Taking a closer look, the immediate responses were not just a matter of identifying problems or sensing opportunities. The organizations also had to quickly transfer their ideas for DI into concrete products, services, processes, or business models, and integrate those as stable as possible into their existing structures and processes. It is this aspect that once again highlights the relevance of understanding and exploiting synergies between BPM and DI, whereby research article #3 offers many insights that provide a foundation to further delve into interactions between both domains.

III. Interdependent View: Digital Technology Fostering Beneficial Interactions between Business Process Management and Digital Innovation

The interdependent view focuses on novel DT-driven interactions between BPM and DI through three articles that go beyond the descriptive nature of the isolated view. First, research article #4 explores the role of DT as the main driver of an increasing need to identify and exploit interactions between BPM and DI. To do so, it details the effects of DT on opportunity recognition and explains how and why these effects emerge (i.e., explanatory knowledge). Second, research article #5 builds on the observation that many of the effects of DT require organizations to take an outward-facing perspective that prioritizes customer needs. More precisely, it proposes a decision model (i.e., prescriptive knowledge) that allows organizations to select a portfolio of process improvement projects from a customer-centric perspective by considering the impact on customer satisfaction. Last, research article #6 examines digital transformation as a change process that integrates BPM as well as DI activities. Focusing on higher education as a specific context, it explores the shifts in the traditional logics of teaching and learning throughout a digital transformation and investigates how these shifts relate to the innovative integration of DT in educational services, processes, and work practices.

1. The Effects of Digital Technology

Through its ability to add digital capabilities to physical and hybrid products and services (Piccoli et al., 2022; Yoo et al., 2010), DT continuously offers new ways for interaction between customers and companies and is now tightly interwoven in our everyday lives (Baskerville et al., 2020; Lokuge et al., 2019). The convergent and generative nature of DT therein leads to the creation of novel spaces for opportunities which are key for any entrepreneurial endeavor (Oberländer et al., 2021; Shepherd et al., 2019). The process of opportunity recognition is a central topic in entrepreneurship research and has been studied from a process perspective in terms of activities, input, and outcome, e.g., Ardichvili et al. (2003), and from a behavioral perspective focusing on an individual's behavior when engaging in opportunity recognition, e.g., Baron (2007).

Despite the long-standing history of entrepreneurship research, recognizing opportunities in the digital age is still a major challenge. One of the main reasons is that it becomes increasingly difficult for research and practice to draw on traditional knowledge of opportunity recognition that was generated when the effects of technology were less pervasive (Nambisan et al., 2017; Steininger, 2019). As a response, the comparably new research domain of digital entrepreneurship has taken on the task of challenging existing assumptions in entrepreneurship and examining opportunity recognition in a digital world (Recker & von Briel, 2019). Consequently, it shifted the focus towards investigating the nature of opportunities enabled or influenced by DT (e.g., Oberländer et al. (2021), von Briel et al. (2021), or Nambisan et al. (2017)). However, research still

lacks a profound understanding of the effects of DT on opportunity recognition (Shepherd et al., 2019; von Briel et al., 2021), in terms of fundamental constructs as well as more detailed aspects of the process and behavioral perspectives (Recker & von Briel, 2019; Steininger, 2019). Understanding the effects of DT on opportunity recognition would be of particular interest not only for digital entrepreneurship but also for closely related domains. For example, to "take advantage of improvement opportunities" (p. 1) is one aspect of BPM (Dumas et al., 2018), and enhancing the opportunity mindset of BPM in general is a widely shared goal in the domain (Rosemann, 2014). Further, DI considers opportunity recognition as the important – but mostly understudied - first step in the innovation process (Abrell et al., 2016; Ciriello et al., 2018; Holmström, 2018). The current lack of understanding thus hinders scientific progress and practitioners are left without guidance on how to best recognize opportunities in a digital world (K. N. Shen et al., 2018; Svahn et al., 2017). Against this backdrop, research article #4 asks *'what are the effects of digital technology on opportunity recognition?'*. To address this question, it draws on opportunity recognition theory to conceptualize the effects of DT on opportunity recognition and explain the evolution from traditional entrepreneurship to DE.

In a first step, the article derives the four key constructs of opportunity recognition from the traditional entrepreneurship literature, i.e., *actor*, *resource*, *market*, *opportunity-idea*. As a starting point, the process of opportunity recognition requires an *actor*, i.e., an organization or individual (Davidsson, 2015). The *opportunity-idea* construct combines the concept of an opportunity, as a possibility for action, with the concept of an idea (K. N. Shen et al., 2018), and is the central outcome of opportunity recognition. Referring to the market-based view (MBV) of the firm, the *market* situation of the *actor* influences the generation of an *opportunity*-idea, e.g., characterized by the *actor*'s position on the *market* and in relation to other *market* participants (Brem & Voigt, 2009; Zhou et al., 2005). Referring to the resource-based view (RBV) of the firm, *resource* relates to the *resource* base (e.g., assets and capabilities) available to the *actor* that shapes the generation of an *opportunity-idea* (Ardichvili et al., 2003; Barney, 1991).

In the second step, the article applies a structured literature review (vom Brocke et al., 2015), complemented with coding techniques for theorizing by Wolfswinkel et al. (2013) to identify the effects of DT on these key constructs. Therein, it builds on the fact that DT enables a close link between opportunity recognition in digital entrepreneurship and DI (von Briel et al., 2021) which allows to draw from mature DT knowledge in the DI literature. This approach reveals three digital phenomena (i.e., *digital invasiveness*, *dissolving product and industry boundaries*, and *dissolving company and customer boundaries*) facilitated through three DT outcomes (i.e., *layered modular architecture*, *digital platforms*, and *digital ecosystems*.) that drive the effects of DT on opportunity recognition. First, digital *invasiveness* refers to DT not only changing the core of entrepreneurial endeavors but also individuals' work and personal lives (Baskerville et al., 2020; von Briel et al., 2021). This development is mainly rooted in the *layered modular architecture*, which enables DT to be an integral part

embedded in our everyday lives. Second, opportunity recognition is found to be affected by *dissolving company and customer boundaries*, a circumstance extending the nature and type of resources at the disposal of actors (Oberländer et al., 2021). Specifically, *digital platforms* allow organizations to integrate customers' and other organizations' resources into their own value creation (Zhang et al., 2020). Third, *digital ecosystems dissolve product and industry boundaries* (Yoo et al., 2010) in areas in which the entrepreneurial endeavors of market participants more than ever build on, relate to, and interfere with each other (Sahut et al., 2021).

Based on these digital phenomena, research article #4 presents three direct as well as three transitive effects of DT on opportunity recognition (Figure 4) and provides rationales for each effect (Table 3). *Digital technology* is the decisive construct that enables a *resource*- as well as *market*-related recognition of opportunities in digital contexts (Kohli & Melville, 2019). The *opportunity-idea* is shaped by the *actor*'s *resource* base, which is enlarged by new digitally extended resources. The *opportunity-idea* is generated by an *actor* who is situated in a specific *market* environment that is expanded through digitally enabled relationships.

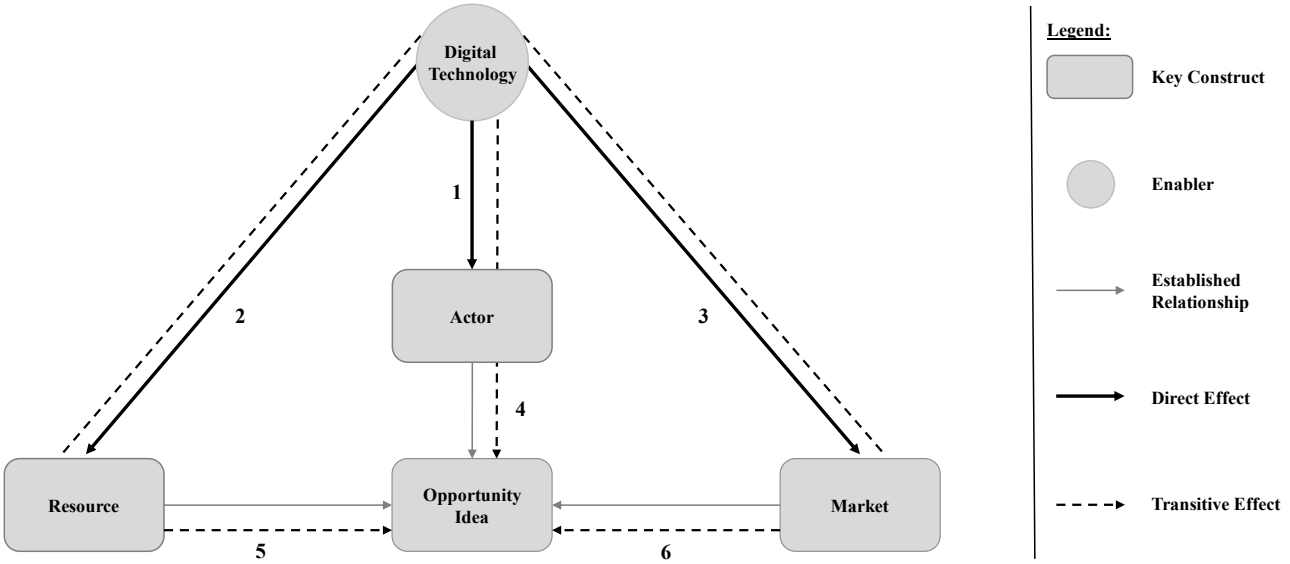

Figure 4. The effects of DT on opportunity recognition

It is found that there is not a single direct effect of *digital technology* on the *opportunity-idea*. Rather, the *opportunity-idea* – as the central construct of opportunity recognition – is transitively affected by *digital technology* through all other constructs. Further, all effects are moderated by the *actor*. Following the idea of causal explanations by Gregor (2006), Table 3 details the direct and transitive effects of *digital technology* based on five elements: First, the construct or established relationship is characterized without the presence of *digital technology* (From). Second, the construct is characterized as it is affected by *digital technology* (To). Third, Table 3 shows the digital phenomenon that is found to drive the effect (Driven by) and, fourth, the DT outcome through which the digital phenomena predominantly emerged (Through). Fifth, it lists rationales that provide explanatory insights into how the digital phenomena drive the effects.

Table 3. Rationales underlying the direct and transitive effects of DT on opportunity recognition

	#	From	To	Driven by	Through	Rationales	References
Direct Effects	**1**	Homogenous entrepreneurs	Growing number and variety of actors (everyone)	Increasing digital invasiveness	Layered modular architecture	1.1 Due to the layered architecture of DT individuals and organizations are constantly working with and surrounded by DT driving digital invasiveness and fostering digital opportunities.	(Ciriello et al., 2017; Iivari et al., 2016)
						1.2 Increasing digital invasiveness fosters the ability of organizations and individuals to participate in opportunity recognition.	(Nambisan et al., 2017; Yoo et al., 2012)
						1.3 DT can take a supporting or leading role as an actor contributing to opportunity recognition.	(Barrett et al., 2015; Henfridsson et al., 2018)
	2	Exclusively internal access only	Externally shared access	Dissolving company and customer boundaries	Digital platforms	2.1 Digital platforms enable shared access to an enlarged resource base – beyond company-owned resources – dissolving company and customer boundaries and leading to digital opportunities.	(Lokuge et al., 2019; Saldanha et al., 2017)
						2.2 Digital platforms provide new digital capabilities, which digitally enhance existing products and can be shared between companies and customers for opportunity recognition.	(Gustavsson and Ljungberg, 2018; Yoo et al., 2012)
						2.3 Digital platforms provide new digital assets such as digital infrastructure, digital applications, and data assets, which serve as foundation for opportunity recognition.	(Fichman et al., 2014; Henfridsson et al., 2018)
	3	Hierarchical relationships	Multi-lateral value networks	Dissolving product and industry boundaries	Digital ecosystems	3.1 Digital ecosystems transform competitors in hierarchy-based value systems into partners for opportunity recognition by dissolving product and industry boundaries.	(Ciriello et al., 2018; Oppong-Tawiah and Bassellier, 2017)
						3.2 Digital ecosystems enable suppliers to contribute valuable knowledge to opportunity recognition and change existing supplier relationships.	(Lee and Berente, 2012; Oborn et al., 2019)
						3.3 Within digital ecosystems, regulators facilitate opportunity recognition across industries by changing legislation that explicitly targets DT.	(Hinings et al., 2018; Suseno et al., 2018)
Transitive Effects	**4**	Context-dependent restrictions	Multitude of (re-) combination possibilities	Increasing digital invasiveness	Layered modular architecture	4.1 The layered architecture of DT shared by actors who are constantly surrounded by DT creates a variety of different compatible resources for opportunity recognition due to protocols and standards.	(Barrett et al., 2015; Lusch and Nambisan, 2015)
						4.2 The layered architecture of DT allows actors new ways of recombination for opportunity recognition through loose coupling via standardized interfaces.	(Henfridsson et al., 2018; Yoo et al., 2010)
	5	Deterministic and final deployment	Continuous iterative development	Dissolving company and customer boundaries	Digital platforms	5.1 By dissolving company and customer boundaries between actors, digital platforms foster the continuous adaptation and iterative refinement of ever-evolving digital artifacts.	(Ciriello and Richter, 2015; Gustavsson and Ljungberg, 2018)
						5.2 Digital platforms enable actors to build on their own or other company's digital artifacts as a starting point for opportunity recognition.	(Oborn et al., 2019; Zapadka, 2020)
	6	Few occasion-related interactions	Continuous integration	Dissolving product and industry boundaries	Digital ecosystems	6.1 By dissolving product and industry boundaries, digital ecosystems enable the continuous exchange of information and sharing of knowledge between actors.	(Lusch and Nambisan, 2015; Suseno et al., 2018)
						6.2 Within digital ecosystems actors can communicate their needs more quickly through short product cycles, which leads to continuous opportunity recognition.	(Abrell et al., 2016; Dery et al., 2017)

In sum, research article #4 not only complements existing digital entrepreneurship research but also more broadly contributes to the descriptive and explanatory knowledge of opportunity recognition in the digital context (Leidner, 2018; Seidel & Watson, 2020). The six effects represent a theory for explaining, i.e., a type II theory in terms of Gregor (2006), by addressing how and why DT influences opportunity recognition (Leidner 2018). Further, as the effects reveal how the constructs of opportunity recognition theory evolved given the influence of DT, they also provide valuable insights into the evolution of traditional entrepreneurship to digital entrepreneurship. The results of research article #4 have far-reaching implications for theory. They are a fundamental step towards sound scientific methods for theory development and validation regarding opportunity recognition in the digital context, e.g., toward theories for predicting (i.e., Types III – IV) as well as design and action (i.e., Type V) (Gregor 2006). Further, considering that the findings are based on a high-level conceptualization of opportunity recognition, they can form the basis to examine the process and behavioral perspectives in greater detail. Last, referring to (Berger et al., 2021) who ask how DT creates "opportunity spaces for entrepreneurial action" (p. 7), the results provide insights into the creation of digital opportunity spaces and the role of the *market* and *resource* constructs (Barney, 1991).

Concluding, the identified effects offer a threefold implication for how DT fosters new and beneficial interactions between BPM and DI. First, the effects concretize the increased complexity that DI processes entail compared to traditional innovation processes, especially during the early stages. As a response, an organization needs to be able to consistently understand interwoven recombination possibilities that stem from an extended resource base and multi-lateral value networks in the market. This requires an organization to draw on mature BPM knowledge to design a robust DI process that incorporates mechanisms and activities that deal with the increased complexity. Second, the effects indicate that an organization needs to be highly flexible to seize related opportunities. For example, they must be open to working with a growing number and variety of actors (effect #1), have the right infrastructure to use shared resources (effect #2), and build products and services that are extendable (effect #5). This requires flexible structures and processes as well as the ability to quickly integrate a novel DT, which can be facilitated by DI capabilities (Buck et al., 2021). Third, all effects feature an outward-facing character, e.g., in terms of shared resources or partnerships among market actors. Particularly effects #1, #5, and #6 highlight the importance of customers as a central source of input for new opportunity-ideas and outline new possibilities to engage with customers during innovation and improvement initiatives. Research article #6 builds specifically on this last aspect and aims to integrate the concept of customer centricity more tightly in BPM in general and business process improvement in particular.

2. Customer-centric Business Process Improvement

Due to fast-changing customer needs and intense competition in the digital age (Gimpel et al., 2018) companies must not only design excellent products but also customer-centric business processes (Galbraith, 2005; Karpen et al., 2015; Moormann & Palvölgyi, 2013). Hence, placing customers at the center of all corporate activities, a strategy also referred to as customer centricity, has evolved into an important success factor for many companies (Moormann & Palvölgyi, 2013). This has even led to awards such as the Digital World Award for Customer Centricity (Bushaus, 2019), or companies anchoring customer centricity in their corporate strategy, e.g., Amazon striving to become the "most customer-centric company" on earth (Amazon, 2023).

When implementing customer centricity, customer-company interactions are a key design variable as they drive customer satisfaction (Galbraith, 2005; Moormann & Palvölgyi, 2013), which in turn affects customer retention and corporate success (Reinartz et al., 2004; van den Bergh et al., 2012). Customer-company interactions are embedded in business processes – specifically in core processes such as service processes or pre-/after-sales processes of manufacturing companies, whose design and improvement are the focus of BPM (Hammer, 2015). However, most of the methods and tools provided by BPM focus on process efficiency while neglecting customer centricity (Benner & Tushman, 2003; Recker & Mendling, 2016; Voss, 2012). Given the importance of customer centricity, BPM scholars have called for complementing the efficiency perspective through a customer-centric perspective (Rosemann, 2014). In response, customer process management, an emergent strand of BPM research, aims to drive customer satisfaction through customer-centric processes (Rosemann, 2014; Trkman et al., 2015). Related knowledge, however, is in its infancy. With many companies facing an abundance of action possibilities, fast-changing customer needs, and scarce resources, specifically approaches to the customer-centric prioritization of process improvement projects are missing (Afflerbach & Frank, 2016). Against this drawback, research article #5 asks the question *'how can companies prioritize process improvement projects to foster customer centricity?'*.

As a response, research article #5 adopts the design science research (DSR) (Gregor & Hevner, 2013; Peffers et al., 2007) and uses multi-criteria decision analysis as well as normative analytical modeling as research methods (Keeney et al., 2003; Meredith et al., 1989). As a resulting artifact, an economic decision model is proposed that accounts for the effects of process improvement projects on customer satisfaction. As for justificatory knowledge, the model adopts ideas from *value-based process decision-making*, e.g., to evaluate projects based on their net present value (NPV), *project portfolio selection*, and the *measurement of customer satisfaction* – specifically ideas from the Kano model (Kano et al., 1984), i.e., feature types with different impact on customer satisfaction and the switching of feature types over time. Figure 5 summarizes the results from the design search results in terms of the outlined problem setting that the artifact addresses, two design objectives derived from the literature, and the design specifications of the decision model.

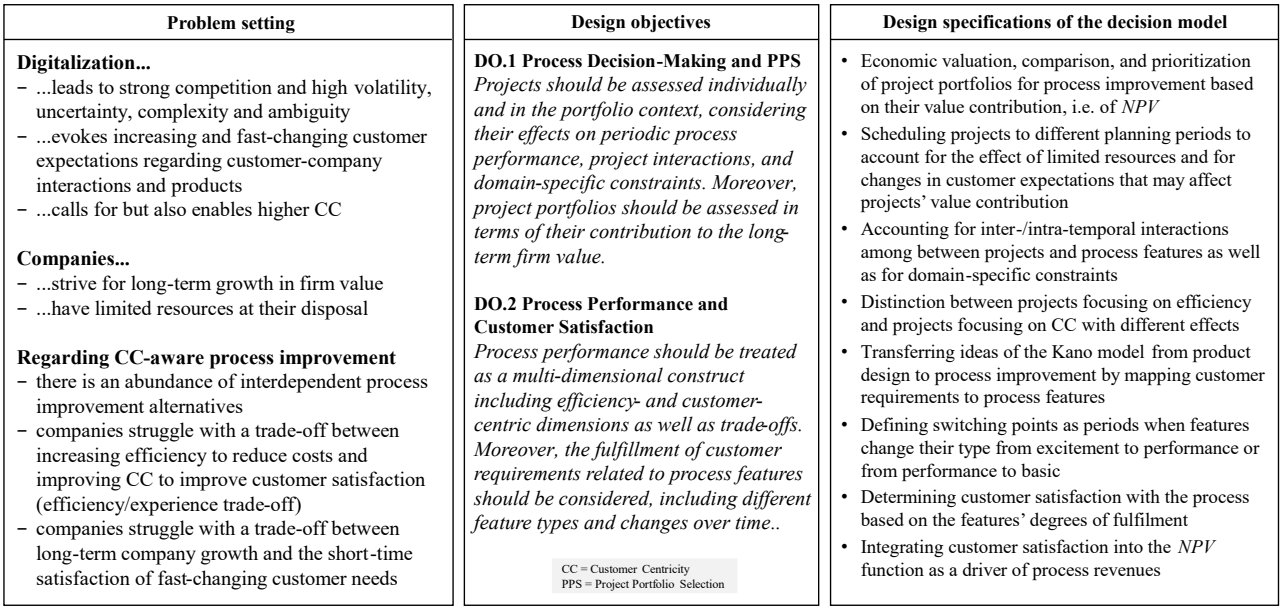

Figure 5. Overview of problem setting, design objectives, and design specification

The resulting decision model aims to assist process analysts in determining the portfolio of process improvement projects with the highest contribution to the firm value. The model is split into three components. First, regarding the objective function, it takes a set of admissible portfolios of project improvement projects as input. It values each portfolio based on its risk-adjusted expected NPV and recommends implementing the portfolio with the highest value contribution (Bitomsky et al., 2019; Lehnert et al., 2016). Further, in line with research on customer centricity, process revenues depend on customer satisfaction (Anderson & Mittal, 2000; Gruca & Rego, 2005). Second, to assess customer satisfaction, the model draws on ideas related to the Kano model (Afflerbach & Frank, 2016; Kano et al., 1984). Each process is characterized by features, each being categorized as either an excitement, performance, or basic feature from the perspective of customers. Through a transformation function, expectations and performance of these features are weighed against each other and transformed into a standardized value for customer satisfaction. Third, the decision model covers two types of process improvement projects. Customer centricity projects primarily aim at increasing the degree of performance regarding distinct features. Efficiency projects primarily aim at reducing costs.

The decision model was thoroughly evaluated following the framework by Sonnenberg and vom Brocke (2012). To validate the design specifications in terms of real-world fidelity and understandability, semi-structured interviews with industry experts were conducted (Myers & Newman, 2007; Venable et al., 2012). Overall, the experts confirmed that the outlined problem setting is relevant and that process improvement from a customer-centric perspective is a key challenge but also an opportunity for BPM. They also considered the decision model as viable for tackling this challenge. They underscored its real-world fidelity, stating that it covers most situations occurring in their daily business. The experts' main criticism was that the decision

model entails high data collection effort. However, they confirmed that this is a common drawback of decision models – particularly of investment models covering a multi-period planning horizon.

To validate the applicability and usefulness of the decision model, a prototype was developed and applied at a German insurance company (INSURANCE). The case is based on a real decision problem at INSURANCE, which matched the problem setting. It related to INSURANCE's Insurance Advice Process, for which six improvement project candidates had been identified. Together with an informant and experts in INSURANCE, the projects were classified as customer centricity or efficiency projects, and all necessary input data for the model was collected. After applying the decision model through the prototype, the results were discussed with the informant and experts. From their point of view, the decision model yielded interpretable and comprehensible results and complied with their own considerations. A final robustness analysis showed that the decision model could cope with estimation inaccuracies and generates consistent results even in case of deviations. Nevertheless, it was shown that the model specifically fits processes for which customer satisfaction is a relevant value driver. If a process hardly depends on customer satisfaction, related effects need not be modeled in such detail as done in the decision model and related data collection effort is not justified.

In sum, the decision model extends the prescriptive knowledge on process prioritization and customer process management by offering a novel approach to integrating customer centricity into process decision-making. The decision model is particularly useful in the digital age, where competition is characterized by volatility, uncertainty, complexity, and ambiguity (Bennett & Lemoine, 2014; Gimpel et al., 2018). Due to convenient access to information, customers can easily compare products and decide how to interact with companies (Hosseini et al., 2018). Hence, customers have increasing and fast-changing expectations regarding digital products and interactions with companies embedded in business processes (Afflerbach & Frank, 2016; Moormann & Palvölgyi, 2013). Owing to scarce resources, companies that therefore strive for customer centricity cannot implement all relevant process improvement projects (Bolsinger, 2015; Buhl et al., 2011; Lehnert et al., 2016). The decision model presented in research article #5 helps assess and select improvement projects for interaction-intensive core processes, for which customer satisfaction is a key value driver. This is an important contribution as knowledge of customer process management has been rather conceptual so far and specifically lacks guidance on how to implement customer centricity (Moormann & Palvölgyi, 2013).

Concluding, research article #5 shows how BPM can make use of the diverse purposes (research article #1) and effects (research article #3) of DT by embracing customer centricity, which is a popular characteristic of DI methods, e.g., value proposition design (Osterwalder, 2015). Taking Figure 4 as a framework, the resulting decision model offers clear structures to connect customer needs at the *market* with DT-driven process improvement initiatives considering available *resources*. This is just one example of how BPM can adopt concepts from the DI domain (i.e., customer centricity) to become a driver of DI itself (i.e., in terms of the

selected process improvement projects). In doing so, BPM *actors* can complement their focus on efficiency-related problems with new *opportunity-ideas* enabled by DT. Following this line of thought, digital contexts seem to challenge and evolve the very nature of BPM (e.g., as shown in Baiyere et al. (2021) or Mendling et al. (2020)). The same can be said about innovation, where DI shifted the focus toward the effects and implications of DT (e.g., as shown in research articles #3 and #4, Sandberg et al. (2020) or Yoo et al. (2010)).

Against this background, one must wonder how organizations deal with the transformative effects of DT and make it an essential part of their institution. In research and practice, the related change process within organizations is referred to as digital transformation. Digital transformation is triggered by technological change in the internal or external environment (e.g., an initial DI), usually encompasses many BPM and DI activities, and includes changes to value creation, structures, and work practices (Baiyere et al., 2020; Hinings et al., 2018; Vial, 2019; Wessel et al., 2021). Research article #6 hence focuses on digital transformation to better understand its inner working mechanisms and delves deep into the digital transformation of one specific context with high societal relevance, i.e., higher education.

3. A Logics Perspective on Digital Transformation

As the world's most numerous providers of higher education, universities are key to sustaining our modern knowledge society (Ashour, 2020; Wit & Altbach, 2021). To fulfill this role, they have traditionally applied three fundamental higher education logics (i.e., dominant ways of thinking – assumptions, practices, and values (Baiyere et al., 2020)) to teaching and learning: (1) mass production (Marginson, 2016; Trow, 1999), i.e., easily scalable 'one-to-many' classroom settings; (2) provider-centric control (Lea et al., 2003; Sadler, 2012), i.e., university actors deciding what to teach; and (3) students as consumers (Planas et al., 2013; Woodall et al., 2014), i.e., the view of students as rather passive recipients of knowledge.

In recent times, teaching and learning at universities have been subject to the influence of an environment that is in constant flux driven by digitalization (Benavides et al., 2020). Digital natives as learners bring in high expectations for proactive and personalized services conditioned by digital experiences in their private lives (Lacka & Wong, 2021; Morris et al., 2020). Further, advances in DT diversify content creation and consumption across various interaction channels (Hew et al., 2019; Oliveira et al., 2021). Finally, universities are encountering a double-edged situation where they witness a swift expansion of digitally accessible knowledge (Platonova et al., 2022) while experiencing a decline in the longevity of its relevance (Boone et al., 2008). These environmental changes reveal a growing need for universities to be able to seize the opportunities of DT for the provision of cutting-edge education. Many universities are thus pursuing digital transformation (Benavides et al., 2020; Bockshecker et al., 2022), in which they face two key obstacles. First, the outlined environmental changes are challenging the fundamental logics that universities have applied to teaching and

learning. While new logics of organizing, value creation, or institution are generally seen as an outcome of digital transformation (Wessel et al., 2021; Yoo et al., 2010), establishing these new logics is a difficult process in which actors must gradually cope with profound changes in structure and work practices (Baiyere et al., 2020). Second, there is the assumption that knowledge of digital transformation in the literature can be applied to any context. This assumption falls short considering that much research focuses on private-sector companies (Nadkarni & Prügl, 2021) or government agencies in the public sector (e.g., Mergel et al. (2019)).

To address this issue, research article #6 takes a logic perspective on digital transformation in higher education. Researchers have already highlighted the criticality of actors adopting new ways of thinking about their work over the course of a digital transformation (Corley & Gioia, 2004; Ravasi & Schultz, 2006; Wessel et al., 2021). The logic perspective provides a unique theoretical lens for analyzing how digital transformation affects the existing ways of thinking in terms of "taken-for-granted assumptions, value systems, and related practices" (Baiyere et al., 2020, p. 239) in higher education. Thus, research article #6 asks the question *'how do higher education logics change because of digital transformation?'*.

To address this question, article #6 aims to unfold how digital transformation relates to shifts in the underlying logics of teaching and learning, which are at the core of universities' value creation (Díaz-García et al., 2022). It draws on a comparative case study of a German and an Australian public university, Alpha and Beta, and builds on data from interviews, confidential as well as publicly available documents, and a longitudinal perspective based on the authors' experiences as academics at both institutions (Baker & Wetherbe, 2013; Hirschheim, 2019). As a starting point, the three traditional logics of teaching and learning are detailed (Table 4). While these logics are not an exhaustive list for the higher education context, they aggregate those prior ways of thinking about teaching and learning that were challenged by environmental changes and shifted over the course of the digital transformation at Alpha and Beta. The logics are structured along three perspectives on teaching and learning, i.e., *process*, *control*, and *actors*. Further, the three logics are conceptualized in terms of key assumptions, some related practices, as well as some values that underlie them (Baiyere et al., 2020).

Table 4. Three traditional higher education logics of teaching and learning

Logics	Assumptions	Some Practices
Process		
Mass production	Teaching and learning processes are expected to be standardized and efficient, and hence scalable for a large cohort of students.	• Establish 'one-to-many' classroom settings • Increase efficiency of educational services and lower administrative effort of education
Control		
Provider-centric	University actors, in particular faculties and lecturers, should be at the center of teaching and learning.	• University actors decide on the space and time of teaching, and the sequence of learning • Design services, digital systems, and tools in line with the demands of university actors

Actors			
Students as consumers	Students should be rather passive consumers of the taught knowledge and educational services.		• Present only the outcome of transformational activities to students • Transactional interactions between university actors and students with a clear division of roles
Some Underlying Values	Scalability Quality Stability	**Selected Key References**	Kugel 1993; Lea et al. 2003; Marginson 2016; Obermiller et al. 2005; Planas et al. 2011; Sadler 2011; Trow 1999; Woodall et al. 2014

Following an intensive three-step coding approach (Gioia et al., 2013), the primary findings of research article #6 are three shifts in these higher education logics that underlie the digital transformation at Alpha and Beta (Figure 6): (1) *mass production to mass personalization* (process); (2) *provider-centric to student-centric* (control); and (3) *students as consumers to students as prosumers* (actor). The three logic shifts manifested in six conceptual themes of digital transformation (Baiyere et al., 2020). The conceptual themes encapsulate how Alpha and Beta used DT to enhance teaching and learning in ways that aligned with the new logics.

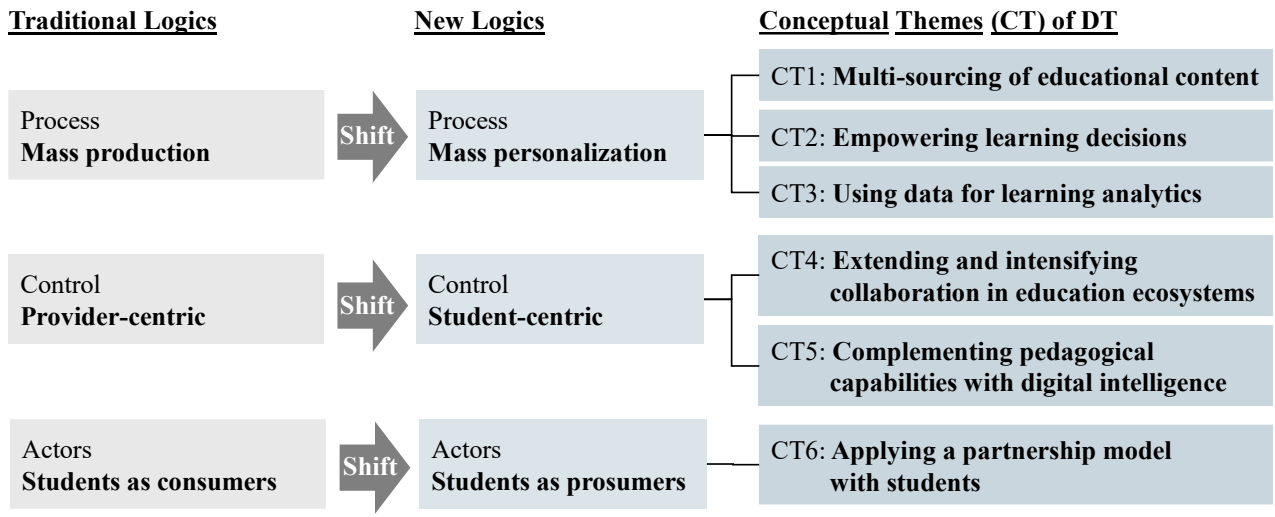

Figure 6. Shifts in higher education logics and conceptual themes of digital transformation

Alpha and Beta no longer relied on *mass production* of their teaching processes (Marginson, 2016; Trow, 1999). Instead, they followed the logic of *mass personalization*, which manifested in the multi-sourcing of educational content, empowering students to make learning decisions, and using data for learning analytics to cater to different preferences. Next, Alpha and Beta turned *provider-centric* control (Lea et al., 2003; Sadler, 2012) into a more *student-centric* control. This logic shift was observed as Alpha and Beta intensified and extended their collaboration with EdTech and BigTech companies to improve the student-centricity of their digital tools and systems. Further, lecturers became facilitators in students' learning and, to do so, had to complement their pedagogical capabilities with digital intelligence. Finally, instead of viewing *students as consumers* (Planas et al., 2013; Woodall et al., 2014), Alpha and Beta adopted the logic of *students as*

prosumers. The logic shift manifested in the application of a partnership model with students to benefit from their experiences and end-user perspective in digital transformation activities.

The digital transformation at Alpha and Beta did not affect the whole organization simultaneously. Instead, the logic shift was particularly pronounced among a small group of actors, that is, the didactics team at Alpha and the learning and teaching unit at Beta. Both groups were pivotal actors of digital transformation, gradually promoting their ideas and vision to peers. The digital transformation at Alpha and Beta, therefore, resembled what Noesgaard et al. (2023, p. 26) describe from a virus theory perspective as 'infection, incubation, and replication as the organization slowly matured and adapted the digital transformation initiative.' Further, a recurring topic during the interviews, reflected in all new logics, was that the universities found their traditional focus on cost-effective and easily scalable teaching to be insufficient in the face of environmental changes. Instead, Alpha and Beta used DT to drive student engagement, empowerment, and personalization (i.e., as 'underlying values') in the learning experience. Hence, DT helped Alpha and Beta to redefine the inner dynamics of their value proposition as learning became more important than teaching. Such a focus on learning instead of on teaching has already been discussed in the higher education literature as highly desirable but little adopted (e.g., Matthews and Mercer-Mapstone (2018), Kugel (1993), and Saulnier et al. (2008)). Considering the empirical material, the digital transformation activities were pivotal for Alpha and Beta to be able to further drive the change in focus *from teaching towards learning*. Table 5 provides an overview of the logic shifts and outlines assumptions, practices related to digital transformation, and underlying values of the new logics.

Table 5. Overview of the three logic shifts underlying digital transformation

Logic shift	Assumption	Practices
Process		
From: Mass production **To:** Mass personalization	Teaching and learning processes should be scaled for a high number of students while catering to preferences in learning through personalization	Drawing on multi-sourced educational content to diversify how students can learn, empowering learning decisions, while using data for learning analytics to personalize guidance for students in the learning process
Control		
From: Provider-centric **To:** Student-centric	Students should be in the center of a growing education ecosystem that includes EdTech and BigTech, and is facilitated by lecturers who orchestrate knowledge provision, offer guidance, and help students to reflect on their learning	Intensifying and extending collaboration with EdTech and BigTech and complementing the pedagogical capabilities of lecturers with digital intelligence
Actor		
From: Students as consumers **To:** Students as prosumers	Students should be active partners of the university who contribute to their own and peers' learning experience	Applying a partnership model with students and between all actors to digital transformation and educational activities
Some new underlying values	• Engagement • Empowerment • Personalization	

The results of research article #6 offer two contributions to theory. First, they contribute to prior studies that focused on digital transformation in higher education from a strategic perspective (e.g., Jonathan (2020)) and digitally supported education (e.g., Hei et al. (2018)). They extend existing knowledge by unfolding how digital strategizing and the claim of a new identity (Wessel et al., 2021) on the macro-level led to changes in value creation, that is, on the meso-level. The digital transformation at Alpha and Beta was not linear. Instead, it followed iterating waves of deep structure changes and DT adoption (Vial, 2019), and led to fundamental changes in value creation when the logic shift was driven forward. Second, the results contribute to the higher education literature. Other scholars have studied learning analytics as a valuable tool for the personalization of learning (e.g., Clow (2013)), student-centricity as a paradigm that many higher education institutions follow (e.g., Frambach et al. (2014)), and how viewing students as partners increases engagement and wellbeing (e.g., Gravett et al. (2020)). The results extend this existing body of knowledge, as the article is the first to provide a structured overview and analysis of new higher education logics that underlie digital transformation.

Concluding, research article #6 presents a 'deep-dive' into how the effects of DT outlined in article #4 can unfold in one specific context. It analyses the digital transformation processes of two public universities to theorize how these processes relate to shifts in the fundamental logics of teaching and learning. The results have two implications for the interaction between BPM and DI. First, the development of DIs and the redesign of processes at Alpha and Beta were closely linked as part of their digital transformation. While the new logics set the general direction, their operationalization often consisted of concrete DIs (e.g., a digital educational service) and their integration into existing structures and processes. This implies that beneficial interactions between BPM and DI not only help each other but also contribute to a larger whole, i.e., the digital transformation of an organization. Second, the digital transformation of both universities was a long-term and demanding process. While the shift in logics led to many good ideas on how DT can improve the student experience, they were only slowly translated into concrete outcomes. In fact, there was a lack of end-to-end management of the DI process at both universities, i.e., from an idea to its implementation (Kohli & Melville, 2019), and a lack of flexibility to quickly implement changes to structures and processes, in particular if they related to DT. BPM and DI activities were obviously interdependent and partially synergizing during the digital transformation, but not fully integrated.

IV. Integrated View - Business Process Management and Digital Innovation as 'Two Sides of the Same Coin'

The integrated view on BPM and DI encompasses two articles that are targeted directly at the intersection of BPM and DI by drawing from their mature bodies of knowledge. Research article #7 focuses on the benefits of BPM for the DI processes. It uses BPM knowledge as a theoretical lens to identify drivers and barriers of DI actions and to provide recommendations for practice. Last, research article #8 aggregates many of the insights that have been generated with this doctoral thesis to understand the empowering effects of BPM and DI capabilities on digital process innovation and DI processes. To do so, it applies a dialectic view and draws on the literature on BPM, DI, and at the intersection of both domains.

1. Drivers and Barriers of the Digital Innovation Process

Research article #6 already established that digital transformation is at the top of the agenda of many universities and that they engage in DI as a part of it (Faria & Nóvoa, 2017; Hedlund, 2019; Hinings et al., 2018). While there is little research explicitly addressing DI at public universities, there is a mature body of knowledge on DI in the public sector in general, which universities in many countries belong to (Agasisti & Pohl, 2012). Among the few studies that specifically address universities, mainly the role of technological change in innovation in higher education institutions has been studied (Vicente et al., 2020), e.g., the impact of the technological transformation on university education and science (Smertenko et al., 2018). Besides, recent research focuses on the switch to digital teaching during the COVID-19 pandemic (Nuere & Miguel, 2021) and the establishment of hybrid campuses (Skulmowski & Rey, 2020).

Despite the growing need for public universities to complement this digital progress in teaching with DI in administration and management, research on the DI process in public universities' administration and management contexts remains scarce. At the same time, public universities struggle to meet expectations to act as DI pioneers in administration and management (Lašáková et al., 2017; Vicente et al., 2020). Thus, it is crucial to understand how the DI process at public universities unfolds to better recognize and support its initiation, development, implementation, and exploitation. Against this backdrop, research article #7 asks the question *'how do public universities enact the DI process and what are related drivers and barriers?'*.

To address this question, article #7 conducts an exploratory single case study (Yin, 2009) at a German university (GU), in particular for three digital process innovations in GU's administration and management. Therein, it builds on mature knowledge of the core elements of BPM (Kerpedzhiev et al., 2021) and uses them as a theoretical lens on the DI process (Kohli & Melville, 2019) to structure the interviews and data analysis approach. As a result, the article derives an overview of 13 drivers (Table 6) and 17 barriers (Table 7) of the

DI process at GU. Each driver and barrier is assigned to a DI action (i.e., *initiate*, *develop*, *implement*, or *exploit*, titled *DIA*) and to a BPM core element (i.e., *strategy* (St.), *governance* (Go.), *method and IT* (M./IT), *culture* (Cu.) or *people* (Pe.), titled *BCE*). As it was found during the interviews that some drivers and barriers influence all four DI actions, those are assigned to the category *Overarching* in *DIA*. Further, exemplary quotes are provided, which are taken directly from the interviews, indicating the interviewee's role.

Table 6. Drivers of the DI process at GU

DIA	BCE	Driver	Exemplary quote	ID
Initiate	*St.*	University structure and development plan that triggers initiatives for DI	"[…] the digitalization of the administration is an important part of the structure and development plan."	D1
	M./IT	Adoption of good practices from other universities and public administrations	"[…] the district office presented the application portal. It could be implemented with few changes."	D2
Develop	*M./IT*	Development and evaluation of minimum viable products	"[…] in the beginning it was about satisfying the requirements. Now we look at other features […]"	D3
		Predefined solution space but open approach during develop phase	"[…] it was clearly specified what should be achieved […] however we had freedom on how to implement it"	D4
Implement	*M./IT*	Short feedback cycles with clearly defined support/service interfaces	"[…] everybody [in this team] knows the appropriate contact person."	D5
	Cu.	Live demonstration of the need and benefit of the DI	"[…] it was smart to show the administration staff the potential of the technology, so they see what is possible."	D6
Exploit	*M./IT*	Consistently defined personal contact points for the technical support of users	"[…] the IT department was always available via telephone […] with direct answer and help." (PP)	D7
	Cu.	User manuals and guidelines for handling the DI outcome	"[…] so she feels safer in its use[…] and also to increase the acceptance."	D8
	Pe.	Previous experience with IT applications and basic IT knowledge	"[…] within this [administration] team there are many people that are technically affine."	D9
Overarching	*M./IT*	Standardized and easily expandable IT infrastructure	"[…] one [campus management] system and settings for all faculties."	D10
	Cu.	Sufficient opportunities for feedback	"[…] call each other regularly to see how it goes."	D11
	Pe.	In-depth know-how and expert knowledge in the IT department	"[…] the know-how for such projects was available in the IT."	D12
		Motivated individuals in the IT department	"[…] individuals in the IT department move things forward […]"	D13

To further condense and structure the insights of the case study, five overall findings and practice recommendations are derived from the drivers and barriers (Table 8). Each finding relates to several drivers and barriers representing an overarching dynamic or pattern that significantly influences the DI process at GU. These findings aim to provide a starting point for developing actionable practices for public universities to overcome barriers and strengthen drivers for the successful development of DI.

Table 7. Barriers of the DI process at GU

DIA	BCE	Barrier	Exemplary quote	ID
Initiate	*St.*	High cost sensitivity of decision-makers given public spending restrictions	"[the management] hesitates if it costs money."	B1
		Limited triggering options for the initiation of DI, mainly due to legislative changes or organizational pain	"We are [legally] obligated to keep old files for five years, but we don't have any storage left. We had to do something."	B2
		Top-down initiation of the DI process with limited stakeholder involvement	"we were not involved, just informed at some point [about the new feature]."	B3
Develop				
Implement	*Go.*	Incomplete stakeholder participation in DI committees and teams	"[…] no one at the user level was involved [in the committee]."	B4
	Cu.	Lack of trust due to negative experiences with previous DI initiatives	"[…] it was difficult from the beginning because communication was an issue last time."	B5
Exploit	*MIT*	Lack of institutionalized feedback loops	"[…] we have brought the feedback, but there was no follow up on it."	B6
		Lack of structured evaluation of DI outcomes	"[…] there is hardly any evaluation [after the successful implementation of a new DI]."	B7
		Lack of homogenization of the DI outcome due to high individualization	"[…] no exchange of employees between different departments is possible due to differing processes."	B8
	Pe.	Time discrepancy between the implementation of DI solution and deployment of service and support	"[…] we would have needed the new feature, but no one knew it existed."	B9
Overarching	*St.*	Lack of perceived support and guidance from university management	"[…] the initial solution could not be implemented due to a missing management decision."	B10
		Lack of perception and management of DI as a process	"[…] an evaluation, despite being a logical last step of it [the DI], is not done."	B11
	Go.	Lack of documentation of DI process and actions	"[…] the process documentation was developed externally."	B12
		Lack of predefined collaboration and cooperation model for DI	"[…] it was easier to contact them [the IT] although I am not supposed to."	B13
		Lack of a central management instance that aligns all DI phases	"[…] communication after a successful DI depends on the person in charge."	B14
	Cu.	Lack of innovation culture in the university's administration and faculties	"There are only a few people who generate ideas […], and sometimes DIs are even hindered."	B15
		Lack of predefined communication strategy regarding internal to internal and internal to external information exchange	"[…] useful DIs would be easier to implement if it would be clear what to communicate to whom, how and when."	B16
	Pe.	Lack of IT affinity in university administration	"[…] not open to new technologies […] and to protect non-affine team members [from IT overload]."	B17

Table 8. Overall findings and practice recommendations

#	Overall findings	Practice recommendations
1	DI at *GU* follows the structure of a process but is neither perceived nor documented as such nor supported by BPM methods and practices. *See also: B12, B13, B15, […]*	• Develop a process understanding of the DI process across management levels. • Institutionalize the DI process via targeted management roles and structures (e.g., DI office).
2	The DI process at *GU* does not fully leverage the innovation potential of its stakeholders due to a decentralized but hierarchical organizational structure that hinders the DI culture. *See also: B3, B5, B11, […]*	• Define communication channels and interfaces to involve and encourage a broader stakeholder base in DI idea generation and conceptualization. • Institutionalize feedback with a broad range of stakeholders to regularly evaluate whether the DI addresses their requirements.
3	The DI process at *GU* is mainly driven by pain points and legislative changes. It therefore focuses on addressing local problems rather than overarching opportunities. *See also: B2, B9, D1, […]*	• Explore opportunities for long-term value-adding and reusable solutions within legislative changes. • Foster bottom-up generativity by giving employees opportunities to develop ideas besides day-to-day operations.
4	The DI process at *GU* is strongly affected by culture- and people-related concerns regarding the use of digital technology. *See also: B6, B17, D6, […]*	• Reduce resistance and fear of change by demonstrating the need and benefit of DI via trainings. • Ensure a consistent level of basic IT know-how among university administration staff.
5	The DI process at *GU* benefits from a high performing IT-department that drives the DI in the *Develop*, *Implement*, and *Exploit* phase. *See also: D3, D10, D12, […]*	• Provide the IT department with the necessary resources and infrastructure to handle the increasing demand for DI. • Establish long-term partnerships between external IT service providers and the IT department.

The results of research article #7 contribute to the explanatory knowledge on BPM and DI at public universities and fit into the management-related research avenue in BPM to study and improve the process of DI (van Looy & Poels, 2019). It demonstrates one approach to combine the two research streams by studying DI as a process while applying BPM knowledge as a theoretical lens. Mendling et al. (2020) thereby propose that methods from DI and BPM could benefit each other. Research article #7 shows that applying an empirical method (i.e., a case study), which is widely used in DI research but rarely in the BPM domain (Mendling et al., 2020), facilitates research at the intersection of both domains.

2. Empowering Effects of Business Process Management and Digital Innovation Capabilities

All the presented articles offer valuable insights into why and how BPM and DI should and can interact for mutual benefit. Research article #8 aggregates many of these gathered insights and directs them toward the very core of the intersection between BPM and DI. It aims to directly build on recent IS research which has developed interest in bringing BPM and DI together, highlighting that both can be complementary and beneficial to each other (Ahmad & van Looy, 2020; Mendling et al., 2020). Studies suggest, for example, that more knowledge is needed about the strategic alignment of BPM and DI (van Looy & Poels, 2019), related success factors (van Looy, 2018), or new capabilities drawing from both domains (Ahmad & van Looy, 2020; Grisold et al., 2021). Most importantly, mature knowledge of the complementary nature of BPM and DI is key not only to address challenges arising at their intersection but also to alleviate both domains to new heights

(Ahmad & van Looy, 2020; Mendling et al., 2020). While DI can empower BPM to become more explorative and opportunity-driven (Mendling et al., 2020), BPM can help DI institutionalize a consistent and repeatable DI process. Against this drawback, research article #8 asks the question *'what are empowering effects of BPM on DI and vice versa?'*.

As a response, it takes a dialectic view as a theoretical lens on the intersection of BPM and DI. The dialectic theory is one of four basic types of process theories (van de Ven & Poole, 1995) explaining change and capability progress (Poeppelbuss et al., 2015) in organizations. It builds on the basic assumption that within an organization, competing forces act like thesis and antithesis and thus create a conflict. This conflict can be solved by a synthesis which is "a novel construction that departs from both the thesis and antithesis" (van de Ven & Poole, 1995, p. 517). Existing literature has already taken a comparable perspective at the interface of BPM and DI (e.g., Mendling et al. (2020), Baiyere et al. (2020)) by examining how opposing assumptions and conflicts between both domains can be resolved. Following explicit calls for research by Grisold et al. (2021), BPM and DI capabilities play a vital role in shaping the convergence and synthesis of both domains. Thus, research article #8 specifically sets out to conceptualize the empowering effects of BPM and DI capabilities.

To do so, two structured literature reviews are conducted. First, the literature at the intersection of BPM and DI is analyzed. In line with the dialectic view, the goal is to identify challenges between BPM and DI (conflict) and potential areas for mutual benefit (synthesis). Regarding challenges, Mendling et al. (2020) discuss how BPM and DI challenge each other's fundamental assumptions and propose a set of convergent assumptions. Further, Baiyere et al. (2020) outline how fundamental logics of BPM evolve in the context of DI, changing the way processes should be designed, agents should behave, and infrastructure should be built (Baiyere et al., 2020). Further, the literature analysis reveals that challenges at the intersection of BPM and DI gravitate around the two topics of digital process innovation (i.e., leveraging DT for the innovative redesign of business processes (Lohoff, 2022; Nambisan et al., 2017)) and the DI process. For example, continuous digital process innovation leads to higher complexity in the process and IT landscape, which makes the application of existing BPM skills, practices, and tools more difficult and challenges well-known workflows of BPM actors (Lohoff, 2022). In terms of the DI process, actors may find process-oriented thinking and strict governance mechanisms around DI actions disadvantageous, challenging DI's iterative and creative nature.

In addition to challenges, existing literature also points to significant benefits from combining efforts in both domains (van Looy, 2018; van Looy & Poels, 2019), highlighting the enabling role DI can have for BPM and vice versa (Ahmad & van Looy, 2020; Grisold et al., 2021). On the one hand, DI activities can be scoped within BPM initiatives to support the DT-driven improvement and redesign of business processes (Grisold et al., 2021; van Looy & Poels, 2019). In this regard, digital process innovation has been discussed, for example, in terms of explorative BPM (e.g., Grisold et al. (2022)), i.e., the inclusion of business and technology trends

as well as customer expectations in the (re)design of processes. On the other hand, BPM can enable DI as designing and implementing processes is key to driving organizational change (Grisold et al., 2021). Considering DI as a process, BPM can provide the necessary skills, practices, and tools to design, implement, monitor, and continuously improve the DI process (Kohli & Melville, 2019).

As a result of the first literature review, digital process innovation and the DI process are chosen as the primary subjects of analysis of research article #8. Focusing on both, it is the primary goal of the article to detail how DI capabilities can empower digital process innovation and how BPM capabilities can empower the DI process. Moreover, four challenges in each subject of analysis are conceptualized, and structured along a set of four areas that are derived from the literature: *people*, *design*, *infrastructure*, and *governance*.

Second, the isolated literature on BPM and DI is analyzed to identify a set of capabilities to build on for the conceptualization of the empowering effects. Broadly speaking, capabilities are a vital topic of discussion in BPM and DI research. They form the basis for any activities of an organization to create value (Buck et al., 2021; Kerpedzhiev et al., 2021) and to apply knowledge from both domains in practice (Amit & Schoemaker, 1993; Barney, 2001; Oberländer et al., 2021). On the one hand, practicing successful BPM is tied to capabilities for identifying, designing, implementing, executing, monitoring, and improving business processes (Recker & Mendling, 2016). Studies often collect and organize BPM capabilities in frameworks, whereby Bruin and Rosemann (2007) have built one of the most prominent ones structuring 30 capability areas around the six BPM factors strategic alignment, governance, methods, information technology, people, and culture. More recently, Kerpedzhiev et al. (2021) investigated BPM capabilities in the digital age to update de Bruin and Rosemann's (2007) capability framework in light of novel digital phenomena. On the other hand, research on DI capabilities builds on the notion that organizations need enhanced or new capabilities due to the impact of DT (Buck et al., 2021; Yoo et al., 2010). However, research explicitly outlining DI capabilities is scarce. Among the few, Buck et al. (2021) drew from high-quality scientific articles to examine capabilities relevant to DI and aggregated findings into a DI capability framework.

As a result of the second literature view, the works of Kerpedzhiev et al. (2021) and Buck et al. (2021) are found to be timely approaches that structure and synthesize a wealth of high-quality research on BPM and DI capabilities. Hence, research article #8 relies on both studies to derive the empowering effects of BPM and DI. Table 9 lists relevant capabilities from their frameworks with an ID to reference them. Relevant in this context means that the DI or BPM capability has the potential to have an empowering effect on BPM or DI. After careful consideration and analysis of the definitions provided in the studies, five DI capabilities and four BPM capabilities were sorted. Thus, from the work of Kerpedzhiev et al. (2021), a total of 26 capabilities and from Buck et al. (2021) a total of 21 capability areas are included.

Table 9. BPM and DI capabilities

BPM Capabilities (Kerpedzhiev et al., 2021)				**DI Capabilities (Buck et al., 2021)**			
B1	Customer Centricity	B14	Process Data Governance	D1	Development of capabilities	D14	IT Infrastructure
B2	Process Centricity	B15	Process Data Analytics	D2	Knowledge gathering	D15	Inside-out IT
B3	Evidence Centricity	B16	Advanced Process Automation	D3	Ambidexterity	D16	Outside-in IT
B4	Change Centricity	B17	Process Positioning	D4	Leadership	D17	Alliance management
B5	Employee Centricity	B18	Process Portfolio Management	D5	Customer Management	D18	Network Integration
B6	Customer Literacy	B19	Process Compliance Management	D6	Customer Service	D19	Network outcome-related
B7	Digital Literacy	B20	Process Architecture Governance	D7	Market-focused learning	D20	Process integration
B8	Data Literacy	B21	Multi-Purpose Process Design	D8	Market shaping	D21	Process change
B9	Innovation Literacy	B22	Contextual Process Governance	D9	New product development		
B10	BPM and Process Literacy	B23	Strategic Process Alignment	D10	Research and Development		
B11	Roles and Responsibilities	B24	Adaptive Process Execution	D11	Project management		
B12	Process Customer and Stakeholder Alignment	B25	Agile Process Improvement	D12	Performance management		
B13	Process Architecture Management	B26	Transformational Process Improvement	D13	Information Management		

The results from both literature reviews are then combined to conceptualize four empowering effects of DI capabilities on digital process innovation (Table 10), and four empowering effects of BPM capabilities on the DI process (Table 11). Each effect addresses one of the identified challenges, which concretizes how opposing assumptions and values of BPM and DI materialize in digital process innovation or the DI process (i.e., the conflict from a dialectic view). The associated empowering effect can alleviate or resolve the conflict and is therefore equivalent to the synthesis from a dialectic view (van de Ven & Poole, 1995). In addition, a set of rationales specifies how capabilities from one domain ("empowering capabilities") support capabilities of the other ("supported capabilities"). Both tables selectively refer to capabilities from Buck et al. (2021) and Kerpedzhiev et al. (2021) that support the rationales (*ID: Capability*). Below, each challenge and associated empowering effect are briefly presented.

Empowering Effects of Digital Innovation Capabilities

People engaging in digital process innovation need to have the right skills and mindset to quickly design, implement and adapt to changing processes, challenging the desire in BPM to build and follow strict business process models. In response to this challenge, DI capabilities (e.g., D7: market-focused learning, D2: knowledge gathering) empower digital process innovation by helping people sense digital opportunities in the process environment and anticipate necessary change (Annarelli et al., 2021; Buck et al., 2021). DI capabilities excel at collecting large amounts of process data and transforming it into valuable knowledge. BPM actors can use this knowledge to become more agile and confident in making explorative decisions consistent with the database and adapt their doing accordingly (Tortora et al., 2021).

Table 10. Challenges in digital process innovation and empowering effects of DI capabilities

	Challenge	**Empowering effect of DI capabilities**	**Rationale for empowering effect**
People	People engaging in digital process innovation need to have the right skills and mindset to quickly design, implement and adapt to ever-changing processes, challenging the desire in BPM to build and follow strict business process models.	**Understand & Adapt** DI capabilities enable people to understand the need for change and become more flexible in adapting their roles, responsibilities, tasks, and procedures/ business models to change and different situations.	• DI capabilities excel at identifying adaptation needs to become more flexible • DI capabilities excel at applying knowledge for exploratory purposes *Supported BPM capabilities:* B1, B4, B6, B7, B8, B9 *Empowering DI capabilities*: D1,D2, D3, D4, D5, D6, D7
Design	Process design in digital process innovation needs to be more flexible in allowing freedom for adaptation, challenging existing design approaches in BPM and the desire for predefined structures and models.	**Explore & Transform** DI capabilities enable the exploration of opportunities regarding new design options for business processes leading to a transformation of the process landscape.	• DI capabilities excel at exploring new process design options that arise from recombining resources, the external network or customers. • DI capabilities excel at driving the transformation of the process landscape through opportunity-driven process innovation *Supported BPM capabilities:* B16, B21, B24, B25, B26 *Empowering DI capabilities*: D1, D3, D5, D6, D7, D8, D9, D10, D17, D18, D19, D21
Infrastructure	Digital process innovation needs flexible infrastructure that can keep up with gradually unfolding and changing processes, challenging the focus of BPM on infrastructural stability and alignment with process models.	**Connect & Pool** DI capabilities advance infrastructure towards flexibility, networking and knowledge building by connecting systems and stakeholders as well as pooling knowledge.	• DI capabilities excel at building a flexible, layered modular infrastructure linking stakeholders and enabling communication and exchange. • DI capabilities excel at building an infrastructure to bundle knowledge from inside and outside the company as well as provide and distribute this knowledge. *Supported BPM capabilities*: B14, B15, B20 *Empowering DI capabilities*: D2, D3, D13, D14, D15, D16, D20
Governance	Governance of digital process innovation is characterized by high complexity and the need for flexibility of roles, methods, and structures, challenging the desire in BPM for consistent governance of all process improvement initatives.	**Versatilize & Foster** DI capabailities enable the versatilization of governance structures to account for interdisciplinary teams, everchanging processes and practices and foster an ambidextrous governance setup.	• DI capabilities excel at managing interdisciplinary teams by integrating, for example, a variety of methods and roles that are applied in a non-standardized manner. • DI capabilities excel at building an ambidextrous governance approach that creates a balance between efficiency-driven and innovation-driven activities. *Supported BPM capabilities:* B11, B13, B17, B18, B19, B20, B22, B23 *Empowering DI capabilities*: D3, D4, D11, D12, D17, D18, D19

Table 11. Challenges in the DI process and empowering effects of BPM capabilities

	Challenge	Empowering effect of BPM capabilities	Rationales for empowering effect
People	People in a DI process need to acquire knowledge in process-oriented thinking and doing, challenging the free-flowing nature of actions	**Commit & Align** BPM capabilities enable people to align their mindsets to understand DI as a process and to commit to applying a BPM lifecycle perspective to the DI process.	• BPM capabilities excel at strengthening commitment to an end-to-end process perspective as well as process-based decision-making. • BPM capabilities excel at building and nurturing a process-oriented mindset and a universally defined DI process. *Supported DI capabilities:* D1, D2, D3, D4, D7 *Empowering BPM capabilities:* B2, B3, B5, B10, B11, B12, B16
Design	The design of a DI process requires structured modeling of the sequence of DI actions and of the approach to idea funneling, challenging the desire for fully flexible execution of actions in DI.	**Model & Exploit** BPM capabilities enable modeling a repeatable DI process and exploiting design options for continuous improvements.	• BPM capabilities excel at building processes that run end-to-end enabling idea funneling. • BPM capabilities excel at identifying design options for DI process improvements *Supported DI capabilities:* D3, D7, D8, D10, D17, D18, D19, D21 *Empowering BPM capabilities:* B16, B21, B24, B25, B26
Infrastructure	Infrastructure of an institutionalized DI process needs to be aligned with existing architecture, challenging the desire of DI to recombine digital resources as needed.	**Build & Define** BPM capabilities enable building a process-oriented infrastructure and defining the infrastructural framework within which DI process actions can take place.	• BPM capabilities excel at creating an infrastructure that is oriented to process flows and integrates the DI process into the business process landscape. • BPM capabilities excel at defining technical and process-related boundaries of the infrastructure to establish continuous processes. *Supported DI capabilities:* D13, D14, D15, D16, D20 *Empowering BPM capabilities:* B14, B15, B20
Governance	Governance around DI processes wants to define clear structures, roles, responsibilities, and metrics, challenging the desire of DI to have as few boundaries as possible to be able to unfold over time.	**Institutionalize & Orchestrate** BPM capabilities enable the institutionalization of the DI process within governance structures and orchestrating people by defining roles and responsibilities.	• BPM capabilities excel at building robust architectures and structures to institutionalize the DI process • BPM capabilities excel at creating structures, decision-making processes and role descriptions that enhance the repeatability and transparency of the DI process. *Supported DI capabilities:* D3, D4, D11, D12, D18, D19 *Empowering BPM capabilities:* B11, B13, B17, B18, B19, B20, B22, B23

Process design in digital process innovation needs to be more flexible in allowing freedom for adaptation, challenging existing design approaches in BPM and the desire for predefined structures and models. In response to this challenge, DI capabilities empower digital process innovation to explore new process designs. DI capabilities excel at recognizing new digital opportunities (e.g., D18: network integration), and recombining resources into new process designs (e.g., D8: market-shaping, D5: customer management) (Annarelli et al., 2021). Finally, by constantly leveraging DI capabilities for opportunity exploration, organizations gradually transform their process landscape design towards higher flexibility (Buck et al., 2021; Yoo et al., 2010).

Digital process innovation needs flexible infrastructure that can keep up with gradually unfolding and changing processes, challenging the focus of BPM on infrastructural stability and alignment with process models. In response to this challenge, DI capabilities (e.g., D13: information management, D14: IT infrastructure) empower digital process innovation by creating infrastructural components that connect entities and people around processes via digital systems and interfaces (Zhen et al., 2021). Due to the generative nature and layered modular architecture of DI (Yoo et al., 2010), DI capabilities enable infrastructure composed of loosely coupled modules. Further, DI capabilities (e.g., D16: outside-in IT, D15: inside-out IT) support building a broader knowledge base that pools and analyses data resources (Annarelli et al., 2021).

Governance of digital process innovation is characterized by high complexity and the need for flexibility of roles, methods, and structures, challenging the desire in BPM for consistent governance of all process improvement initiatives. In response to this challenge, DI capabilities (e.g., D18: network integration, D17: alliance management) empower digital process innovation by helping to versatile the governance around it. More precisely, DI capabilities support the meaningful integration of complex networks of interdisciplinary experts and excel at leveraging the benefits of the resulting cross-disciplinary teams (van Looy, 2018). In doing so, new top management roles can be involved in decision-making (Tumbas et al., 2018). In this regard, DI capabilities foster building ambidextrous governance (Buck et al., 2021).

Empowering Effects of Business Process Management Capabilities

People in a DI process need to acquire knowledge in process-oriented thinking and doing, challenging the free-flowing nature of actions. In response to this challenge, BPM capabilities (e.g., B2: process centricity, B10: BPM and process literacy) empower the DI process by fostering a process-oriented culture (Handayani & Mahendrawathi, 2019; Kerpedzhiev et al., 2021). BPM capabilities help DI actors commit to the DI process as defined and align their understanding of process-orientation (e.g., B12: process customer and stakeholder alignment). Specifically, BPM capabilities excel at lowering the unpredictability of the DI process by building process-related knowledge, ensuring end-to-end process control in all DI actions, and increasing decision reliability through analytical insights (Kerpedzhiev et al., 2021; Rosemann & vom Brocke, 2014).

The design of a DI process requires structured modeling of the sequence of DI actions and of the approach to idea funneling, challenging the desire for fully flexible execution of actions in DI. In response to this challenge, BPM capabilities (e.g., B21: multi-purpose process design, B16: advanced process automation) empower the DI process to model a repeatable DI process design with clearly defined decision points for idea funneling (Kerpedzhiev et al., 2021; Teece et al., 2016). Further, BPM capabilities (e.g., B24: adaptive process execution, B25: agile process improvement) can help to constantly exploit the chosen DI process design by looking for improvement opportunities (Kerpedzhiev et al., 2021). In this regard, BPM capabilities excel at showing the full range of process designs from which the most suitable can be selected.

The infrastructure of an institutionalized DI process needs to be aligned with existing architecture, challenging the desire of DI to recombine digital resources as needed. In response to this challenge, BPM capabilities (e.g., B13: process architecture management, B14: process data governance) empower the DI process to build the technical infrastructure needed for full integration into the process landscape (Antonucci et al., 2021). Further, BPM capabilities can help to define the technical and process-related boundaries within which DI can freely take place, e.g., enabling the integration of multiple streams of technology (Ferraris et al., 2018).

Governance around DI processes wants to define clear structures, roles, responsibilities, and metrics, challenging the desire of DI to have as few boundaries as possible to be able to unfold over time. In response to this challenge, BPM capabilities (e.g., B20: process architecture governance, B17: process positioning) empower the DI process by helping to institutionalize it within a governance structure, including the definition of standards in the DI process for modeling, execution, and decision-making. As a result, the DI process becomes more reliable and controllable. Further, BPM capabilities (e.g., B11: roles and responsibilities) ensure clearly defined roles and responsibilities through which actors can orchestrate the DI process.

In sum, research article #8 makes two vital contributions. First, it contributes to the descriptive knowledge at the intersection of BPM and DI (Gregor, 2006). Taking a dialectic view, the eight empowering effects represent the synthesis addressing conflicts arising at the intersection of BPM and DI, and detailing how both domains can empower each other. By organizing capabilities around the empowering effects, insights are provided into which BPM and DI capabilities are particularly relevant to the intersection to build a synthesis between conflicting assumptions and values. Second, the article contributes to the explanatory knowledge at the intersection of BPM and DI (Leidner, 2018; Seidel & Watson, 2020). Thereby, the rationales provide an initial explanation of how BPM and DI capabilities help to address arising challenges in digital process innovation and the DI process. Thus, capabilities in both domains excel at specific purposes complementing and supporting mostly insufficient capabilities in the other domain (Grisold et al., 2021).

Based on these contributions, two overarching observations for interactions between BPM and DI can be made. First, the structure along the areas *people*, *design*, *infrastructure*, and *governance* supports the underlying tenet

in the literature that some areas benefit more than others from interactions between BPM and DI. For BPM, DI capabilities are especially relevant to *design* and *people* as they excel at sensing and seizing digital opportunities and driving an opportunity-driven mindset. For DI, BPM capabilities are especially relevant to *infrastructure* and *governance* as they excel at aligning processes with existing systems and tools, building structure, and defining responsibilities. While collaboration in other areas is also important, leveraging the empowering effects in these areas might be particularly beneficial. Second, the assumption in the literature is supported that research at the intersection of BPM and DI is the natural next step after isolated discussions in both domains. More precisely, it becomes evident that both domains are already aware of the identified challenges in digital process innovation and the DI process, e.g., as shown in Rosemann (2014), Grisold et al. (2022), or Lohoff (2022). It is hence no surprise that there are also (supported) capabilities for each empowering effect, relating to capabilities in BPM already targeted towards challenges in digital process innovation and vice versa for DI capabilities and the DI process. However, the historical focus in both domains has led to the development of different strengths. Therefore, the complementary (empowering) capabilities of the other domain are much more mature.

Concluding, research article #8 represents an important step towards integrating the different perspectives on interactions between BPM and DI. It aggregates insights from many of the other research articles of this thesis and combines them with mature knowledge from the literature to structure and detail the empowering effects of BPM on DI and vice versa. It also showcases the applicability and value of the dialectic view (van de Ven & Poole, 1995) in this context and provides an approach for further inquiries that extend the application of the dialectic theory or draw on additional process theories, e.g., lifecycle, teleological, or evolutionary process theories (Poeppelbuss et al., 2015; van de Ven & Poole, 1995).

V. Conclusion

1. Summary

Balancing the desire for stable structures and processes with the drive to innovate and change has never been more difficult for organizations. In this regard, DT represents a double-edged sword. On the one hand, DT exacerbates the tension between stability and change by dissolving product and industry, as well as company and customer boundaries, and by challenging assumptions and logics that underly research and practice (Nambisan et al., 2019). On the other hand, DT offers a well of new digital opportunities to improve business processes, transform value creation, and build innovative products, services, and business models (Hund et al., 2021). In the IS field, the domains of BPM and DI are at the forefront of investigating the dynamics between DT, stability, and change. At first glance, the desire of BPM for consistency and stability seems to conflict with the focus of DI on change and flexibility (Mendling et al., 2020). In contrast, this doctoral thesis takes an opportunistic stance on the intersection between BPM and DI and aims to unfold how both can interact for mutual benefit. Providing novel perspectives on BPM and DI, this thesis is relevant for research scholars and practitioners alike. First, it recognizes that separated discussions in the BPM and DI literature should continue to inform research at their intersection. Hence, it takes an *isolated view* on DT, BPM, and DI, and draws on categorization and classification schemes to advance a foundational understanding of the DT construct, the structure and purpose of BPM-G setups, and DI responses to exogenous shocks. Second, it takes an *interdependent view* to uncover the effects of DT on opportunity recognition and drive forward explorative process improvement through a customer-centric perspective. Further, it unfolds how digital transformation, which encompasses an interplay of BPM and DI activities, relates to shifts in the underlying logics of organizations, focusing on the specific context of higher education. Third, it concludes with an *integrated view* on BPM and DI, emphasizing the benefits of BPM for the DI process and proposing a structured set of empowering effects of BPM and DI capabilities on digital process innovation and the DI process.

Regarding the *isolated view*, Section II provides three articles that generate descriptive knowledge on the DT construct, BPM-G setups, and DI responses to exogenous shocks. To do so, two of the articles follow a taxonomy development approach (Kundisch et al., 2021; Nickerson et al., 2013). The first leads to a taxonomic theory including two artifacts that allow to classify DT through its diverse purposes (research article #1): (1) A taxonomy of DT and (2) purpose-related DT archetypes. The multi-layer taxonomy is based on a sample of 92 real-world DTs compiled from the GHC for emerging technology. Structured along four layers of DT in line with Yoo et al. (2010), the taxonomy represents a valuable tool to categorize individual DTs. The taxonomy is used to extract nine purpose-related archetypes of DT, which reflect combinations of DT characteristics typically co-occurring in practice. The second taxonomy of the isolated view is for BPM-G

setups (research article #2). The taxonomy structures how BPM can be institutionalized and helps to discuss different BPM-G setups in terms of their role for technology integration, DI, or regulatory alignment. It is found that organizations need to balance three different tensions when designing a BPM-G setup: *centralization vs. decentralization* (Siggelkow & Levinthal, 2003), *exploration vs. exploitation* (Smith & Tushman, 2005), and *standardization vs. flexibilization* (Howard-Grenville, 2005). The taxonomy concretizes the design options that an organization can choose from to address these tensions and, in doing so, facilitates discussions on the rationales that were applied to a specific BPM-G setup. Concluding the isolated view, four patterns of crisis-driven DI are developed (research article #3). The patterns take into account whether a crisis-driven DI was implemented because of a *sense of urgency* (e.g., due to restrictions to physical contact during the COVID-19 pandemic), or to address new opportunities emerging in the crisis with a *sense of ambition* (e.g., due to citizens being forced into isolation). Further, the patterns distinguish between a DI focus on *exploitation* (i.e., refining existing offerings associated with certainty and low organizational effort) and *exploration* (i.e., the creation of radically new offerings associated with uncertainty and high organizational effort). The application of the resulting four patterns to secondary data from 43 organizations allowed valuable insights into their emergence in practice and to detail them via related core actions and attributes.

Regarding the *interdependent view*, section III offers three articles that go beyond descriptive knowledge and delve into novel DT-facilitated interactions between BPM and DI. First, the role of DT as the driver of these interactions is further explored (research article #4). An analysis of the literature on entrepreneurship, digital entrepreneurship, and DI is conducted to understand how DT affects the four key constructs of opportunity recognition, i.e., *actor*, *resources*, *market*, and *opportunity-idea*. The resulting six effects of DT on opportunity recognition emerged due to three digital phenomena (i.e., *digital invasiveness*, *dissolving product and industry boundaries*, and *dissolving company and customer boundaries*) that are fostered through three DT outcomes (i.e., *layered modular architecture*, *digital platforms*, and *digital ecosystems*). Explanatory knowledge is provided through a set of rationales for each effect. Second, as many of these effects refer to stronger interactions with customers, a decision model for the selection of process improvement projects is proposed that considers the impact on customer satisfaction (research article #5). The literature on customer centricity is drawn on as justificatory knowledge and the Kano model (Kano et al. 1984) is used to integrate a calculation logic for customer satisfaction. The model fosters a customer-centric perspective for BPM practitioners, which is particularly useful in the digital age, where customers can easily compare products, decide how to interact with companies, and have high demands for digital processes. Third, digital transformation is investigated as a change process that integrates BPM as well as DI activities (research article #6). Focusing on higher education as a specific context with high societal relevance, a logic perspective is taken in a comparative case study to examine how digital transformation affects teaching and learning. It is found that three shifts in the

traditional logics of teaching and learning occurred over the course of digital transformation, each relating to novel and DT-enabled educational services, processes, and work practices.

The *integrated view* concludes this doctoral thesis in section IV, where the two domains are seen as "two sides of the same coin" (Mendling et al., 2020, p. 215). The two included articles are positioned directly at the intersection of BPM and DI. Considering that existing research leans towards a focus on how DI affects BPM, the benefits of BPM for the DI process are investigated (research article #7). Analyzing the DI process at a public university, a set of drivers and barriers for the successful execution of the DI process is identified by using mature knowledge of BPM as a theoretical lens. The results highlight the importance of considering DI as an interconnected process that can be – like any process – designed, monitored, and continuously improved. Last, the fundamental question of this doctoral thesis is taken head-on (research article #8) by identifying and detailing the empowering effects of BPM on DI and vice versa. More precisely, applying the dialectic view as a theoretical lens, BPM and DI capabilities take a vital role in addressing challenges in both domains by shaping the corresponding synthesis. Hence, eight empowering effects of BPM and DI capabilities on digital process innovation and the DI process are derived and detailed based on the existing literature. The results also support the assumption that the dialectic theory fosters sensemaking at the intersection of BPM and DI.

2. Limitations and Future Research

Like any research, the results of this doctoral thesis have limitations that offer fruitful avenues for future research. This section presents an overview of these limitations and outlines potentials for further research that advances the bodies of knowledge on BPM, DI, and at the intersection of both domains. A detailed perspective on the limitations is provided in the individual research articles (see Appendix).

First, regarding the *isolated view*, there are limits to any categorization or classification scheme in a changing environment as stated by Bailey (1994), Nickerson et al. (2013), and Kundisch et al. (2021). This is especially true for dynamic topics related to DT, which is often seen as a catalysator for but also prone to volatility, uncertainty, complexity, and ambiguity (Buckley, 2020). Hence, one cannot ensure that all the developed dimensions and characteristics of the taxonomies or the four patterns of crisis-driven DI will resist any technological change in the future. Continuing to apply an outdated categorization or classification scheme entails risks, e.g., when it is used to build other more advanced types of theory. To counteract this issue and remain useful, categorization and classification schemes should be adaptable and extendible (Nickerson et al., 2013). Therefore, future research should periodically evaluate whether the taxonomies and the four patterns are still valid and, if necessary, update them by using our thorough descriptions of the development process. Moreover, although the data underlying the taxonomies and patterns offered rich insights, future research may study a larger sample of DTs, BPM-G setups, and DI responses to exogenous shocks to challenge the

completeness of the results. Last, taxonomies and patterns are a simplification of reality as the comprehensiveness of the results needs to be balanced with their understandability. While a generic nature is a strength of categorization and classification schemes (Limaj & Bernroider, 2022), future research can focus on individual elements, e.g., one dimension or one pattern, to unfold them in more detail.

Second, regarding the *interdependent view*, the effects of DT on opportunity recognition are based on knowledge from the DI literature and secondary case data. Hence, future studies could focus on gathering in-depth empirical data, e.g., through case studies, to further, evaluate, detail, and develop the effects. This could be combined with a broader sample of studies, including research from domains other than DI, which encapsulate valuable insights into the effects of DT, e.g., the digital transformation literature. Further, as with almost any mathematical model, the decision model for the customer-centric prioritization of process improvement projects builds on simplifying assumptions. For instance, it considers input parameters as deterministic or captures risk only via a risk-adjusted interest rate. Increased real-world fidelity, however, would come with more data collection effort. Future research may carefully examine whether the model's real-world fidelity can be improved while maintaining its level of applicability. The decision model should also be applied in more cases to identify ideas for tailoring it to various contexts and refine the recommendations for its application. Finally, research article #6 is limited due to its focus on the teaching and learning of two public universities. Thereby, the generalizability of the new logics of teaching and learning to other types of higher education institutions was not tested. Future research could address these limitations by studying digital transformation in more universities and in terms of its impact on other purposes of higher education.

Third, regarding the integrated view, the drivers and barriers of the DI process are based on a single case study. They hence require additional quantitative and qualitative examinations by investigating the DI process at other public universities and be evaluated regarding their transferability to the public sector in general or even the private sector. Last, the empowering effects of BPM and DI capabilities are limited in terms of their focus on digital process innovation and the DI process. Both domains also offer beneficial interactions in other areas. For example, BPM also takes an enabling role in exploiting the output of DI processes such as the update of business processes alongside the upscaling of a new digital service (Grisold et al., 2021). Thus, future research could investigate whether the empowering effects also correspond to these other subjects in BPM and DI. In this regard, scholars may also study how the empowering effects relate to the concept of dynamic capabilities, which has been found as particularly important for BPM and DI (L. Shen et al., 2022).

In sum, combining efforts of the BPM and DI domains promises great benefits, but also requires much work to overcome challenges at the intersection and to uncover how synergies can be leveraged. I hope that this doctoral thesis is an important step towards bringing BPM and DI closer together by providing novel perspectives on how DT drives their convergence and how both can interact for mutual benefit.

VI. References

Abrell, T., Pihlajamaa, M., Kanto, L., vom Brocke, J., & Uebernickel, F. (2016). The role of users and customers in digital innovation: Insights from B2B manufacturing firms. *Information & Management*, *53*(3), 324–335. https://doi.org/10.1016/j.im.2015.12.005

Adarkar, A., Hyde, P., Maxwell, M. N., & Sridharan, A. (2020). *Leading a consumer bank through the coronavirus pandemic*. McKinsey. https://www.mckinsey.com/industries/financial-services/our-insights/leading-a-consumer-bank-through-the-coronavirus-pandemic

Afflerbach, P., & Frank, L. (2016). Customer experience versus process efficiency: towards an analytical framework about ambidextrous BPM. *Proceedings of the International Conference on Information Systems (ICIS)*.

Agasisti, T., & Pohl, C. (2012). Comparing German and Italian Public Universities: Convergence or Divergence in the Higher Education Landscape? *Managerial and Decision Economics*, *33*(2), 71–85. https://doi.org/10.1002/mde.1561

Ahmad, T., & van Looy, A. (2019). Reviewing the historical link between Business Process Management and IT: making the case towards digital innovation. In M. Kolp (Ed.), *Towards a design science for information systems: Proceedings of the 13th International Conference on Research Challenges in Information Science* (pp. 1–12). IEEE. https://doi.org/10.1109/RCIS.2019.8877039

Ahmad, T., & van Looy, A. (2020). Business Process Management and Digital Innovations: A Systematic Literature Review. *Sustainability*, *12*(17), 6827. https://doi.org/10.3390/su12176827

Alibaba Clouder. (2020). *How Did Alibaba Help Retailer Lin Qingxuan Cope with the Coronavirus Outbreak?* alibaba.com. https://www.alibabacloud.com/blog/how-did-alibaba-help-retailer-lin-qingxuan-cope-with-the-coronavirus-outbreak_595950

Amazon. (2023). *Who we are*. https://www.aboutamazon.eu/who-we-are

Amit, R., & Schoemaker, P. J. H. (1993). Strategic assets and organizational rent. *Strategic Management Journal*, *14*(1), 33–46. https://doi.org/10.1002/smj.4250140105

Anderson, E. W., & Mittal, V. (2000). Strengthening the Satisfaction-Profit Chain. *Journal of Service Research*, *3*(2), 107–120. https://doi.org/10.1177/109467050032001

Annarelli, A., Battistella, C., Nonino, F., Parida, V., & Pessot, E. (2021). Literature review on digitalization capabilities: Co-citation analysis of antecedents, conceptualization and consequences. *Technological Forecasting and Social Change*, *166*, 120635. https://doi.org/10.1016/j.techfore.2021.120635

Antonucci, Y. L., Fortune, A., & Kirchmer, M. (2021). An examination of associations between business process management capabilities and the benefits of digitalization: all capabilities are not equal. *Business Process Management Journal*, *27*(1), 124–144. https://doi.org/10.1108/BPMJ-02-2020-0079

Ardichvili, A., Cardozo, R., & Ray, S. (2003). A theory of entrepreneurial opportunity identification and development. *Journal of Business Venturing*, *18*(1), 105–123. https://doi.org/10.1016/s0883-9026(01)00068-4

Arsanjani, A., Bharade, N., Borgenstrand, M., Schume, P., Wood, J. K., & Zheltonogov, V. (2015). *Business Process Management Design Guide: Using IBM Business Process Manager* (First edition). *WebSphere handbook series*. IBM Corporation International Technical Support Organization.

Arthur, W. B. (2009). *The Nature of Technology: What It Is and How It Evolves* (1st ed.). Free Press.

Ashour, S. (2020). Quality higher education is the foundation of a knowledge society: where does the UAE stand? *Quality in Higher Education*, *26*(2), 209–223. https://doi.org/10.1080/13538322.2020.1769263

Bailey, K. D. (1994). *Typologies and taxonomies: An introduction to classification techniques*. *Sage University Paper Series on Quantitative Applications in the Social Sciences: Vol. 102*. SAGE Publications.

Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European Journal of Information Systems*, *29*(3), 238–259. https://doi.org/10.1080/0960085X.2020.1718007

Baker, J., & Wetherbe, J. C. (2013). Corporate Sponsorship of Academic Research: The Trend, Its Drivers, and Its Implications. *Communications of the Association for Information Systems*, *33*. https://doi.org/10.17705/1CAIS.03317

Baltuttis, D., Häckel, B., Jonas, C. M., Oberländer, A. M., Röglinger, M., & Seyfried, J. (2022). Conceptualizing and Assessing the Value of Internet of Things Solutions. *Journal of Business Research*, *140*, 245-263. https://doi.org/10.1016/j.jbusres.2021.10.063

Bar Am, J., Furstenthal, L., Jorge, F., & Roth, E. (2020). *Innovation in a crisis: Why it is more critical than ever*. McKinsey. https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/innovation-in-a-crisis-why-it-is-more-critical-than-ever

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Barney, J. (2001). Resource-based theories of competitive advantage: A ten-year retrospective on the resource-based view. *Journal of Management*, *27*(6), 643–650. https://doi.org/10.1177/014920630102700602

Baron, R. A. (2007). Behavioral and cognitive factors in entrepreneurship: entrepreneurs as the active element in new venture creation. *Strategic Entrepreneurship Journal*, *1*(1-2), 167–182. https://doi.org/10.1002/sej.12

Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). Service Innovation in the Digital Age: Key Contributions and Future Directions. *MIS Quarterly*, *39*(1), 135–154. https://doi.org/10.25300/MISQ/2015/39:1.03

Baskerville, R. L., Myers, M. D., & Yoo, Y. (2020). Digital First: The Ontological Reversal and New Challenges for Information Systems Research. *MIS Quarterly*, *44*(2), 509–523.

Baumbach, S., Oberländer, A. M., Röglinger, M., & Rosemann, M. (2020). Dynamic capabilities for opportunity exploration: insights from an explorative case study. *International Journal of Entrepreneurial Venturing*, *12*(6), Article 112232, 575.

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, *20*(11). https://doi.org/10.3390/s20113291

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom*. Yale University Press.

Benner, M. J., & Tushman, M. L. (2003). Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisited. *Academy of Management Review*, *28*(2), 238–256.

Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: Understanding threats to performance in a VUCA world. *Business Horizons*, *57*(3), 311–317. https://doi.org/10.1016/j.bushor.2014.01.001

Benson, J. K. (1977). Organizations: A Dialectical View. *Administrative Science Quarterly*, *22*(1), 1. https://doi.org/10.2307/2391741

Berger, E. S., Briel, F. von, Davidsson, P., & Kuckertz, A. (2021). Digital or not – The future of entrepreneurship and innovation. *Journal of Business Research*, *125*, 436–442. https://doi.org/10.1016/j.jbusres.2019.12.020

Berghout, E. (2020). COVID and Opportunities for Information Systems Management Research. *Information Systems Management*, 1–4.

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). Digital Business Strategy: Toward a Next Generation of Insights. *MIS Quarterly*, *37*(2), 471–482.

Bitomsky, L., Huhn, J., Kratsch, W., & Roglinger, M. (2019). Process meets project prioritization a decision model for developing process improvement roadmaps. *Proceedings of the European Conference on Information Systems (ECIS)*.

Blume, M., Oberländer, A. M., Röglinger, M., Rosemann, M., & Wyrtki, K. (2020). Ex ante assessment of disruptive threats: Identifying relevant threats before one is disrupted. *Technological Forecasting and Social Change*, *158*, 120103.

Boaden, R., & Lockett, G. (1991). Information technology, information systems and information management: definition and development. *European Journal of Information Systems*, *1*(1), 23–32.

Bockshecker, A., Ebner, K., Smolnik, S., & and Baumöl, U. (2022). Managing the Digital Transformation of Universities: Business Model Analysis and Design Principles. *PACIS 2022 Proceedings*, Article 278.

Boer, F. G. de, Müller, C. J., & Caten, C. S. t. (2015). Assessment model for organizational business process maturity with a focus on BPM governance practices. *Business Process Management Journal*, *21*(4), 908–927.

Bolsinger, M. (2015). Bringing value-based business process management to the operational process level. *Information Systems and E-Business Management*, *13*(2), 355–398.

Boone, T., Ganeshan, R., & Hicks, R. L. (2008). Learning and Knowledge Depreciation in Professional Services. *Management Science*, *54*(7), 1231–1236. https://doi.org/10.1287/mnsc.1070.0849

Brem, A., & Voigt, K.-I. (2009). Integration of market pull and technology push in the corporate front end and innovation management—Insights from the German software industry. *Technovation*, *29*(5), 351–367. https://doi.org/10.1016/j.technovation.2008.06.003

Bruin, T. de, & Rosemann, M. (2007). *Using the Delphi Technique to Identify BPM Capability Areas*. ACIS 2007 Proceedings.

Buck, C., Grüneke, T., & Stelzl, K. (2021). Structuring the Jungle of Capabilities Fostering Digital Innovation. In Ahlemann (Ed.), *Lecture Notes in Information Systems and Organisation. Innovation Through Information Systems* (1st ed., Vol. 48, pp. 290–304). Springer International Publishing. https://doi.org/10.1007/978-3-030-86800-0_21

Buhl, H. U., Röglinger, M., Stöckl, S., & Braunwarth, K. S. (2011). Value Orientation in Process Management. *Business & Information Systems Engineering*, *3*(3), 163–172. https://doi.org/10.1007/s12599-011-0157-5

Bushaus, D. (2019). *TM Forum Excellence Award winners share the spotlight*. https://inform.tmforum.org/features-and-opinion/tm-forum-excellence-award-winners-share-the-spotlight

Carugati, A., Mola, L., Plé, L., Lauwers, M., & Giangreco, A. (2020). Exploitation and exploration of IT in times of pandemic: from dealing with emergency to institutionalising crisis practices. *European Journal of Information Systems*, *29*(6), 762–777.

Chen, Y., & Roldan, M. (2021). Digital Innovation during COVID-19: Transforming Challenges to Opportunities. *Communications of the Association for Information Systems*, *48*.

Ciriello, R. F., & Richter, A. (2015). Idea Hubs as Nexus of Collective Creativity in Digital Innovation. *Proceedings of the International Conference on Information Systems (ICIS)*.

Ciriello, R. F., Richter, A., & Schwabe, G. (2017). From Process to Practice: Towards a Practice-based Model of Digital Innovation. *Proceedings of the International Conference on Information Systems (ICIS)*.

Ciriello, R. F., Richter, A., & Schwabe, G. (2018). Digital Innovation. *Business & Information Systems Engineering*, *60*(6), 563–569.

Clow, D. (2013). An overview of learning analytics. *Teaching in Higher Education*, *18*(6), 683–695. https://doi.org/10.1080/13562517.2013.827653

Cordes, A.-K., & Rosemann, M. (2020). Developing Organizational Digital Intelligence: A Conceptual Framework. *Proceedings of the 28th European Conference on Information Systems (ECIS2020), a Virtual AIS Conference: Liberty, Equality, and Fraternity in a Digitizing World*(978-1-7336325-1-5). https://eprints.qut.edu.au/205046/

Corley, K. G., & Gioia, D. A. (2004). Identity Ambiguity and Change in the Wake of a Corporate Spin-off. *Administrative Science Quarterly*, *49*(2), 173–208. https://doi.org/10.2307/4131471

Danilova, K. B. (2019). Process owners in business process management: a systematic literature review. *Business Process Management Journal*, *25*(6), 1377–1412.

Danneels, L., & Viaene, S. (2022). Identifying Digital Transformation Paradoxes. *Business & Information Systems Engineering*, *64*(4), 483–500. https://doi.org/10.1007/s12599-021-00735-7

Davidsson, P. (2015). Entrepreneurial opportunities and the entrepreneurship nexus: A re-conceptualization. *Journal of Business Venturing*, *30*(5), 674–695. https://doi.org/10.1016/J.JBUSVENT.2015.01.002

Davidsson, P., Recker, J., & Briel, F. (2018). External Enablement of New Venture Creation: A Framework. *Academy of Management Perspectives*.

Davis, G. (2000). "Information Systems Conceptual Foundations: Looking Backward and Forward. In R. L. Baskerville, J. Stage, & J. DeGross (Eds.), *IFIP Advances in Information and Communication Technology. Organizational and Social Perspectives on Information Technology* (pp. 62–82). Springer Verlag.

Díaz-García, V., Montero-Navarro, A., Rodríguez-Sánchez, J.-L., & Gallego-Losada, R. (2022). Digitalization and digital transformation in higher education: A bibliometric analysis. *Frontiers in Psychology*, *13*, 1081595. https://doi.org/10.3389/fpsyg.2022.1081595

Distel, B., Plattfaut, R., & Kregel, I. (2023). How business process management culture supports digital innovation: a quantitative assessment. *Business Process Management Journal*, *29*(5), 1352–1385. https://doi.org/10.1108/BPMJ-12-2022-0637

Dumas, M., La Rosa, M., Mendling, J., & Reijers, H. A. (2018). *Fundamentals of business process management* (Second edition). Springer.

Dyer, L., Forget, A., Osmani, F., Zahn, J., & Redbooks, I. B. (2013). *Creating a BPM Center of Excellence (CoE)*. IBM Redbooks.

Egger, A., ter Hofstede, A. H. M., Kratsch, W., Leemans, S. J. J., Röglinger, M., & Wynn, M. T. (2021). Bot Log Mining: Using Logs from Robotic Process Automation for Process Mining. In G. Dobbie, U. Frank, G. Kappel, S. W. Liddle, & H. C. Mayr (Eds.), *Conceptual Modeling. ER 2020. Lecture Notes in Computer Science Lecture Notes in Computer Science* (1st ed. 2020, Vol. 12400, pp. 51–61). Springer. https://doi.org/10.1007/978-3-030-62522-1_4

El Sawy, O. A. (2003). The IS Core IX: The 3 Faces of IS Identity: Connection, Immersion, and Fusion. *Communications of the Association for Information Systems*, *12*. https://doi.org/10.17705/1CAIS.01239

Faria, J. A., & Nóvoa, H. (2017). Digital Transformation at the University of Porto. In S. Za, M. Drăgoicea, & M. Cavallari (Eds.), *Lecture Notes in Business Information Processing. Exploring Services Science* (Vol. 279, pp. 295–308). Springer International Publishing. https://doi.org/10.1007/978-3-319-56925-3_24

Faulkner, P., & Runde, J. (2019). Theorizing the Digital Object. *MIS Quarterly*, *43*(4). https://doi.org/10.25300/MISQ/2019/13136

Ferraris, A., Monge, F., & Mueller, J. (2018). Ambidextrous IT capabilities and business process performance: an empirical analysis. *Business Process Management Journal*, *24*(5), 1077–1090. https://doi.org/10.1108/BPMJ-07-2017-0201

Fichman, R. G., Dos Santos, B. L., & Zheng, Z. (2014). Digital Innovation as a Fundamental and Powerful Concept in the Information Systems Curriculum. *MIS Quarterly*, *38*(2), 329–343.

Fischer, M., Imgrund, F., Janiesch, C., & Winkelmann, A. (2020). Strategy archetypes for digital transformation: Defining meta objectives using business process management. *Information & Management*, *57*(5), 103262. https://doi.org/10.1016/j.im.2019.103262

Frambach, J. M., Driessen, E. W., Beh, P., & van der Vleuten, C. P. (2014). Quiet or questioning? Students' discussion behaviors in student-centered education across cultures. *Studies in Higher Education*, *39*(6), 1001–1021. https://doi.org/10.1080/03075079.2012.754865

Gaim, M., Wåhlin, N., e Cunha, M. P., & Clegg, S. (2018). Analyzing competing demands in organizations: a systematic comparison. *Journal of Organization Design*, *7*(1).

Galbraith, J. R. (2005). *Designing the Customer-Centric Organization: A Guide to Strategy, Structure, and Process*. Jossey-Bass.

Gimpel, H., Hosseini, S., Huber, R., Probst, L., Röglinger, M., & Faisst, U. (2018). Structuring Digital Transformation: A Framework of Action Fields and its Application at ZEISS. *Journal of Information Technology Theory and Application*, *19*(1/3), 31–54. https://aisel.aisnet.org/jitta/vol19/iss1/3

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking Qualitative Rigor in Inductive Research. *Organizational Research Methods*, *16*(1), 15–31. https://doi.org/10.1177/1094428112452151

Goni, J. I. C., & van Looy, A. (2022). Process innovation capability in less-structured business processes: a systematic literature review. *Business Process Management Journal*, *28*(3), 557–584.

Gravett, K., Kinchin, I. M., & Winstone, N. E. (2020). 'More than customers': conceptions of students as partners held by students, staff, and institutional leaders. *Studies in Higher Education*, *45*(12), 2574–2587. https://doi.org/10.1080/03075079.2019.1623769

Gregor, S. (2006). The Nature of Theory in Information Systems. *MIS Quarterly*, *30*(3), 611–642. https://doi.org/10.2307/25148742

Gregor, S., & Hevner, A. (2013). Positioning and Presenting Design Science Research for Maximum Impact. *MIS Quarterly*, *37*(2), 337–355. https://doi.org/10.25300/MISQ/2013/37.2.01

Grisold, T., Groß, S., Stelzl, K., vom Brocke, J., Mendling, J., Röglinger, M., & Rosemann, M. (2022). The Five Diamond Method for Explorative Business Process Management. *Business & Information Systems Engineering*, *64*(2), 149–166. https://doi.org/10.1007/s12599-021-00703-1

Grisold, T., vom Brocke, J., Gross, S., Mendling, J., Röglinger, M., & Stelzl, K. (2021). Digital Innovation and Business Process Management: Opportunities and Challenges as Perceived by Practitioners.

Communications of the Association for Information Systems, *49*(1), 556–571. https://doi.org/10.17705/1CAIS.04927

Grisold, T., Wurm, B., Mendling, J., & vom Brocke, J. (2020). Using Process Mining to Support Theorizing About Change in Organizations. In T. Bui (Ed.), *Proceedings of the Annual Hawaii International Conference on System Sciences*. https://doi.org/10.24251/HICSS.2020.675

Gruca, T. S., & Rego, L. L. (2005). Customer Satisfaction, Cash Flow, and Shareholder Value. *Journal of Marketing*, *69*(3), 115–130. https://doi.org/10.1509/jmkg.69.3.115.66364

Gustavsson, M., & Ljungberg, J. (2018). Entrepreneurship in the Digital Society. *Proceedings of the Conference on Information Systems (ICIS)*.

Hammer, M. (2015). What is Business Process Management? In J. vom Brocke & M. Rosemann (Eds.), *International Handbooks on Information Systems. Handbook on Business Process Management 1: Introduction, Methods, and Information Systems* (2nd ed., pp. 3–16). Springer Berlin Heidelberg.

Handayani, S. F., & Mahendrawathi, E. (2019). Antecedent and Business Process Management Non-Technical Capabilities in Social Media Implementation for Micro, Small and Medium Enterprises: A Conceptual Model. *Procedia Computer Science*, *161*, 1114–1121. https://doi.org/10.1016/j.procs.2019.11.223

Haskamp, T., Dremel, C., Marx, C., & Uebernickel, F. (2021). Understanding Inertia in Digital Transformation: A Literature Review and Multilevel Research Framework. *Proceedings of the Conference on Information Systems (ICIS)*.

He, Z.-L., & Wong, P.-K. (2004). Exploration vs. Exploitation: An Empirical Test of the Ambidexterity Hypothesis. *Organization Science*, *15*(4), 481–494.

Hedlund, H. (2019). Architecting Structural Flexibility in Design Processes - A Case Study of Public Sector Digital Innovation. *Proceedings of the European Conference on Information Systems (ECIS)*.

Hei, M. de, Admiraal, W., Sjoer, E., & Strijbos, J.-W. (2018). Group learning activities and perceived learning outcomes. *Studies in Higher Education*, *43*(12), 2354–2370. https://doi.org/10.1080/03075079.2017.1327518

Henfridsson, O., & Bygstad, B. (2013). The Generative Mechanisms of Digital Infrastructure Evolution. *MIS Quarterly*, *37*(3), 907–931. https://doi.org/10.25300/MISQ/2013/37.3.11

Henfridsson, O., Nandhakumar, J., Scarbrough, H., & Panourgias, N. (2018). Recombination in the open-ended value landscape of digital innovation. *Information and Organization*, *28*(2), 89–100.

Hernaus, T., Bosilj Vuksic, V., & Indihar Štemberger, M. (2016). How to go from strategy to results? Institutionalising BPM governance within organisations. *Business Process Management Journal*, *22*(1), 173–195.

Hew, K. F., Lan, M., Tang, Y., Jia, C., & Lo, C. K. (2019). Where is the "theory" within the field of educational technology research? *British Journal of Educational Technology : Journal of the Council for Educational Technology*, *50*(3), 956–971. https://doi.org/10.1111/bjet.12770

Hinings, B., Gegenhuber, T., & Greenwood, R. (2018). Digital innovation and transformation: An institutional perspective. *Information and Organization*, *28*(1), 52–61. https://doi.org/10.1016/j.infoandorg.2018.02.004

Hirschheim, R. (2019). Against Theory: With Apologies to Feyerabend. *Journal of the Association for Information Systems*, 1338–1355. https://doi.org/10.17705/1jais.00569

Hirschheim, R., & Klein, H. K [Heinz K.] (1989). Four paradigms of information systems development. *Communications of the ACM*, *32*(10), 1199–1216. https://doi.org/10.1145/67933.67937

Holmström, J. (2018). Recombination in digital innovation: Challenges, opportunities, and the importance of a theoretical framework. *Information and Organization*, *28*(2), 107–110. https://doi.org/10.1016/j.infoandorg.2018.04.002

Hosseini, S., Merz, M., Röglinger, M., & Wenninger, A. (2018). Mindfully going omni-channel: An economic decision model for evaluating omni-channel strategies. *Decision Support Systems*, *109*, 74–88. https://doi.org/10.1016/j.dss.2018.01.010

Howard-Grenville, J. A. (2005). The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context. *Organization Science*, *16*(6), 618–636.

Hund, A., Wagner, H.-T., Beimborn, D., & Weitzel, T. (2021). Digital innovation: Review and novel perspective. *The Journal of Strategic Information Systems*, *30*(4), Article 101695.

Jansen, J. J. P., van den Bosch, F. A. J., & Volberda, H. W. (2006). Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Management Science*, *52*(11), 1661–1674.

Jonathan, G. M. (2020). Digital Transformation in the Public Sector: Identifying Critical Success Factors. In (pp. 223–235). Springer, Cham. https://doi.org/10.1007/978-3-030-44322-1_17

Kallinikos, J., Aaltonen, A., & Marton, A. (2013). The Ambivalent Ontology of Digital Artifacts. *MIS Quarterly*, *37*(2), 357–370.

Kallinikos, J., & Mariátegui, J.-C. (2011). Video as Digital Object: Production and Distribution of Video Content in the Internet Media Ecosystem. *The Information Society*, *27*(5), 281–294. https://doi.org/10.1080/01972243.2011.607025

Kano, N., Seraku, N., Takahashi, F., & Tsuji S. (1984). Attractive quality and must-be quality. *Journal of Japanese Society for Quality Control*, *14*, 147.

Karpen, I. O., Bove, L. L., Lukas, B. A., & Zyphur, M. J. (2015). Service-Dominant Orientation: Measurement and Impact on Performance Outcomes. *Journal of Retailing*, *91*(1), 89–108. https://doi.org/10.1016/j.jretai.2014.10.002

Keeney, R. L., Meyer, R. F., & Raiffa, H. (2003). *Decisions with multiple objectives: Preferences and value tradeoffs* (Transferred to digital printing). Cambridge Univ. Press. https://doi.org/10.1017/CBO9781139174084

Kerpedzhiev, G. D., König, U. M., Röglinger, M., & Rosemann, M. (2021). An Exploration into Future Business Process Management Capabilities in View of Digitalization. *Business & Information Systems Engineering*, *63*(2), 83–96. https://doi.org/10.1007/s12599-020-00637-0

Kirchmer, M. (2010). Management of Process Excellence. In J. vom Brocke & M. Rosemann (Eds.), *Handbook on Business Process Management 2* (pp. 39–56). Springer Berlin Heidelberg.

Klein, H. K [H. K.], & Hirschheim, R. A. (1989). Legitimation in Information Systems Development: A Social Change Perspective. *Office Technology and People*, *5*(1), 29–46. https://doi.org/10.1108/EUM0000000003527

Klun, M., & Trkman, P. (2018). Business process management – at the crossroads. *Business Process Management Journal*, *24*(3), 786–813. https://doi.org/10.1108/BPMJ-11-2016-0226

Kohli, R., & Melville, N. P. (2019). Digital innovation: A review and synthesis. *Information Systems Journal*, *29*(1), 200–223. https://doi.org/10.1111/isj.12193

Kotter, J. P. (2008). *A sense of urgency*. Harvard Business Review Press. https://ebookcentral.proquest.com/lib/gbv/detail.action?docID=5181975

Kratsch, W., Manderscheid, J., Reißner, D., & Röglinger, M. (2017). Data-driven Process Prioritization in Process Networks. *Decision Support Systems*, *100*, 27–40. https://doi.org/10.1016/j.dss.2017.02.011

Krogh, G., Kucukkeles, B., & Ben-Menahem, S. M. (2020). Lessons in Rapid Innovation From the COVID-19 Pandemic. *MIT Sloan Management Review*, *61*(4). https://sloanreview.mit.edu/article/lessons-in-rapid-innovation-from-the-covid-19-pandemic/

Kugel, P. (1993). How professors develop as teachers. *Studies in Higher Education*, *18*(3), 315–328. https://doi.org/10.1080/03075079312331382241

Kundisch, D., Muntermann, J., Oberländer, A. M., Rau, D., Röglinger, M., Schoormann, T., & Szopinski, D. (2021). An Update for Taxonomy Designers. *Business & Information Systems Engineering.* Advance online publication. https://doi.org/10.1007/s12599-021-00723-x

Lacka, E., & Wong, T. C. (2021). Examining the impact of digital technologies on students' higher education outcomes: the case of the virtual learning environment and social media. *Studies in Higher Education*, *46*(8), 1621–1634. https://doi.org/10.1080/03075079.2019.1698533

Lašáková, A., Bajzíková, Ľ., & Dedze, I. (2017). Barriers and drivers of innovation in higher education: Case study-based evidence across ten European universities. *International Journal of Educational Development*, *55*, 69–79. https://doi.org/10.1016/j.ijedudev.2017.06.002

Laycey, J., Malakar, Y., McCrea, R., & Moffat, K. (2019). Public perceptions of established and emerging mining technologies in Australia. *Resource Policy*, *62*, 125–135.

Lea, S. J., Stephenson, D., & Troy, J. (2003). Higher Education Students' Attitudes to Student-centred Learning: Beyond 'educational bulimia'? *Studies in Higher Education*, *28*(3), 321–334. https://doi.org/10.1080/03075070309293

Lee, J., & Berente, N. (2012). Digital Innovation and the Division of Innovative Labor: Digital Controls in the Automotive Industry. *Organization Science*, *23*(5).

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmann, T., Drews, P., Mädche, A., Urbach, N., & Ahlemann, F. (2017). Digitalization: Opportunity and Challenge for the Business and Information Systems Engineering Community. *Business & Information Systems Engineering*, *59*(4), 301–308. https://doi.org/10.1007/s12599-017-0484-2

Lehnert, M., Linhart, A., & Röglinger, M. (2016). Value-based process project portfolio management: integrated planning of BPM capability development and process improvement. *Business Research*, *9*(2), 377–419.

Leidner, D. (2018). Review and Theory Symbiosis: An Introspective Retrospective. *Journal of the Association for Information Systems*, *19*(06), 552–567.

Limaj, E., & Bernroider, E. W. (2022). A taxonomy of scaling agility. *The Journal of Strategic Information Systems*, *31*(3), 101721. https://doi.org/10.1016/j.jsis.2022.101721

Livari, N., & Molin-Juustila, Tonja, Kinnula, Marianne (2016). The Future Digital Innovators: Empowering the Young Generation with Digital Fabrication and Making. *Proceedings of the Conference on Information Systems (ICIS)*.

Lohoff, L. (2022). A Taxonomy for Digital Process Innovation. *Proceedings of the Pacific Asia Conference on Information Systems (PACIS)*.

Lokuge, S., Sedera, D., Grover, V., & Dongming, X. (2019). Organizational readiness for digital innovation: Development and empirical calibration of a construct. *Information & Management*, *56*(3), 445–461. https://doi.org/10.1016/j.im.2018.09.001

Lusch, R. F., & Nambisan, S. (2015). Service Innovation: A Service-Dominant Logic Perspective. *MIS Quarterly*, *39*(1), 155–175. https://doi.org/10.25300/MISQ/2015/39.1.07

March, J. G. (1991). Exploration and Exploitation in Organizational Learning. *OrgSci*, *2*(1), 71–87.

Marginson, S. (2016). The worldwide trend to high participation higher education: dynamics of social stratification in inclusive systems. *Higher Education*, *72*(4), 413–434. https://doi.org/10.1007/s10734-016-0016-x

Matthews, K. E., & Mercer-Mapstone, L. D. (2018). Toward curriculum convergence for graduate learning outcomes: academic intentions and student experiences. *Studies in Higher Education*, *43*(4), 644–659. https://doi.org/10.1080/03075079.2016.1190704

McKelvey, B. (1982). *Organizational Systematics: Taxonomy, Evolution, Classification*. University of California Press.

Mendling, J., Pentland, B. T., & Recker, J. (2020). Building a complementary agenda for business process management and digital innovation. *European Journal of Information Systems*, *29*(3), 208–219. https://doi.org/10.1080/0960085X.2020.1755207

Meredith, J. R., Raturi, A., Amoako-Gyampah, K., & Kaplan, B. (1989). Alternative research paradigms in operations. *Journal of Operations Management*, *8*(4), 297–326. https://doi.org/10.1016/0272-6963(89)90033-8

Mergel, I., Edelmann, N., & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, *36*(4), 101385. https://doi.org/10.1016/j.giq.2019.06.002

Michel, A. (2014). The Mutual Constitution of Persons and Organizations: An Ontological Perspective on Organizational Change. *Organization Science*, *25*(4), 1082–1110. https://doi.org/10.1287/orsc.2013.0887

Moormann, J., & Palvölgyi, E. Z. (2013). Customer-Centric Business Modeling: Setting a Research Agenda. *IEEE 15th Conference on Business Informatics*.

Morris, N. P., Ivancheva, M., Coop, T., Mogliacci, R., & Swinnerton, B. (2020). Negotiating growth of online education in higher education. *International Journal of Educational Technology in Higher Education*, *17*(1). https://doi.org/10.1186/s41239-020-00227-w

Mousavi Baygi, R., Introna, L. D., & Hultin, L. (2021). Everything Flows: Studying Continuous Socio-Technological Transformation in a Fluid and Dynamic Digital World. *MIS Quarterly*, *45*(1), 423–452. https://doi.org/10.25300/MISQ/2021/15887

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, *17*(1), 2–26. https://doi.org/10.1016/j.infoandorg.2006.11.001

Nadkarni, S., & Prügl, R. (2021). Digital transformation: a review, synthesis and opportunities for future research. *Management Review Quarterly*, *71*(2), 233–341. https://doi.org/10.1007/s11301-020-00185-7

Nahm, A. Y., Rao, S. S., Solis-Galvan, L. E., & Ragu-Nathan, T. S. (2002). The Q-Sort Method: Assessing Reliability And Construct Validity Of Questionnaire Items at a Pre-Testing Stage. *Journal of Modern Applied Statistical Methods*, *1*(1), 114–125. https://doi.org/10.22237/jmasm/1020255360

Nambisan, S., Lyytinen, K., Majchrzak, A., & Song, M. (2017). Digital Innovation Management: Reinventing Innovation Management Research in a Digital World. *MIS Quarterly*, *41*(1), 223–238. https://doi.org/10.25300/MISQ/2017/41:1.03

Nambisan, S., Wright, M., & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges and key themes. *Research Policy*, *48*(8), 103773.

Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A Method for Taxonomy Development and its Application in Information Systems. *European Journal of Information Systems*, *22*(3), 336–359. https://doi.org/10.1057/ejis.2012.26

Noesgaard, M. S., Nielsen, J. A., Jensen, T. B., & Mathiassen, L. (2023). Same but Different: Variations in Reactions to Digital Transformation Within an Organizational Field. *Journal of the Association for Information Systems*, *24*(1), 12–34. https://doi.org/10.17705/1jais.00770

Nuere, S., & Miguel, L. de (2021). The Digital/Technological Connection with COVID-19: An Unprecedented Challenge in University Teaching. *Technology, Knowledge and Learning*, *26*(4), 931–943. https://doi.org/10.1007/s10758-020-09454-6

Oberländer, A. M., Roglinger, M., & Rosemann, M. (2021). Digital opportunities for incumbents – A resource-centric perspective. *The Journal of Strategic Information Systems*, *30*(3), Article 101670.

Obermiller, C., Fleenor, P., & Peter, R. (2005). Students as Customers or Products: Perceptions and Preferences of Faculty and Students. *Marketing Education Review*, *15*(2), 27–36. https://doi.org/10.1080/10528008.2005.11488902

Oborn, E., Barrett, M., Orlikowski, W., & Kim, A. (2019). Trajectory Dynamics in Innovation: Developing and Transforming a Mobile Money Service Across Time and Place. *Organization Science*, *30*(5), 1097–1123. https://doi.org/10.1287/orsc.2018.1281

Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology : Journal of the Council for Educational Technology*, *52*(4), 1357–1376. https://doi.org/10.1111/bjet.13112

Oppong-Tawiah, D., & Bassellier, G. (2017). Digital Innovation, Platform Orientation and the Performance of IT Startups. *Proceedings of the Conference on Information Systems (ICIS)*.

Orlikowski, W. J. (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3), 398–427. https://doi.org/10.1287/orsc.3.3.398

Osterwalder, A. (2015). *Value Proposition Design: How to Create Products and Services Customers Want* (1., Auflage). *Strategyzer series*. John Wiley & Sons. https://learning.oreilly.com/library/view/-/9781118968062/?ar

Pavlou, P. A., & El Sawy, O. A. (2010). The "Third Hand": IT-Enabled Competitive Advantage in Turbulence Through Improvisational Capabilities. *Information Systems Research*, *21*(3), 443–471. https://doi.org/10.1287/isre.1100.0280

Peffers, K., Tuunanen, T., Rothenberger, M. A., & Chatterjee, S. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, *24*(3), 45–77. https://doi.org/10.2753/MIS0742-1222240302

Piccoli, G., Rodriguez, J., & Grover, V. (2022). Digital Strategic Initiatives and Digital Resources: Construct Definition and Future Research Directions. *MIS Quarterly*, *46*(4). https://doi.org/10.2139/ssrn.4009793

Planas, A., Soler, P., Fullana, J., Pallisera, M., & Vilà, M. (2013). Student participation in university governance: the opinions of professors and students. *Studies in Higher Education*, *38*(4), 571–583. https://doi.org/10.1080/03075079.2011.586996

Platonova, R. I., Khuziakhmetov, A. N., Prokopyev, A. I., Rastorgueva, N. E., Rushina, M. A., & Chistyakov, A. A. (2022). Knowledge in digital environments: A systematic review of literature. *Frontiers in Education*, *7*, Article 1060455. https://doi.org/10.3389/feduc.2022.1060455

Poeppelbuss, J., Plattfaut, R., & Niehaves, Bjoern (2015). How Do We Progress? An Exploration of Alternate Explanations for BPM Capability Development. *Communications of the Association for Information Systems*, *36*. https://doi.org/10.17705/1CAIS.03601

Ravasi, D., & Schultz, M. (2006). Responding to Organizational Identity Threats: Exploring the Role of Organizational Culture. *Academy of Management Journal*, *49*(3), 433–458. https://doi.org/10.5465/amj.2006.21794663

Recker, J., & Mendling, J. (2016). The State of the Art of Business Process Management Research as Published in the BPM Conference. *Business & Information Systems Engineering*, *58*(1), 55–72. https://doi.org/10.1007/s12599-015-0411-3

Recker, J., & von Briel, F. (2019). The Future of Digital Entrepreneurship Research: Existing and Emerging Opportunities. *Proceedings of the Conference on Information Systems (ICIS)*.

Reeves, M., Fæste, L., Chen, C., Carlsson-Szlezak, P., & Whitaker, K. (2020). *How Chinese Companies Have Responded to Coronavirus*. Havard Business Review. https://hbr.org/2020/03/how-chinese-companies-have-responded-to-coronavirus

Reinartz, W., Krafft, M., & Hoyer, W. D. (2004). The Customer Relationship Management Process: Its Measurement and Impact on Performance. *Journal of Marketing Research*, *41*(3), 293–305. https://doi.org/10.1509/jmkr.41.3.293.35991

Rosemann, M. (2014). Proposals for Future BPM Research Directions. In C. Ouyang & J.-Y. Jung (Eds.), *Proceedings of the 2nd Asia Pacific Business Process Management Conference* (pp. 1–15). Springer.

Rosemann, M., & vom Brocke, J. (2014). The Six Core Elements of Business Process Management. In M. Rosemann (Ed.), *International Handbooks on Information Systems. Handbook on business process management - introduction, methods, and inform* (pp. 105–122). Springer-verlag Berlin And Hei. https://doi.org/10.1007/978-3-642-45100-3_5

Ross, H. (1974). *Biological Systematics*. Addison-Wesley.

Sadler, I. (2012). The challenges for new academics in adopting student-centred approaches to teaching. *Studies in Higher Education*, *37*(6), 731–745. https://doi.org/10.1080/03075079.2010.543968

Sahut, J.-M., Iandoli, L., & Teulon, F. (2021). The age of digital entrepreneurship. *Small Business Economics*, *56*(3), 1159–1169. https://doi.org/10.1007/s11187-019-00260-8

Saldanha, T. J. V., Mithas, S., & Krishnan, M. S. (2017). Leveraging Customer Involvement for Fueling Innovation: The Role of Relational and Analytical Information Processing Capabilities. *MIS Quarterly*, *41*(1), 367–396. https://doi.org/10.25300/MISQ/2017/41.1.14

Salmimaa, T., Hekkala, R., & Pekkola, S. (2015). Paradoxes of Change Management in Information System Development. *Proceedings of the European Conference on Information Systems*, Article 156. Advance online publication. https://doi.org/10.18151/7217460

Sandberg, J., Holmstrom, J., & Lyytinen, K. (2020). Digitization and Phase Transitions in Platform Organizing Logics: Evidence from the Process Automation Industry. *MIS Quarterly*, *44*(1), 129–153. https://doi.org/10.25300/MISQ/2020/14520

Santana, A. F. L., Alves, C. F., Santos, H. R. M., & Lima Cavalcanti Felix, A. de. (2011). BPM Governance: An Exploratory Study in Public Organizations. In T. Halpin, S. Nurcan, J. Krogstie, P. Soffer, E. Proper, R. Schmidt, & I. Bider (Eds.), *Enterprise, Business-Process and Information Systems Modeling. BPMDS EMMSAD 2011 2011. Lecture Notes in Business Information Processing* (Vol. 81, pp. 46–60). Springer Berlin Heidelberg.

Sarkar, S., & Osiyevskyy, O. (2018). Organizational change and rigidity during crisis: A review of the paradox. *European Management Journal*, *36*(1), 47–58.

Saulnier, B. M., Landry, J. P., Longenecker, H. E., JR., & and Wagner, T. A. (2008). From Teaching to Learning: Learner-Centered Teaching and Assessment in Information Systems Education. *Journal of Information Systems Education*, *19*(2), 169–174.

Schmiedel, T., & vom Brocke, J. (2015). Business Process Management: Potentials and Challenges of Driving Innovation. In J. vom Brocke & T. Schmiedel (Eds.), *Management for Professionals. BPM - Driving Innovation in a Digital World* (pp. 3–15). Springer International Publishing. https://doi.org/10.1007/978-3-319-14430-6_1

Seidel, S., & Watson, R. T. (2020). Integrating Explanatory/Predictive and Prescriptive Science in Information Systems Research. *Communications of the Association for Information Systems*, *47*(1), 284–314. https://doi.org/10.17705/1CAIS.04714

Shen, K. N., Lindsay, V., & Xu, Y. (2018). Digital entrepreneurship. *Information Systems Journal*, *28*(6), 1125–1128. https://doi.org/10.1111/isj.12219

Shen, L., Zhang, X., & Liu, H. (2022). Digital technology adoption, digital dynamic capability, and digital transformation performance of textile industry: Moderating role of digital innovation orientation. *Managerial and Decision Economics*, *43*(6), 2038–2054. https://doi.org/10.1002/mde.3507

Shepherd, D. A., Wennberg, K., Suddaby, R., & Wiklund, J. (2019). What Are We Explaining? A Review and Agenda on Initiating, Engaging, Performing, and Contextualizing Entrepreneurship. *Journal of Management*, *45*(1), 159–196. https://doi.org/10.1177/0149206318799443

Siggelkow, N., & Levinthal, D. A. (2003). Temporarily Divide to Conquer: Centralized, Decentralized, and Reintegrated Organizational Approaches to Exploration and Adaptation. *OrgSci*, *14*(6), 650–669.

Škrinjar, R., & Trkman, P. (2013). Increasing process orientation with business process management: Critical practices'. *International Journal of Information Management*, *33*(1), 48–60. https://doi.org/10.1016/j.ijinfomgt.2012.05.011

Skulmowski, A., & Rey, G. D. (2020). Covid-19 as an accelerator for digitalization at a German university: Establishing hybrid campuses in times of crisis. *Human Behavior and Emerging Technologies*.

Smertenko, P., Dimitriev, O., Pochekailova, L., & Cernyshov, L. (2018). Technological Transformations and Their Implications for Higher Education. In J. Valsiner, A. Lutsenko, & A. Antoniouk (Eds.), *Cultural Psychology of Education: Vol. 7. Sustainable Futures for Higher Education: The Making of Knowledge Makers* (Vol. 7, pp. 67–75). Springer International Publishing. https://doi.org/10.1007/978-3-319-96035-7_8

Smith, W. K., & Tushman, M. L. (2005). Managing Strategic Contradictions: A Top Management Model for Managing Innovation Streams. *Organization Science*, *16*(5), 522–536.

Soh, C., Yeow, A., & Goh, Q. W. (2023). Shaping Digital Transformation Pathways: Dynamics of Paradoxical Tensions and Responses. *Journal of the Association for Information Systems*, *24*(6), 1594–1617. https://doi.org/10.17705/1jais.00852

Song, W., & Pan, Y. (2021). Tech Giants and New Entry Threats. *Proceedings of the International Conference on Information Systems (ICIS)*, Article 11.

Sonnenberg, C., & vom Brocke, J. (2012). Evaluation Patterns for Design Science Research Artefacts. In M. Helfert & B. Donnellan (Eds.), *Communications in Computer and Information Science. Practical aspects of design science: European design science symposium* (Vol. 286, pp. 71–83). Scholars Portal. https://doi.org/10.1007/978-3-642-33681-2_7

Spanyi, A. (2015). The Governance of Business Process Management. In J. vom Brocke & M. Rosemann (Eds.),. *Handbook on Business Process Management 2* (2nd ed., pp. 333–349). Springer Berlin Heidelberg.

Spencer, I., Irina, M., Tanni, D., Bahri, S., Abelardo, C., & Carla, S. (2020). *COVID-19 Induced Behaviour: Food and Skin Care Businesses.* askwonder.com. https://askwonder.com/research/covid-19-induced-behaviour-food-skin-care-businesses-vpchekews

Steininger, D. M. (2019). Linking information systems and entrepreneurship: A review and agenda for IT-associated and digital entrepreneurship research. *Information Systems Journal*, *29*(2), 363–407. https://doi.org/10.1111/isj.12206

Sun, R., & Zhang, M. (2018). Demystifying the Paradox of Stability and Flexibility in Information Systems Design: An Affordance Perspective. *Proceedings of the International Conference on Information Systems*, Article 6.

Suseno, Y., Laurell, C., & Sick, N. (2018). Assessing value creation in digital innovation ecosystems: A Social Media Analytics approach. *The Journal of Strategic Information Systems*, *27*(4), 335–349. https://doi.org/10.1016/j.jsis.2018.09.004

Svahn, F., Mathiassen, L., & Lindgren, R. (2017). Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns. *MIS Quarterly*, *41*(1), 239–253. https://doi.org/10.25300/MISQ/2017/41.1.12

Tarafdar, M., & Tanriverdi, H. (2018). Impact of the Information Technology Unit on Information Technology-Embedded Product Innovation. *Journal of the Association for Information Systems*, *19*(8).

Teece, D., Peteraf, M. A., & Leih, S. (2016). Dynamic Capabilities and Organizational Agility: Risk, Uncertainty and Entrepreneurial Management in the Innovation Economy. *SSRN Electronic Journal.* Advance online publication. https://doi.org/10.2139/ssrn.2771245

Tortora, D., Chierici, R., Farina Briamonte, M., & Tiscini, R. (2021). 'I digitize so I exist'. Searching for critical capabilities affecting firms' digital innovation. *Journal of Business Research*, *129*, 193–204. https://doi.org/10.1016/j.jbusres.2021.02.048

Trkman, P., Mertens, W., Viaene, S., & Gemmel, P. (2015). From business process management to customer process management. *Business Process Management Journal*, *21*(2), 250–266. https://doi.org/10.1108/BPMJ-02-2014-0010

Trow, M. (1999). From Mass Higher Education to Universal Access: The American Advantage. *Minerva*, *37*(4), 303–328.

Tsoukas, H., & Chia, R. (2002). On Organizational Becoming: Rethinking Organizational Change. *Organization Science*, *13*(5), 567–582. https://doi.org/10.1287/orsc.13.5.567.7810

Tumbas, S., Berente, N., & vom Brocke, J. (2018). Digital Innovation and Institutional Entrepreneurship: Chief Digital Officer Perspectives of their Emerging Role. *Journal of Information Technology*, *33*(3), 188–202. https://doi.org/10.1057/s41265-018-0055-0

van de Ven, A. H., & Poole, M. S. (1995). Explaining Development and Change in Organizations. *Academy of Management Review*, *20*(3), 510–540. https://doi.org/10.5465/amr.1995.9508080329

van den Bergh, J., Thijs, S., Işik, Ö., & Viaene, S. (2012). The World Is Not Enough: Customer Centricity and Processes. *BPTrends*. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=077c004341f596c54b6d11cf531c538dc9e41cf1

van der Valk, H., Haße, H., Möller, F., & Otto, B. (2021). Archetypes of Digital Twins. *Business & Information Systems Engineering.* Advance online publication. https://doi.org/10.1007/s12599-021-00727-7

van Looy, A. (2018). On the Synergies Between Business Process Management and Digital Innovation. In M. Weske, M. Montali, I. Weber, & J. vom Brocke (Eds.), *Lecture Notes in Computer Science*. (Vol. 11080, pp. 359–375). SPRINGER INTERNATIONAL PU. https://doi.org/10.1007/978-3-319-98648-7_21

van Looy, A. (2021). A quantitative and qualitative study of the link between business process management and digital innovation. *Information & Management*, *58*(2), 103413. https://doi.org/10.1016/j.im.2020.103413

van Looy, A., & Poels, G. (2019). A Practitioners' Point Of View On How Digital Innovation Will Shape The Future Of Business Process Management: Towards A Research Agenda. In T. X. Bui (Ed.), *Proceedings of the 52nd Annual Hawaii International Conference on System Sciences*. University of Hawaii at Manoa Hamilton Library ScholarSpace.

Venable, J., Pries-Heje, J., & Baskerville, R. (2012). A Comprehensive Framework for Evaluation in Design Science Research. In K. Peffers, M. Rothenberger, & B. Kuechler (Eds.), *Design Science Research in Information Systems. Advances in Theory and Practice. DESRIST 2012. Lecture Notes in Computer Science* (Vol. 7286, pp. 423–438). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-29863-9_31

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, *28*(2), 118–144. https://doi.org/10.1016/j.jsis.2019.01.003

Vicente, P. N., Lucas, M., Carlos, V., & Bem-Haja, P. (2020). Higher education in a material world: Constraints to digital innovation in Portuguese universities and polytechnic institutes. *Education and Information Technologies*, *25*(6), 5815–5833. https://doi.org/10.1007/s10639-020-10258-5

vom Brocke, J., Baier, S., Schmiedel, T., Stelzl, K., Röglinger, M., & Wehking, C. (2021). Context-Aware Business Process Management: Method Assessment and Selection. *Business Information Systems Engineering*, *63*(5), 533–550.

vom Brocke, J., Mendling, J., & Rosemann, M. (Eds.). (2021). *Business Process Management Cases Vol. 2: Digital Transformation - Strategy, Processes and Execution*. Springer-Verlag GmbH, DE.

vom Brocke, J., Schmiedel, T., Recker, J., Trkman, P., Mertens, W., & Viaene, S. (2014). Ten principles of good business process management. *Business Process Management Journal*, *20*(4), 530–548. https://doi.org/10.1108/BPMJ-06-2013-0074

vom Brocke, J., Simons, A., Riemer, K., Niehaves, Bjoern, Plattfaut, R., & Cleven, A. (2015). Standing on the Shoulders of Giants: Challenges and Recommendations of Literature Search in Information Systems Research. *Communications of the Association for Information Systems*, *37*. https://doi.org/10.17705/1CAIS.03709

vom Brocke, J., Weber, M., Baumgartner, C., Roettcher, A., & Segerlund, S. (2022). Where to Allocate Business Process Management (BPM) in an Organization? Developing the BPM Governance Matrix at Endress+Hauser. *International Business Process Management Conference Industry Forum*.

vom Brocke, J., Zelt, S., & Schmiedel, T. (2016). On the role of context in business process management. *International Journal of Information Management*, *36*(3), 486–495.

von Briel, F., Recker, J., Selander, L., Jarvenpaa, S. L., Hukal, P., Yoo, Y., Lehmann, J., Chan, Y., Rothe, H., Alpar, P., Fürstenau, D., & Wurm, B. (2021). Researching Digital Entrepreneurship: Current Issues and Suggestions for Future Directions. *Communications of the Association for Information Systems*, *48*(1), 284–304. https://doi.org/10.17705/1CAIS.04833

Voss, M. (2012). Impact of customer integration on project portfolio management and its success—Developing a conceptual framework. *International Journal of Project Management*, *30*(5), 567–581. https://doi.org/10.1016/j.ijproman.2012.01.017

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind Jensen, T. (2021). Unpacking the Difference Between Digital Transformation and IT-Enabled Organizational Transformation. *Journal of the Association for Information Systems*, *22*(1), 102–129. https://doi.org/10.17705/1jais.00655

Wit, H. de, & Altbach, P. G. (2021). Internationalization in higher education: global trends and recommendations for its future. *Policy Reviews in Higher Education*, *5*(1), 28–46. https://doi.org/10.1080/23322969.2020.1820898

Wolfswinkel, J. F., Furtmueller, E., & Wilderom, C. P. M. (2013). Using grounded theory as a method for rigorously reviewing literature. *European Journal of Information Systems*, *22*(1), 45–55. https://doi.org/10.1057/ejis.2011.51

Woodall, T., Hiller, A., & Resnick, S. (2014). Making sense of higher education: students as consumers and the value of the university experience. *Studies in Higher Education*, *39*(1), 48–67. https://doi.org/10.1080/03075079.2011.648373

Yin, R. K. (2009). *Case study research: Design and methods* (4th ed.). *Applied Social Research Methods: Vol. 5*. SAGE.

Yoo, Y., Boland, R. J., Lyytinen, K., & Majchrzak, A. (2012). Organizing for Innovation in the Digitized World. *Organization Science*, *23*(5), 1398–1408. https://doi.org/10.1287/orsc.1120.0771

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research Commentary —The New Organizing Logic of Digital Innovation: An Agenda for Information Systems Research. *Information Systems Research*, *21*(4), 724–735. https://doi.org/10.1287/isre.1100.0322

Zapadka, P. (2020). Digital Innovation in Industrial-Age Firms: Managing the Balancing Act of Knowledge Integration. *Proceedings of the European Conference on Information Systems (ECIS)*.

Zhang, H., Gupta, S., Sun, W., & Zou, Y. (2020). How social-media-enabled co-creation between customers and the firm drives business value? The perspective of organizational learning and social Capital. *Information & Management*, *57*(3), 103200. https://doi.org/10.1016/j.im.2019.103200

Zhen, Z., Yousaf, Z., Radulescu, M., & Yasir, M. (2021). Nexus of Digital Organizational Culture, Capabilities, Organizational Readiness, and Innovation: Investigation of SMEs Operating in the Digital Economy. *Sustainability*, *13*(2), 720. https://doi.org/10.3390/su13020720

Zhou, K. Z., Yim, C. K., & Tse, D. K. (2005). The Effects of Strategic Orientations on Technology- and Market-Based Breakthrough Innovations. *Journal of Marketing*, *69*(2), 42–60. https://doi.org/10.1509/jmkg.69.2.42.60756

Zigurs, I., & Buckland, B. K. (1998). A Theory of Task/Technology Fit and Group Support Systems Effectiveness. *MIS Quarterly*, *22*(3), 313. https://doi.org/10.2307/249668

VII. Appendix

1 Index of Research Articles

Research Article #1: What makes Digital Technology? A Categorization based on Purpose

Baier S., Berger S., Kreuzer T., Oberländer A.M., Röglinger M. (2023). What makes Digital Technology? A Categorization based on Purpose. *Communications of the Association of Information Systems, 52*, 332-384. https://doi.org/10.17705/1CAIS.05215

(VHB-JQ3: Category C)

Research Article #2: Conceptualizing Business Process Management Governance Setups

Friedrich F., Kreuzer T., Ritter C., Röglinger M. (2023). Conceptualizing Business Process Management Governance Setups. Submitted to (initial submission): *Information & Management*.

(VHB-JQ3: Category B)

Research Article #3: Four Patterns of Digital Innovation in Times of Crisis

Buck C., Kreuzer T., Oberländer A.M., Röglinger M., Rosemann M. (2022). Four Patterns of Digital Innovation in Times of Crisis. *Communications of the Association of Information Systems 50*, 617-645. https://doi.org/10.17705/1CAIS.05029

(VHB-JQ3: Category C)

Research Article #4: The Effects of Digital Technology on Opportunity Recognition

Kreuzer T., Lindenthal A., Oberländer A.M., Röglinger M. (2022). The Effects of Digital Technology on Opportunity Recognition. *Business Information Systems Engineering 64*, 47-67. https://doi.org/10.1007/s12599-021-00733-9

(VHB-JQ3: Category B)

Research Article #5: Customer-centric Prioritization of Process Improvement Projects

Kreuzer T., Röglinger M., Rupprecht L. (2020) Customer-centric Prioritization of Process Improvement Projects. *Decision Support Systems 133*. https://doi.org/10.1016/j.dss.2020.113286

(VHB-JQ3: Category B)

Research Article #6: Digital Transformation and the New Logics of Higher Education

Kreuzer T., Eymann T., Oberländer A.M., Rosemann M., Watkowski L. (2023). Digital Transformation and the New Logics of Higher Education. Will be submitted to: *European Journal of Information Systems.*

(VHB-JQ3: A)

Research Article #7: Drivers and Barriers of the Digital Innovation Process – Case Study Insights from a German Public University

Kleider E., Kreuzer T., Lösser B., Oberländer A.M., Eymann T. (2021). Drivers and Barriers of the Digital Innovation Process – Case Study Insights from a German Public University. *Business Process Management. BPM 2021. Lecture Notes in Computer Science (Proceedings of the BPM Conference)*, 437–454. https://doi.org/10.1007/978-3-030-85469-0_27

(VHB-JQ3: C)

Research Article #8: A Match Made in Heaven? Empowering Effects of Business Process Management and Digital Innovation Capabilities

Friedrich F., Kreuzer T., Kuch F. (2023) A Match Made in Heaven? Empowering Effects of Business Process Management and Digital Innovation Capabilities. *Proceedings of the 31st European Conference on Information Systems* (2023), Research Paper 227. https://aisel.aisnet.org/ecis2023_rp/227/

(VHB-JQ3: Category B)

2 Individual Contribution to the Research Articles

This thesis is cumulative and comprises and eight research articles representing the main body of work. All articles were developed in teams with multiple co-authors. Thus, this section is to detail the corresponding research settings and outline my individual contributions to each article.

Research article #1: I co-authored this article with four other co-authors (Marie-Sophie Baier, Stephan Berger, Anna Maria Oberländer, Maximilian Röglinger). I had a leading role in developing the overall storyline, which focused on a purpose-related perspective, and in applying this perspective on our results. In addition, I was particular involved in building the theoretical foundation of the study, conducted the analysis of other technology classification, and created the overview of unique combinations of characteristics for each archetype. This allowed me to also take a key role for crafting the introduction, theoretical background, and discussion. Last, I helped the other co-authors in describing our research design in the main paper and appendix and supported the longitudinal analysis as evaluation.

Research article #2: I co-authored this research article with Franziska Friedrich, Christian Ritter, and Maxmilian Röglinger. I helped two of the other co-authors with the data collection and was particularly involved in the analysis and interpretation of the data, as well as the development of the taxonomy. Thereby, all co-authors jointly developed the theoretical lens as the guiding structure of the analysis. I also took a key role in creating the overall storyline, writing the manuscript, and revising it for two re-submissions, for which one other co-author and I created the illustrative cases. So far, I was involved in each part of the research project and will continue to do so after we get feedback from the Information & Management journal.

Research article #3: I co-authored this article with Christoph Buck, Anna Maria Oberländer, Maximilian Röglinger and Michael Rosemann. All co-authors jointly worked on the theoretical foundations that underlie the four patterns and contributed their knowledge on the related theoretical lenses. Two of the co-authors and I were primarily responsible for the collection and initial analysis of data, where each of us contributed an equal number of cases to the data set. I was specifically engaged with conceptualizing the emerging properties, the development of the illustrative cases in the results section, and the creation of the propositions. Overall, I was involved in the writing of every section and all stages of development.

Research article #4: This research article was developed by a team of four co-authors (Thomas Kreuzer, Anna Lindenthal, Anna Maria Oberländer, Maximilian Röglinger). While one co-author initially coded the set of papers, all co-authors jointly analysed the codes, helped to further aggregate them, and ultimately conceptualized the effects as the primary outcome. I was particularly engaged with the theoretical foundation underlying our work. I did a thorough analysis of the literature on (digital) entrepreneurship and opportunity recognition, carved out our understanding of the key constructs, and were hence able to take a leading role in the discussion of our contribution and theoretical implications.

Research article #5: I co-authored this article with Maximilian Röglinger and Lea Rupprecht. I was involved in all stages of developing this research article, from crafting the initial research idea and manuscript to multiple rounds of textual refinement throughout multiple revisions at the Decision Support Systems. I led the overall design science research process, proposed, and refined the design objectives, and developed the components of the decision model. While discussing results with the other two co-authors, I was responsible for the multi-staged evaluation, created the prototype, led the interviews and workshops with the industry experts, and conducted the robustness analysis.

Research article #6: This research article was developed with four co-authors (Torsten Eymann, Anna Maria Oberländer, Michael Rosemann, Laura Watkowski), whereas I was the leading author. Specifically, I gathered the theoretical foundation, led the data collection and analysis, i.e., the three-step coding process, developed the results, and theorized on their implications. Although the research article represents, to a large extent, my work, the other co-authors were involved in each part of the project, contributed their own perspective as a part of the higher education sector, helped to discuss and advance our results, and refined the manuscript.

Research article #7: I co-authored this article with Emil Kleider, Benedict Lösser, Anna Maria Oberländer and Torsten Eymann. While two of the four other co-authors collected the case study data through interviews, I was involved in crafting the initial idea, designing the interview structure, and defining the theoretical lens. Further, I helped with the analysis of coded data, interpretation, as well as development of the drivers and barriers. I also took a key role in writing the manuscript for the initial submission and re-submission after the conditional accept. Throughout, I was involved in each phase of the project.

Research article #8: This article was developed in a team of three co-authors (Franziska Friedrich, Thomas Kreuzer, Felicitas Kuch). I initially came up with the idea to study empowering effects between BPM and DI. We jointly carved out the theoretical foundation for the study, whereafter I was particular involved in the design of our research approach. I helped to structure and detail the challenges of digital process innovation and the DI process, and proposed the studies from which we ultimately drew our set of BPM and DI capabilities. All co-authors jointly discussed the findings from the literature reviews and iteratively developed and refined the empowering effects of BPM and DI capabilities. I was involved in each part of the research project, spanning from the initial submission to the European Conference on Information Systems to refining the manuscript after the conditional accept for re-submission.

3 Research Article #1: What makes Digital Technology? A Categorization based on Purpose

Authors: Baier S., Berger S., Kreuzer T., Oberländer A. M., Röglinger M.

Published in: *Communications of the Association of Information Systems 52*, 332-384
DOI: 10.17705/1CAIS.05215

Abstract: Digital technology (DT) is creating and shaping today's world. Building on its identity and history of technology research, the Information Systems discipline is at the forefront of understanding the nature of DT and related phenomena. Understanding the nature of DT requires understanding its purposes. Because of the growing number of DTs, these purposes are diversifying, and further examination is needed. To that end, we followed an organizational systematics paradigm and present a taxonomic theory for DT that enables its classification through its diverse purposes. The taxonomic theory comprises a multi-layer taxonomy of DT and purpose-related archetypes, which we inferred from a sample of 92 real-world DTs. In our empirical evaluation, we assessed the reliability, validity, and usefulness of the taxonomy and archetypes. The taxonomic theory exceeds existing technology classifications by being the first that (1) has been rigorously developed, (2) considers the nature of DT, (3) is sufficiently concrete to reflect the diverse purposes of DT, and (4) is sufficiently abstract to be persistent. Our findings add to the descriptive knowledge on DT, advance our understanding of the diverse purposes of DT, and lay the ground for further theorizing. Our work also supports practitioners in managing and designing DTs.

Keywords: Digital Technology, Information Technology, Purpose-related Classification, Taxonomy, Taxonomic Theory, Cluster Analysis.

4 Research Article #2: Conceptualizing Business Process Management Governance Setups

Authors: Friedrich F., Kreuzer T., Ritter C., Röglinger M. (2023)

Submitted to: *Information & Management*

Extended Abstract:

Business Process Management (BPM) is a pivotal driver of innovation and operational excellence in the digital age (Kerpedzhiev et al. 2021). In recent years, it has become even more important due to its interplay with digital transformation (Baiyere et al. 2021), and the increasing availability of process data renders process mining a key technology in the digital age (Grisold et al. 2021). Nevertheless, the development of BPM capabilities on the enterprise level still represents a key challenge for organizations, where the establishment of an effective BPM governance (BPM-G) is one important factor (Spanyi 2015; vom Brocke et al. 2022).

BPM-G includes the roles, structures, and methods in organizations that provide guidance, boundaries, and continuity for their BPM activities (Kerpedzhiev et al. 2021). Existing studies find that there is a well of options for designing BPM-G setups (Santana et al. 2011; vom Brocke et al. 2022), e.g., via a BPM centre of excellence (Arsanjani et al. 2015; Rosemann 2015). How an organization combines these design options in its BPM-G setup mostly depends on context factors such as the overarching strategy or targeted purpose of BPM (vom Brocke et al. 2021). To design a BPM-G setup that is appropriate for its context, organizations need to be able to consider relevant dimensions and characteristics that are available to them (vom Brocke et al. 2021). However, a comprehensive conceptualization of BPM-G setups is still missing. Hence, it remains unclear which dimensions constitute BPM-G setups, which characteristics can be chosen and combined (e.g., a mix of decentralized roles with a centralized unit), and which rationales organizations apply when designing their BPM-G setup. This hampers efforts in research and practice to better understand the multi-dimensionality of BPM-G and adopt BPM on the enterprise level. Against this background, we ask the question: How can BPM-G setups be conceptualized?

To address this question, we develop a taxonomy of BPM-G setups (Nickerson et al. 2013) based on interviews with BPM practitioners as well as justificatory knowledge from the BPM-G and organizational design literature. The resulting taxonomy is structured along three organizational tensions as layers: Centralization vs. decentralization (Siggelkow and Levinthal 2003), exploration vs. exploitation (Smith and Tushman 2005), and standardization vs. flexibilization (Howard-Grenville 2005). These tensions were continuously mentioned in the interviews as something that practitioners needed to consider when deciding between alternative characteristics of their BPM-G setup (Gaim et al. 2018). For evaluation, we apply the taxonomy in three illustrative cases, using it as a basis for discussions with practitioners. As a result, we gain an in-depth understanding of the BPM-G setup in each case and

of the rationales that underly design decisions. Overall, our work contributes to the descriptive knowledge of BPM-G and its intersection with organizational design, providing a foundational understanding and an overview of its dimensions and characteristics.

Keywords: Business Process Management Governance, Taxonomy Development, Organizational Design, Organizational Tensions

References

Arsanjani, A., Bharade, N., Borgenstrand, M., Schume, P., Wood, J. K., & Zheltonogov, V. (2015). *Business Process Management Design Guide: Using IBM Business Process Manager* (First edition). *WebSphere handbook series*. IBM Corporation International Technical Support Organization.

Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European Journal of Information Systems*, *29*(3), 238–259.

Gaim, M., Wåhlin, N., e Cunha, M. P., & Clegg, S. (2018). Analyzing competing demands in organizations: a systematic comparison. *Journal of Organization Design*, *7*(1).

Grisold, T., vom Brocke, J., Gross, S., Mendling, J., Röglinger, M., & Stelzl, K. (2021). Digital Innovation and Business Process Management: Opportunities and Challenges as Perceived by Practitioners. *Communications of the Association for Information Systems*, *49*(1), 556–571.

Howard-Grenville, J. A. (2005). The Persistence of Flexible Organizational Routines: The Role of Agency and Organizational Context. *Organization Science*, *16*(6), 618–636.

Kerpedzhiev, G. D., König, U. M., Röglinger, M., & Rosemann, M. (2021). An Exploration into Future Business Process Management Capabilities in View of Digitalization. *Business & Information Systems Engineering*, *63*(2), 83–96.

Nickerson, R. C., Varshney, U., & Muntermann, J. (2013). A Method for Taxonomy Development and its Application in Information Systems. *European Journal of Information Systems*, *22*(3), 336–359.

Rosemann M. (2015). The Service Portfolio of a BPM Center of Excellence. In: J. vom Brocke, M. Rosemann (eds) *Handbook on Business Process Management 2*: (pp. 267-284), Springer Berlin Heidelberg.

Santana, A. F. L., Alves, C. F., Santos, H. R. M., & Lima Cavalcanti Felix, A. de. (2011). BPM Governance: An Exploratory Study in Public Organizations. In T. Halpin, S. Nurcan, J. Krogstie, P. Soffer, E. Proper, R. Schmidt, & I. Bider (Eds.), *Enterprise, Business-Process and Information Systems Modeling. BPMDS EMMSAD 2011 2011. Lecture Notes in Business Information Processing* (Vol. 81, pp. 46–60). Springer Berlin Heidelberg.

Smith, W. K., & Tushman, M. L. (2005). Managing Strategic Contradictions: A Top Management Model for Managing Innovation Streams. *Organization Science*, *16*(5), 522–536.

Spanyi, A. (2015). The Governance of Business Process Management. In J. vom Brocke & M. Rosemann (Eds.),. *Handbook on Business Process Management 2* (2nd ed., pp. 333–349). Springer Berlin Heidelberg.

vom Brocke, J., Baier, M.-S., Schmiedel, T., Stelzl, K., Röglinger, M., & Wehking, C. (2021). Context-Aware Business Process Management: Method Assessment and Selection. *Business Information Systems Engineering*, *63*(5), 533–550

vom Brocke, J., Weber, M., Baumgartner, C., Roettcher, A., & Segerlund, S. (2022). Where to Allocate Business Process Management (BPM) in an Organization? Developing the BPM Governance Matrix at Endress+Hauser. *International Business Process Management Conference Industry Forum*.

5 Research Article #3: Four Patterns of Digital Innovation in Times of Crisis

Authors: Buck C., Kreuzer T., Oberländer A. M., Röglinger M., Rosemann M.

Published in: *Communications of the Association of Information Systems 50,* 617-645
DOI: 10.17705/1CAIS.05029

Abstract: Exogenous shocks, such as COVID-19, significantly change fundamental premises on which economies and individual organizations operate. The light-asset nature of digital technologies provides the potential to not only facilitate an immediate crisis response, but also to catalyze novel innovation types to address the societal and economic changes caused by exogenous shocks. As digital innovation became a relevant part of organizations' COVID-19 responses and given that a corresponding structured knowledge base did not exist, we found the need to better understand crisis-driven digital innovation. Drawing on prior knowledge from crisis management and organizational ambidexterity as a theoretical lens, we present four patterns of crisis-driven digital innovation, classified along two dimensions: (1) driven by a sense of urgency or ambition and (2) focusing on exploitative or explorative innovation. Based on a thorough analysis of digital innovation cases during the COVID-19 crisis, we illustrate and discuss these four patterns and their emerging properties to explain how and why they led to digital innovation in the context of the crisis. Our work contributes to the explanatory knowledge on digital innovation in times of crisis, helping researchers and practitioners to understand and develop digital innovation in response to exogenous shocks.

Keywords: Digital Innovation, Innovation Patterns, Organizational Ambidexterity, Crisis Management, Sense of Urgency, Sense of Ambition, COVID-19

6 Research Article #4: The Effects of Digital Technology on Opportunity Recognition

Authors: Kreuzer T., Lindenthal A., Oberländer A.M., Röglinger M.

Published in: *Business Information Systems Engineering 64*, 47-67
DOI: 10.1007/s12599-021-00733-9

Abstract: Recognizing opportunities enabled by digital technology (DT) has become a competitive necessity in today's digital world. However, opportunity recognition is a major challenge given the influence of DT, which not only disperse agency across various actors, but also blur boundaries between customers, companies, products, and industries. As a result, traditional entrepreneurship knowledge needs to be rethought and the effects of DT on opportunity recognition need to be better understood. Drawing from opportunity recognition theory – as one of the central theories in the entrepreneurship domain – this study builds on a structured literature review to identify and explain three direct as well as three transitive effects of DT on opportunity recognition. These effects have been validated with real-world cases as well as interviews with academics and practitioners. In sum, this study contributes to descriptive and explanatory knowledge on the evolution from traditional to digital entrepreneurship. As a theory for explaining, the findings extend opportunity recognition theory by il-luminating how and why DT influences opportunity recognition. Thereby, re-search and practice are supported in investigating and managing opportunities more effectively.

Keywords: Opportunity Recognition, Digital Entrepreneurship, Digital Technology, Digital Technology Effects, Digital Innovation.

7 Research Article #5: Customer-centric Prioritization of Process Improvement Projects

Authors: Kreuzer T., Röglinger M., Rupprecht L.

Published in: *Decision Support Systems 133*
DOI: 10.1016/j.dss.2020.113286

Abstract: Today, customers can conveniently compare products and decide how to interact with companies. With customer centricity becoming an important success factor, companies must drive customer satisfaction not only through excellent products but also through customer-centric processes. As many companies face an abundance of action possibilities, fast-changing customer needs, and scarce resources, guidance regarding the customer-centric prioritization of process improvement projects is in high need. As existing approaches predominantly focus on process efficiency, we propose a decision model that accounts for the effects of process improvement on customer centricity in line with justificatory knowledge on value-based process decision-making, project portfolio selection, and the measurement of customer satisfaction. When building the decision model, we adopted the design science paradigm and used multi-criteria decision analysis as well as normative analytical modeling as research methods. We evaluated the model by discussing it with practitioners, by building a software prototype, and by applying it at a German insurance company. Overall, our research extends the prescriptive knowledge on process prioritization and customer process management.

Keywords: Business Process Management; Business Process Improvement; Process Decision-Making, Customer Centricity; Project Portfolio Selection; Kano Model

8 Research Article #6: Digital Transformation and the New Logics of Higher Education

Authors: Kreuzer T., Eymann T., Oberländer A. M., Rosemann M., Watkowski L.

To be submitted to: *European Journal of Information Systems*

Extended Abstract:

Universities are the most numerous providers of higher education and key to sustaining our modern knowledge society (Ashour, 2020). To fulfil this role, they have traditionally applied three fundamental higher education logics (i.e., dominant ways of thinking – assumptions, practices, and values (Baiyere et al., 2020)) to teaching and learning: (1) mass production (Marginson, 2016), i.e., easily scalable 'one-to-many' classroom settings; (2) provider-centric control (Sadler, 2012), i.e., university actors deciding what to teach; and (3) students as consumers (Woodall et al., 2014), i.e., the view of students as rather passive recipients of knowledge.

In recent times, teaching and learning at universities have been subject to the influence of an environment that is in constant flux driven by digitalization (Benavides et al., 2020). Digital natives as learners bring in high expectations for proactive and personalized services (Lacka & Wong, 2021), and advances in digital technology diversify content creation and consumption (Oliveira et al., 2021). Further, universities witness a swift expansion of digitally accessible knowledge while experiencing a decline in the longevity of its relevance (Platonova et al., 2022). As a response, many universities have started to pursue digital transformation (Benavides et al., 2020), in which they face two key obstacles. First, the outlined environmental changes are challenging the fundamental logics of teaching and learning. While new logics of organizing or value creation are a known outcome of digital transformation (Wessel et al., 2021), establishing new logics is a difficult process in which actors must cope with deep structural changes (Baiyere et al., 2020). Second, the assumption in the literature that knowledge about digital transformation can be applied to any context is insufficient, considering that much of the research focuses on the private sector or government agencies in the public sector.

To address this issue, we take a logic perspective on the digital transformation in higher education. Logics are theoretical constructs that can be applied to different contexts and at multiple levels of analysis and have proven their value in information systems research to make sense of technology-related change (Baiyere et al., 2020). The logic perspective therefore provides a unique theoretical lens for analysing how digital transformation affects the existing ways of thinking in teaching and learning in terms of "taken-for-granted assumptions, value systems, and related practices" (Baiyere et al., 2020, p. 239). Thus, we ask the question: How do higher education logics change because of digital transformation?

To address this question, we draw on a comparative case study of the digital transformation at a German and an Australian public university, Alpha and Beta. We build on primary data from interviews, secondary data

from confidential as well as publicly available documents, and a longitudinal perspective based on our own experiences as academics at both institutions. We find that digital transformation triggers three shifts in higher education logics related to the *process*, *control*, and *actors* in teaching and learning: from mass production to *mass personalization*; from provider-centric to *student-centric*; from students as consumers to *students as prosumers*. The logic shifts manifest in six conceptual themes of digital transformation that encapsulate how both universities empower their value creation with digital technology. Researchers can build on our results to further explore digital transformation in the higher education sector, but we also call for them to adopt a logic perspective to study digital transformation in other contexts.

Keywords: Digital Transformation; Higher Education; Logic Perspective; Comparative Case Study

References

Ashour, S. (2020). Quality higher education is the foundation of a knowledge society: where does the UAE stand? *Quality in Higher Education*, *26*(2), 209–223. https://doi.org/10.1080/13538322.2020.1769263

Baiyere, A., Salmela, H., & Tapanainen, T. (2020). Digital transformation and the new logics of business process management. *European Journal of Information Systems*, *29*(3), 238–259. https://doi.org/10.1080/0960085X.2020.1718007

Benavides, L. M. C., Tamayo Arias, J. A., Arango Serna, M. D., Branch Bedoya, J. W., & Burgos, D. (2020). Digital Transformation in Higher Education Institutions: A Systematic Literature Review. *Sensors*, *20*(11). https://doi.org/10.3390/s20113291

Lacka, E., & Wong, T. C. (2021). Examining the impact of digital technologies on students' higher education outcomes: the case of the virtual learning environment and social media. *Studies in Higher Education*, *46*(8), 1621–1634. https://doi.org/10.1080/03075079.2019.1698533

Marginson, S. (2016). The worldwide trend to high participation higher education: dynamics of social stratification in inclusive systems. *Higher Education*, *72*(4), 413–434. https://doi.org/10.1007/s10734-016-0016-x

Oliveira, G., Grenha Teixeira, J., Torres, A., & Morais, C. (2021). An exploratory study on the emergency remote education experience of higher education students and teachers during the COVID-19 pandemic. *British Journal of Educational Technology : Journal of the Council for Educational Technology*, *52*(4), 1357–1376. https://doi.org/10.1111/bjet.13112

Platonova, R. I., Khuziakhmetov, A. N., Prokopyev, A. I., Rastorgueva, N. E., Rushina, M. A., & Chistyakov, A. A. (2022). Knowledge in digital environments: A systematic review of literature. *Frontiers in Education*, *7*, Article 1060455. https://doi.org/10.3389/feduc.2022.1060455

Sadler, I. (2012). The challenges for new academics in adopting student-centred approaches to teaching. *Studies in Higher Education*, *37*(6), 731–745. https://doi.org/10.1080/03075079.2010.543968

Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind Jensen, T. (2021). Unpacking the Difference Between Digital Transformation and IT-Enabled Organizational Transformation. *Journal of the Association for Information Systems*, *22*(1), 102–129. https://doi.org/10.17705/1jais.00655

Woodall, T., Hiller, A., & Resnick, S. (2014). Making sense of higher education: students as consumers and the value of the university experience. *Studies in Higher Education*, *39*(1), 48–67. https://doi.org/10.1080/03075079.2011.648373

9 Research Article #7: Drivers and Barriers of the Digital Innovation Process: Case Study Insights from a German Public University

Authors: Kleider E., Kreuzer T., Lösser B., Oberländer A. M., Eymann T.

Published in: *Business Process Management. BPM 2021. Lecture Notes in Computer Science (Proceedings of the BPM Conference)*, 437–454.
DOI: 10.1007/978-3-030-85469-0_27

Abstract: Due to growing digital opportunities, persistent legislative pressure, and re-cent challenges in the wake of the COVID-19 pandemic, public universities need to engage in digital innovation (DI). While society expects universities to lead DI efforts, the successful development and implementation of DIs, particularly in administration and management contexts, remains a challenge. In addition, research lacks knowledge on the DI process at public universi-ties, while further understanding and guidance are needed. Against this backdrop, our study aims to enhance the understanding of the DI process at public universities by providing a structured overview of corresponding drivers and barriers through an exploratory single case study. We investigate the case of a German public university and draw from primary and secondary data of its DI process from the development of three specific digital pro-cess innovations. Building upon Business Process Management (BPM) as a theoretical lens to study the DI process, we present 13 drivers and 17 barriers structured along the DI actions and BPM core elements. We discuss corresponding findings and provide related practice recommendations for public universities that aim to engage in DI. In sum, our study contributes to the explanatory knowledge at the convergent interface between DI and BPM in the context of public universities.

Keywords: Digital Innovation, Digital Innovation Process, Process Innovation, Public University, Case Study

10 Research Article #8: A Match Made in Heaven? Empowering Effects of Business Process Management and Digital Innovation Capabilities

Authors: Friedrich F., Kreuzer T., Kuch F.

Published in: *Proceedings of the 31st European Conference on Information Systems (ECIS)*, Research Paper 227
Link: https://aisel.aisnet.org/ecis2023_rp/227/

Abstract: Business Process Management (BPM) and Digital Innovation (DI) are at the forefront of understanding and shaping organizational change in the digital age. Yet BPM still struggles to fully embrace an opportunity-driven mindset while DI is rarely institutionalized as a structured process. To overcome challenges, combining efforts of both domains promises great benefits. Hence, we take a dialectic view on the intersection of BPM and DI and conduct two structured literature reviews to derive eight empowering effects of BPM and DI capabilities on Digital Process Innovation and the DI Process. Drawing from dialectic theory, our study contributes to the descriptive and explanatory knowledge on BPM and DI, answering calls to advance research at their intersection. Our findings provide a basis for further theorizing and insights on how existing knowledge on BPM and DI can inform research at their intersection. Practitioners can use our results to synergize their BPM and DI capabilities.

Keywords: Business Process Management, Digital Innovation, Capabilities, Dialectic Theory