Jens Dibbern · Jens Förderer ·
Thomas Kude · Franz Rothlauf ·
Kai Spohrer _Editors_

Digitalization Across Organizational Levels

New Frontiers for Information Systems Research

Springer

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Preface

We have edited this book in honor of Prof. Dr. Armin Heinzl to celebrate his 60th birthday. We feel deeply indebted to Armin, who served as our academic advisor and supporter during our own academic careers. Clearly, Armin has had a tremendous impact on our academic careers.

In the tradition of a "Festschrift", we invited all of Armin's former Ph.D. students, who continued in academia afterward, to contribute to this book. Moreover, we invited contributions from three outstanding academics who have been influencing and accompanying Armin's work and life since the early days of his career, namely Wolfgang König (advisor and reviewer of Armin's dissertation and habilitation), Rudy Hirschheim, and Dorothy Leidner. The result is an edited book consisting of 11 chapters. Each chapter sheds light on the topic of digitalization from different perspectives and focuses on different emergent digitalization phenomena. Accordingly, we entitled the book "Digitalization Across Organizational Levels", with the subtitle *New Frontiers for Information Systems Research*. The title of the book resonates with Armin's impressive research output, which he has generated since he entered the academic field as a doctoral student in 1986 at the WHU Koblenz.

Throughout his career, Armin has published numerous groundbreaking articles and books which were often far ahead of their time. As one of the pioneers in the research area, Armin studied IS outsourcing and related IT management questions in his doctoral and habilitation theses (published in 1991 and 1996). Already at that time, Armin went beyond what we would today consider traditional IS research questions to also study forward-looking IT-related challenges, e.g., on the evolution of IS. Besides his interest in organizational phenomena related to IS, he also developed interest in emergent technologies in practically relevant contexts, e.g., applying agent technology for patient scheduling in hospitals or using genetic algorithms for optimizing flight schedules. Building on these earlier contributions, Armin has always worked at the forefront of IS research and pushed the frontiers, e.g., in the context of implications of digital technology for individuals or on digital ecosystems. For Armin, it is always essential that his research creates impact and is relevant for societies, organizations, and individuals. He considers adhering to the

highest standards of scientific rigor not as a goal in and of itself, but as a matter of course and a necessary condition for conducting high-quality research. Armin has never engaged in a research project just for the sake of publishing, but only if he saw value. In this light, his list of publications, which is filled with articles in our discipline's top-ranked outlets and highly cited papers, is all the more impressive.

In his teaching, Armin was equally visionary as in his research. The strategic importance of IS—as opposed to representing a mere secondary function within organizations that would support business—has been a key pillar of Armin's courses from the beginning of his career. Armin also recognized the value of new digital technologies, such as mobile computing or predictive analytics, early on and included them in his classes. Thus, Armin's students would learn about digital transformation long before it made the news, and his courses continue to be at the forefront of digital innovation. Armin's pedagogical approach is characterized by innovation and participant focus, both in his courses and in building new programs and institutions, as evidenced by his role in the foundation of the Mannheim Business School and its Digital Academy. Another important element of Armin's pedagogical activities—from which we all benefited tremendously—is doctoral education. He has also served in various roles for the key business administration and IS associations in Germany. For instance, he served as the junior scholars' chairman ("Nachwuchsobmann") of the German-speaking IS community for many years and used this role to establish yearly meetings among the IS postdocs of the German-speaking countries. This portrays his strong interest in supporting junior scholars and in helping the IS discipline flourish throughout his entire career.

Armin has always been highly active in terms of community services and in setting the German IS discipline on a course toward global relevance. He built bridges and took various roles in our primary IS journals and conferences. For instance, Armin has served as the vice editor-in-chief of *Business & Information Systems Engineering*, the flagship journal of the German-speaking IS community. In this role, he opened the journal—still called *WIRTSCHATFSINFORMATIK* at the time—to the international IS community by introducing English as a secondary and eventually as the primary journal language. He co-organized and co-chaired various workshops and conferences, among them the International Conference on the Outsourcing of Information Services (ICOIS in 2001 2007, 2013, and 2019), sponsored by partners from the IT services industry, and the International Conference on Information Systems at Fort Worth, Texas, in 2015. Armin has also been a great contributor to the national and international impact of IS. He initiated and participated in various individual and collaborative research projects funded by industry and agencies at the federal (DFG, BMBF) and state levels, such as in Bavaria (e.g., FORWIN) and Baden-Württemberg (e.g., CollaBaWü, Cloud Mall BW).

We are grateful that we have had and continue to have Armin as our mentor and advisor. We have always appreciated his ambition, leadership, kindness, and humor, and we look forward to working with him on research projects and spending time with him in the years to come.

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Contents

Part I
Introduction

Studying Digitalization Across Levels: An Overview and Introduction

Thomas Kude and Jens Dibbern

Abstract Advances in digital technologies have significantly increased the speed of digitalization in the new millennium. Such digitalization occurs across various levels, such as the individual, team, organization, and ecosystem levels. This paper seeks to provide an overview of how information systems (IS) research addresses digitalization phenomena across different levels. Thereby, it distinguishes between two interrelated perspectives: one referring to the management of IS and digital transformation; the other relating to the design of digital artifacts and the implications arising from their application and use, i.e., IS impacts. The respective digitalization research streams are illustrated with examples from past and current IS research.

1 Introduction

The past decade has witnessed tremendous changes of the capabilities and roles of information systems (IS) in organizations. Information systems—which are located at the intersection of information technology (IT), people, and tasks (Heinrich et al., 2011; Davis & Olson, 1985)—have long played a crucial role for organizations. Traditionally, the management of IS used to be a secondary function in organizations, whose role was to support the business side in creating value (Porter, 1985). This supportive role can be characterized from a technological perspective, in terms of the systems in place to support business, and from an organizational perspective, in terms of the related organizational challenges (Markus & Robey, 1988).

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From a technological perspective, IS management has often been concerned with enterprise systems, such as enterprise resource planning (ERP) systems (Dibbern et al., 2002; Heinzl & Brehm, 2006; Brehm et al., 2001) or knowledge management systems (Alavi & Leidner, 2001). From an organizational perspective, key concerns of IS management have included sourcing decisions and IT governance (Heinzl, 1991, 1996; Weill, 2004). Given the high complexity and cost of IS services, as well as the lack of human resources, the question of whether to outsource IS services or provide them in-house has been a critical one (Heinzl, 1991, 1996). While questions related to outsourcing focus on whether the service is provided in-house or through the market, organizations have implemented IT governance frameworks to specify decision rights and accountabilities and ensure desirable behavior in the use of IT (Weill, 2004) and thereby enable alignment between IT and business (Luftman & Brier, 1999).

While these systems and organizational challenges remain highly relevant and have often become even more critical, the role of IS management has evolved as a result of recent technological developments. Various innovations, e.g., in terms of sensor and communication technology, have contributed to the ubiquity of technological devices such as smart phones. The resulting data, along with advances in computing power and algorithms, have made machine learning a viable technology that is now widely used across industries (Bichler et al., 2017), such as manufacturing or health care (Jussupow et al., 2021b). As another example, Blockchain technology is making its way into organizational applications, for instance, in the context of the digitalization of supply chains or the Internet of Things (Risius & Spohrer, 2017).

Given these technological developments, the role of IS management—once focused mostly on the reliable provision of enterprise systems to support business—has expanded considerably. Digital technology has evolved from tools to support value creation to also become a substantial part of the value itself, as products and services are partly or even entirely digitalized. For example, whereas banking services used to be provided in physical branches or through ATMs, these branches lose importance for most people, as banking services are often consumed through apps and payments are made electronically, e.g., through platforms like Ant Financial. As another example, the media industry shifted from newspapers or DVDs to digital content and video streaming, resulting in struggles for previously flourishing companies such as Blockbuster.

To digitally transform and remain successful despite digital disruptions, incumbent organizations need to adjust their business models and their operating models (Venkatraman, 2017). From a business model perspective, incumbent organizations increasingly need to find their place in digital ecosystems consisting of digital giants such as Apple or Alibaba, numerous technology entrepreneurs, and other incumbent organizations. From an operating model perspective, organizations need to move away from traditional hierarchies to enable agility and digital innovation. In the next section, we discuss how the evolution of IS management in organi-

zations is reflected by changing research foci in the Information Systems (IS)[1] discipline.

2 The Evolution of Information Systems Research Across Organizational Levels

Reflecting on the evolution of IS research has been an important issue in the IS discipline (Alavi & Carlson, 1992; Somogyi & Galliers, 1987; Galliers, 1993; Heinzl, 1996). Here we reflect on research on digitalization and the associated evolution of IS management within organizations focusing on key research themes that have been studied in academic research in the IS discipline. This is illustrated in Fig. 1, which shows exemplary IS research questions pertaining to two broad categories—the management of IS and digital transformation (on the left) and the design and implications of digital artifacts (on the right). The questions are situated on different organizational levels, from teams and individuals, over intra- and inter-organizational levels, to the level of digital ecosystems (see dark grey triangle in the center of Fig. 1).

The evolution of major themes in IS research is depicted in Fig. 1 through the light grey arrows connecting the different levels and themes in a circular way. In line with the role of IS in organizations as a secondary, supportive function, the focus of early research on IS management has often been at the intra- and inter-organizational levels.[2] In light of the changes outlined above—most notably that incumbent organizations are increasingly embedded in digital ecosystems and rely on agile teams to develop digital innovation—IS research on the management of IS and digital transformation has expanded from the intra- and inter-organizational level to digital ecosystems at a higher organizational level and to teams and individuals at a lower organizational level.

In tandem with the study of questions on how to manage IS and digital transformation, IS research has also examined the design and implications of digital artifacts as well as broader questions related to the industry and regulatory context. Importantly, the circular arrows in Fig. 1 are not meant to propose a rigid process that would connect research across organizational levels and themes in a deterministic way. Instead, the arrows illustrate that IS research streams across levels of analysis and genres constantly influence and fertilize each other. For example, technological advancements and the digital transformation of organizations raise

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[1] We follow an inclusive view of the IS discipline, comprising the business & information systems engineering ("Wirtschaftsinformatik" in German) discipline with its origins at the intersection of management and computer science as well as the more management oriented IS field originating from business schools (Heinrich et al., 2011).

[2] Beyond IS management, a major research stream of traditional IS research was concerned with the use of IS at the individual level (Burton-Jones et al., 2017).
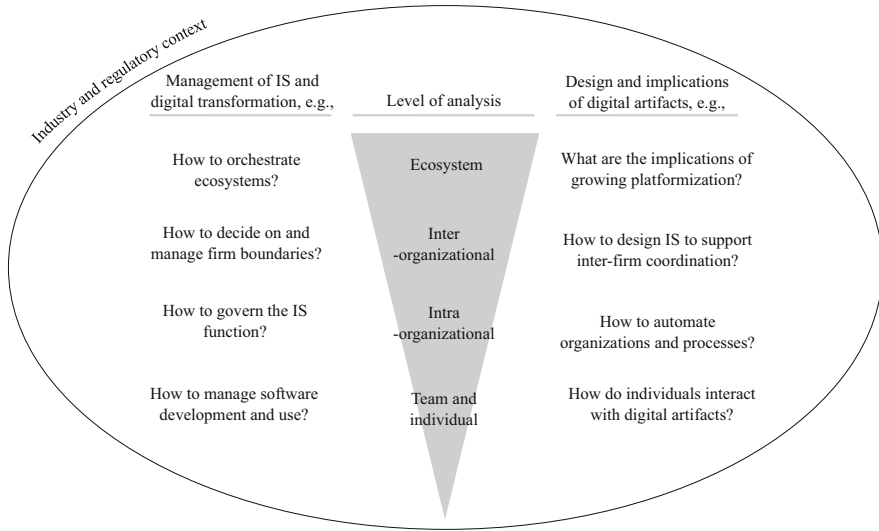
Fig. 1 Overview of levels of analysis and exemplary research questions

important novel questions for the established literature stream on IS outsourcing (Hirschheim et al., 2020). The evolution of these different streams is outlined next, with some illustrative examples of notable research work.[3]

As noted above, mirroring some of the enduring challenges of IS management in practice, IS research has often studied questions at the intra- and inter-organizational levels. At the intra-organizational level, the question of how to govern the IS function has received particular attention by IS researchers. For instance, Kude et al. (2018) studied regulation-oriented and consensus-oriented IT governance capabilities and their impact on IT-based synergies. Based on an exploratory field study that included interviews with CIOs and other IT executives, the authors propose that IT governance capabilities lead to IT-based synergies through IT relatedness and business process relatedness. At the intra-organizational level, the question of how to decide on and manage firm boundaries has often taken center stage (Dibbern & Heinzl, 2009; Dibbern et al., 2008, 2012; Winkler et al., 2009; Heinzl, 1991, 1996). For example, Dibbern et al. (2008) examined variations in client extra costs across offshored IS development and maintenance projects. The authors integrated transaction-cost and knowledge-based arguments to develop a theoretical framework, which was empirically corroborated based no qualitative data from six projects in a large German financial services institution. The findings show that different types of client extra costs arise after contractual agreements

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[3] In keeping with the goal of this book to honor the research contributions of Armin Heinzl, as well as his comprehensive works covering various parts of the framework in Fig. 1, we specifically draw on his contributions to illustrate research streams across levels of analysis and genres.

have been made, and that these extra costs are particularly high in projects where a large amount of client-specific knowledge is required. Notably, these costs are less caused by the threat of opportunistic behavior—as transaction-cost arguments would predict—but rather by the efforts associated with knowledge transfer, i.e., in line with knowledge-based reasoning.

With technological advances and the increasing ubiquity of technology across industries, IS researchers have also long been interested in the management of IS and digital transformation at the team and individual level. This stream of research did not only include IS use—a long-time mainstream of the IS discipline (Burton-Jones et al., 2017)—but also IS development, in particular following the widespread reliance on agile software development methodologies in practice (Kude et al., 2019; Scheerer et al., 2013, 2015; Gholami & Heinzl, 2013; Bick et al., 2017; Hildenbrand et al., 2008). For instance, Kude et al. (2019) examined how applying the agile practice of pair programming in software development teams contributes to team performance. In particular, the authors hypothesize that pair programming helps teams to establish shared understanding and backup behavior, which is particularly beneficial if task novelty is high. The hypotheses are corroborated through a survey study of software development teams at a large enterprise software firm.

One key element of digital transformations is that organizations are increasingly embedded in digital ecosystems, as opposed to being monolithic entities with clear-cut boundaries. Given the important role of digital platforms in this context, studying the orchestration of platform ecosystems has become an important stream in the IS literature (e.g., Foerderer et al., 2018b, 2019, 2021; Halckenhäußer et al., 2020; Kude et al., 2012; Arndt et al., 2009). One particular focus in this research was the software industry, for instance, in terms of enterprise software platforms (Foerderer et al., 2019) or mobile operating systems (Foerderer et al., 2018b). Much of this work has focused on questions around platform governance (Halckenhäußer et al., 2020; Hurni et al., 2022; Huber et al., 2017), such as the implications of competing with app developers (Foerderer et al., 2018b) or the question of how to enable complementors to develop add-on functionality (Foerderer et al., 2019).

Since its inception, IS research has not only focused on improving our understanding of phenomena related to the management of IS (see left hand side of Fig. 1) but has also studied the design and implications of digital artifacts (see right hand side of Fig. 1). Often, this work has focused on the individual and team level as well as the intra-organizational level. At the individual and team level, research often followed a design-science approach (Hevner et al., 2004) and developed solutions for teams and individuals to collaborate, for instance, in the context of software development teams (Geisser et al., 2007; Hildenbrand et al., 2009). Another stream of research studied the implications of the ubiquity of digital artifacts on individual users (Jussupow et al., 2018, 2020; Seeger et al., 2021; Fallon et al., 2019; Spohrer et al., 2021; Neben et al., 2015). For example, Seeger et al. (2021) examined the interaction of human actors and human-like conversational agents. Drawing on the psychological theory of anthropomorphism the authors developed and tested—through an online experiment—a theoretical framework on the design of human-like chatbots.

At the intra-organizational level, IS research was often interested in the question of how to automate organizations and processes in various industries. For instance, prior work studied the design and the implications of digital artifacts for organizations in the health care sector (Jussupow et al., 2021a; Paulussen et al., 2013; Denz et al., 2008; Baumgart et al., 2007), the software industry (Stuckenberg et al., 2014), the aviation industry (Grosche et al., 2001, 2007), the construction sector (Deibert et al., 2009), or for financial services organizations (Schoberth et al., 2003, 2006).

At the inter-organizational and ecosystem levels, IS researchers have also been interested in the design and implications of digital artifacts. For instance, in one stream of IS research, studies have looked at the question of how inter-firm coordination in the software industry can be supported through digital artifacts (Hoffmann et al., 2019; Kramer et al., 2017; Klimpke et al., 2014). At the ecosystem level, researchers have started to turn attention to the implications of platformization across industries (Foerderer et al., 2022). These questions go beyond particular platform ecosystems, such as Apple's or Google's mobile operating ecosystems, to include the wider industry level and questions of regulation that policymakers are interested in (Foerderer et al., 2018a, see large circle in Fig. 1).

3 Contributions in This Book

The book is structured into six parts and 11 chapters, starting with this introductory chapter (Part I) that introduces a multi-level perspective of research on digitalization and that provides an overview of the book. The overview includes a summary of the subsequent 10 chapters organized into five parts (Parts II–VI). Each part addresses different perspectives as introduced in the framework depicted in Fig. 1.

Part II, including the chapters on "The Early History of IT Outsourcing: A Personal Reflection" and "How to Ensure Collective Action in Multinational Projects: Insights from the EurHisFirm Project", is dedicated to the inter-organizational perspective. The digitalization and digital transformation of organizations often involve the inclusion of multiple parties (Dibbern & Rudy, 2020). The parties involved may be organized differently. One widely established form refers to contract-based client-vendor IT outsourcing arrangements (Dibbern et al., 2004; Kern & Willcocks, 2002). Another form refers to coalitions of multiple organizations with shared interests, such as in a multi-party project that seeks to achieve a common goal (Malhotra et al., 2001). Yet another form may be characterized as a hybrid organizational arrangement (Borys & Jemison, 1989), such as a multi-vendor outsourcing arrangement, that relies on formal contracts between the client and its vendors, while also seeking to achieve a common objective (Krancher et al., 2022). In the following two chapters, the authors share their experiences and provide reflections on two of these organizational forms, the first on the history of IT outsourcing and the second on the challenges of achieving collective action in a multi-party transnational IT project.

In the chapter "The Early History of IT Outsourcing: A Personal Reflection", Rudy Hirschheim reflects on the history of IT outsourcing and how it has changed over time. He attributes its beginnings to the early 1990s, when the first multi-billion-dollar IT outsourcing deals created quite a stir in the IS community. It did not take long until IS research recognized the importance of this new phenomenon, which led to a significant stream of IS outsourcing research that continues to evolve and grow. Rudy Hirschheim, together with Mary Lacity, were among the pioneers in researching IS outsourcing in the U.S. (Lacity & Hirschheim, 1993a, b), in the same vein as Leslie Willcocks (U.K.) and Armin Heinzl (Germany) were among the academic trailblazers in Europe (Willcocks et al., 1995; Heinzl & Stoffel, 1991; Heinzl, 1991, 1993). Soon on, IS outsourcing had become a global phenomenon that went through various stages (or waves), which are described and reflected on by Rudy Hirschheim in his introductory chapter. Following the idea of waves, IT outsourcing may also be seen as a forerunner of many related phenomena of the division of labor among organizations in the digitalization process, among them the emergence of IT as a service (via the cloud), crowdsourcing, open-source communities, and (digital) platform ecosystems.

It is also notable that not only organizations, but also countries and their governments increasingly realize the need of spanning together in addressing digitalization challenges that cannot be addressed by individual actors alone. Often, such collective digitalization challenges arise from organizational interdependencies and network effects in exploiting the benefits of digital assets, such as shared IT infrastructures and pooled data.

In the chapter "How to Ensure Collective Action in Multinational Projects: Insights from the EurHisFirm Project", Wolfgang König, Muriel Frank, Jefferson Braswell, Lukas Ranft and Pantelis Karapanagiotis, reflect on such a challenge of ensuring collective (as opposed to individual) action in a transnational multi-party project. As such, they take the exemplary case of EurHISFirm as a basis (https://eurhisfirm.eu). EurHISFirm is a project funded by the European Union's Horizon 2020 research and innovation program. Its key objective is to provide an open-access platform for company-level data in Europe, as a basis for researchers, policymakers, and other stakeholders for the purpose of data analysis. As such, various IT artifacts (e.g., a common data model) have to be developed collaboratively across the various involved parties. König et al. present their lessons learned from this project as participants and observers of the project, thereby shedding light on the challenges of collective action among organizations and European states.

The third part of this book (*Part III*) zooms into two issues that colloquially are often referred to as "soft factors" when it comes to understanding digitalization processes and capabilities. Both are closely linked to the individual perspective, acknowledging the human factor in IS. The first paper falling into this category addresses the role of culture in the context of knowledge management systems; the second the role of gender, specifically the role of females in taking on IT careers.

In the chapter "A Theory of Organizational Information Culture", Dorothy Leidner develops a theory that recognizes the role of culture as an often-overlooked aspect in the design, implementation, and use of knowledge management systems.

Specifically, she introduces the notion of information culture as complementary to widely established concepts of individual and organizational culture. As such, she distinguishes four information cultures, i.e., information hoarding, selective information sharing, random information sharing, and full information sharing. Her theory elaborates on the implications of these different information cultures for the sharing of tacit knowledge and how individual and organizational cultures influence such different information cultures towards the sharing of tacit knowledge.

In the chapter "IT or Not IT? A Female View on Inhibiting and Promoting Factors in Young Women's Decisions for a Career in IT", Birte Malzahn, Jessica Slamka, and Daniela Scheid problematize and analyze the digital gender gap in higher IT education, specifically the underrepresentation of women in IT-related courses of study, such as computer science. They argue that the digital gender gap has its roots in differences as to how females experience and get in contact with IT education throughout different phases of their life, i.e., the growth and exploration phases, which then influences their initial decision for an occupation qualification (IT- or non-IT-related). In each phase, they analyze the inhibiting and promoting factors and approaches.

The fourth part of the book (*Part IV*) zooms out to the IT platform and ecosystem perspective. Digital platforms and platform ecosystems may be seen as combinations of technical, organizational, and partly social innovations (Gawer & Cusumano, 2014; Tiwana, 2014). On the technical side, the Internet has provided the basis for a more networked economy, in that it enabled easy access to and sharing of digital (and digitalized) resources, such as data, information, content, software, hardware storage, and processing power. Internet-based architectural innovations (e.g., service-oriented architectures, web services, or application programming interfaces) and other innovations, e.g., in scaled data base management, distributed computing, and cryptography (just to name a few), provide the basis for emerging technology platforms, such as cloud computing infrastructures, or, more recently, blockchain infrastructures (Weinhardt et al., 2009; Tapscott & Tapscott, 2017; Felin & Lakhan, 2018). On the organization side, this is mirrored by the emergence of platform ecosystems that have considerably changed the IT (services) industry (Tiwana, 2014; Huber et al., 2017). On the one hand, this change is visible through new players having entered the market. For example, Salesforce, having started as a CRM Software-as-a-Service (SaaS) provider, not only has become one of the biggest and fastest growing software companies in the world, but also has transformed into a key (cloud services) platform provider with an ever-growing ecosystem of complementors. Moreover, new intermediaries, such as Airbnb or Uber, have entered the market, that define themselves as digital platforms or multi-sided markets, the core business model of which lies in connecting supply and demand (i.e., consumption) of digital and non-digital assets in new innovative ways. Another form of connection of supply and demand refers to social networking platforms (e.g., Facebook, Twitter) that may also be seen as social innovations increasingly substituting common practices of communicating and networking. On the other hand, established IT giants, such as SAP or Oracle, had to re-invent their business models from on-premises software (license) sellers to cloud service

providers, establishing themselves as platforms and ecosystems. The emergence of such digital platforms and ecosystems has led to a growing stream of research that has begun to study various issues around them, such as their various forms and functions, their governance, their key value propositions, their emergence, growth, and evolution, and their outcomes and implications (Ghazawneh & Henfridsson, 2013; Jacobides et al., 2018; Karhu et al., 2020; Foerderer et al., 2018b).

The next two chapters contribute to the existing body of knowledge by taking two different views; the one takes the perspective of dyadic relationships between a platform owner and its particular complementors to understand the conditions under which value in the form of innovation is created on platforms; the other takes a holistic network perspective of digital platforms seeking to understand their wider consequences and implications—some of them rather unintended and neglected, but becoming increasingly important.

In the chapter "How Access to Resources Affects Complementor Innovation in Platform Ecosystems", Thomas Huber, Thomas Hurni, Oliver Krancher, and Jens Dibbern examine the conditions under which complementors contribute to product and process innovations on software platforms (e.g., SAP, IBM, or Apple). Specifically, they argue that this depends on the extent to which the partnership with a platform owner provides access to valuable resources, such as technical, social, and commercial capital, but that it is also important that the platform owner is willing to share critical information relevant for the particular partnership. Data from platform partnerships in the Swiss software industry provides support for the combined role of access to resources and information sharing for stipulating complementor innovation.

In the chapter "The Economic and Social Consequences of Digital Platforms: A Systematic and Interdisciplinary Literature Review", Michaela Lindenmayr, Tobias Kircher, Alexander Stolte, and Jens Förderer examine the economic and social consequences of digital platforms. Specifically, they focus on three challenges that come along with running and participating in digital platforms, which are privacy, the generation and distribution of harmful content, and implications for innovation and competition. Considered concertedly, these three challenges show mutual dependencies that can enhance or dampen the particular challenges—also depending on the particular context and perspective taken. For example, guaranteeing anonymity on digital platforms may enhance privacy, but also may allow particular users to distribute harmful content under the cloak of anonymity.

As noted above, technological innovations provided the backbone for the emergence of digital platforms and platform ecosystems. While it is important to understand the implications of such new organizational forms and how to manage them, it is also important to note that technologies are constantly evolving, leading to new opportunities with novel transformational potentials.

Part V contributes two chapters that examine two of these emerging technologies. The first refers to blockchain technology, which is essentially a shared, immutable ledger that facilitates the process of recording transactions and tracking assets in a business network (Beck et al., 2017). This emerging technology has led to various digital innovations, the most prominent being Bitcoin, the first and still

most widely used cryptocurrency network established by its anonymous founder Satoshi Nakamoto (Kher et al., 2021). Today, various blockchain platforms have been established that allow for various applications of the blockchain technology, thereby enabling follow-up digital service innovations (Felin & Lakhan, 2018; Lacity, 2018). The second refers to process mining, in terms of a class of techniques that support the automatic discovery of business process models from event log data (vom Brocke et al., 2021). As such, it has been established as an outgrowth of process modeling and data mining techniques over the past 20 years but is still further developed and in the process of reaping its full potential.

In the chapter "The Affordances of Blockchain Platforms: Why Service Providers Use Blockchains", Kai Spohrer and Marten Risius examine the affordances of blockchain platforms from the perspective of service providers that draw on the resources provided on such platforms to create their own blockchain applications and serve their customers in new innovative ways. Based on multiple cases of such service providers that make use of a blockchain platform for their own business and using affordance theory as a theoretical basis, they identify five types of affordances. These affordances draw on different material properties of the blockchain technology, and they partially enable and constrain each other. Based on the actualized affordance, the service providers can be categorized into four groups, i.e., authenticity services, efficiency services, consultancy services, and consumer orchestration services. Beyond this typology of affordances and service providers, the authors take a dynamic view of affordance actualizing, finding that as blockchain platforms constantly evolve, service providers may either focus and extend their engagement with a particular platform or decouple and diversify to other specific platforms. This process of change hinges on whether the service provider values stay aligned with enacted community values of the platform or become misaligned over time.

In the chapter "Process Mining for Carbon Accounting: An Analysis of Requirements and Potentials", Lars Brehm, Jessica Slamka, and Andreas Nickmann elaborate the requirements and potentials of process mining for supporting organization-specific sustainability goals. Specifically, they use expert interviews to explore the supporting role of process mining for carbon accounting—an increasingly established practice in organizations to document and analyze their carbon footprint as a basis to take measures to reduce CO_2 emissions. One of the requirements for reaping the potential of process mining for carbon accounting lies in linking carbon-related data to the particular event logs of business processes. To automate such retrieval and integration of carbon data, external data sources could be tapped into via application programming interfaces. This can help realize various potentials for reaching sustainability goals both at the corporate and ecosystem levels.

Finally, the sixth part of this book (Part VI) bridges different perspectives, including organization, network as well as the industry and regulatory environment. It includes two papers that both take a strong market-related perspective in that they examine structural elements of markets (i.e., centrality or concentration measures)—on the one hand, the online book market, exemplified by a large online bookstore; on the other hand, the airline market in Europe.

In the chapter "The Impact of Product Recommendation Networks on Sales: The Moderating Influence of Product Age", Nils Herm-Stapelberg and Franz Rothlauf examine how online stores can make sense of the mass of data that they have about their online sales in order to gain knowledge about future sales. This is exemplified by an online bookstore that seeks to make sense of its data. Specifically, they analyze how the page rank centrality of a book (as an indication of the attractiveness of the book) is associated with its actual sales. They also examine how this relationship is influenced by the age of the book. The results suggest that page rank matters for online sales, but that the age of products (i.e., books) should also be taken into account. This suggests that combinations of product attributes from the past need to be considered for market predictions.

In the chapter "Airline Market Concentration in Europe", Tobias Grosche examines the structural properties of the airline market, which provides an important basis for airline flight scheduling (Grosche et al., 2007). Specifically, he assesses the level of competition in the European Airline market by measuring market concentration for particular routes (city pairs). This allows analyzing market competition on different levels, i.e., the city, the country, or region level. The results also show that Europe has a higher market concertation than the United States. While one may assume that this has to do with the reduction of the number of airlines in Europe, the opposite is the case; the reduction of the number of airlines has come along with an increase in market concertation in Europe. Overall, the results provide important insights into market concentration development and its source, which is informative not only for the design of airline yield management systems, but also for industry regulators.

4 Conclusion

The objective of this chapter was to provide an overall umbrella for studying digitalization in the IS field and to introduce this book, which presents a collection of papers that viewed the phenomenon from different perspectives and with different thematic orientations. As this book is written in honor of Armin Heinzl and his 60th birthday, our introductory chapter was also largely inspired by his impressive collection of research contributions over the last 30 years. In fact, his contributions (up to date) provide a microcosm of digitalization research that by itself has taken an evolution. For example, he has also examined IS phenomena from different perspectives, and while he has studied some research themes enduringly (e.g., IS outsourcing), he has also undergone a transformation both thematically and with respect to the level of analysis taken. In illustrating our framework, we drew on Armin's work, but we also tried to develop the framework as an umbrella for the chapters of this book (and of course were influenced by our own view on the IS world). We therefore belief that the framework is of general interest and applicability, helping to guide future research endeavors on digitalizing. It may be viewed as a navigation instrument that helps researchers to find their home in the digital research landscape and see linkages to related fields of study—either across

levels or across thematic orientations (e.g., from management to design and vice versa).

In general, the future of research on digitization appears wide open with many emerging questions. We have tried to articulate some important questions, but there are many more. Hopefully, this book will help motivate individuals to either begin research in the field or continue engaging in digitalization research. Much has been done, but there is still much more to be done. We hope the readers enjoy the papers in this volume. Happy reading!

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Part II
Outsourcing and Multi-party Projects: Reflections and Experiences