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Frederik von Briel
University of Queensland

Jan Recker
University of Hamburg

Lisen Selander
University of Gothenburg

Sirkka L. Jarvenpaa
University of Texas at Austin

Philipp Hukal
Copenhagen Business School

See next page for additional authors

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Authors

Frederik von Briel, Jan Recker, Lisen Selander, Sirkka L. Jarvenpaa, Philipp Hukal, Youngjin Yoo, Julian Lehmann, Yolande Chan, Hannes Rothe, Paul Alpar, Daniel Fürstenau, and Bastian Wurm

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Frederik von Briel
UQ Business School
University of Queensland
Brisbane, Australia

Jan Recker
Hamburg Business School
University of Hamburg
Hamburg, Germany

Lisen Selander
Division of Informatics at Department of Applied Information Technology
University of Gothenburg
Göteborg, Sweden

Sirkka L. Jarvenpaa
Department of Information, Risk, and Operations Management
McCombs School of Business
University of Texas at Austin
Austin, Texas, USA

Philipp Hukal
Department of Digitalization
Copenhagen Business School
Copenhagen, Denmark

Youngjin Yoo
Weatherhead School of Management
Case Western Reserve University
Cleveland, Ohio, USA

Julian Lehmann
KIN Center for Digital Innovation
School of Business and Economics
VU Amsterdam
Amsterdam, Netherlands

Yolande Chan
The Stephen J. R. Smith School of Business
Queen's University
Kingston, Canada

Hannes Rothe
Department of Information Systems
School of Business & Economics
Freie Universität Berlin
Berlin, Germany

Paul Alpar
Faculty of economics
Philipps University
Marburg, Germany

Daniel Fürstenau
Department of Information Systems
School of Business & Economics
Freie Universität Berlin and
Einstein Center Digital Future
Berlin, Germany

Bastian Wurm
Institute for Information Business
Department of Informations Systems and Operations
WU (Vienna University of Economics and Business)
Vienna, Austria



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Abstract:

This report documents the outcomes of a professional development workshop (PDW) held at the 40th International Conference on Information Systems in Munich, Germany. The workshop focused on identifying how information systems (IS) researchers can contribute to enriching our knowledge about digital entrepreneurship—that is, the point at which digital technologies and entrepreneurship intersect. The PDW assembled numerous IS researchers working on different aspects of digital entrepreneurship. Jointly, we delineated digital entrepreneurship from related phenomena and conceptualized the different roles that digital technologies can have in entrepreneurial endeavors. We also identified relevant strategies, opportunities, and challenges in conducting digital entrepreneurship research. This report summarizes the shared views that emerged from the interactions at the PDW and our collaborative effort to write this report. The report provides IS researchers interested in digital entrepreneurship with food for thought and a foundation for future research.

Keywords: Digital Entrepreneurship, Digital Ventures, Entrepreneurial Endeavors, Entrepreneurship Processes, Research Agenda

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1 Introduction

Digital entrepreneurship research focuses on how digital technologies—man-made technological objects that include non-material, algorithmically organized, computed components (Faulkner & Runde, 2019)—shape and are shaped by entrepreneurial processes (e.g., prototyping, scaling, or funding), outcomes (e.g., new market offerings, business models, or ventures), and contexts (e.g., ecosystems, networks, or communities; Nambisan, 2017; Yoo, Henfridsson, & Lyytinen, 2010). Many changes occur at the point at which digital technology and entrepreneurship intersect. For example, digital technologies have:

- Sparked entrepreneurial endeavors that have crossed previously bounded industry sectors (e.g., Autio, Nambisan, Thomas, & Wright, 2018)
- Unlocked formerly inaccessible entrepreneurial networks, ecosystems, and communities (e.g., Bruton, Khavul, Siegel, & Wright, 2015; Ingram Bogusz, Teigland, & Vaast, 2019)
- Digitized heretofore analog assets and economic goods and, thus, led to new entrepreneurial market offerings (e.g., Porter & Heppelmann, 2014), and
- Accelerated new ventures' inception, scaling, and evolution (e.g., Huang, Henfridsson, Liu, & Newell, 2017; Reuber & Fischer, 2011; Younkin & Kashkooli, 2016).

In information systems (IS) discipline, digital entrepreneurship emerged as an important research area around 2010 (Davidson & Vaast, 2010; Del Giudice & Straub, 2011). Several subsequent papers have advocated its value to the IS discipline and beyond (e.g., to the literature on innovation management and new product development; Nambisan, 2013; Yoo, 2013). Currently, research with a dedicated focus on the phenomenon of digital entrepreneurship is accelerating in and beyond the IS discipline. For example, we can see as much in the increasing number of published papers and special issues on digital entrepreneurship (Berger, von Briel, Davidsson, & Kuckertz, 2021; Fang, Henfridsson, & Harvenpaa, 2018; Nambisan, Wright, & Feldmann, 2019; Shen, Lindsay, & Xu, 2018).

Given this momentum, we felt that the 40th International Conference on Information Systems presented an opportune time to hold a professional development workshop (PDW) on digital entrepreneurship. The PDW focused on identifying how IS researchers can contribute to enriching our knowledge about digital entrepreneurship. The PDW started with a panel discussion that Jan Recker, one of the organizers, moderated. Philipp Hukal, Sirkka Jarvenpaa, Lisen Selander, and Youngjin Yoo served as panelists. These individuals actively conduct research in the digital entrepreneurship space, and each brought a different perspective and focus to the discussion.

After the panel discussion, roundtable discussions that invoved all workshop participants occurred. In each roundtable, at least one panelist or one of the two co-organizers, Frederik von Briel and Jan Recker, served as moderator. An assistant took notes during the workshop. The panel and roundtable discussions focused on five guiding questions:

1) What is peculiar or unique about digital entrepreneurship (if anything)?
2) What are the roles of digital technologies in digital entrepreneurship?
3) What are the key research questions and opportunities in digital entrepreneurship research?
4) What data and methods are particularly suitable for investigating digital entrepreneurship?
5) What are the challenges in advancing digital entrepreneurship research?

After the event, we invited all participants to join in documenting the shared views that had emerged from our joint discussions at the PDW. Several participants accepted our invitation. Thus, readers should read this report as summarizing the convergent ideas about how IS researchers can contribute to enhancing our knowledge about digital entrepreneurship, which PDW participants, including the panel members and organizers, developed during the PDW and the collaborative writing process that followed.

This paper proceeds as follows: in Section 2, we first report on the outcomes of our joint attempt to delineate digital entrepreneurship from related phenomena. In Section 3, we present our attempt to clarify different roles that digital technologies perform in digital entrepreneurship and explain how a focus on each role raises important research questions. In Section 4, we discuss unique research questions that PDW participants saw emerging from situating digital entrepreneurship in the larger realm of studies on technology and organizing. In Section 5, we discuss PDW participants' ideas about novel methods and data that can help to advance our knowledge of digital entrepreneurship. In Section 6, we discuss key

challenges to advancing digital entrepreneurship research that PDW participants saw. Finally, in Section 7, we conclude the paper.

2 Delineating Digital Entrepreneurship as a Phenomenon

The first guiding question concerned whether there is anything peculiar or unique about digital entrepreneurship. After all, advances in information and communication technologies have always spurred opportunities to create new economic activities and start new businesses (Roberts, 1991). To answer our question, we compared digital entrepreneurship to other phenomena, such as "regular" entrepreneurship (e.g., Davidsson, 2016; Shane & Venkataraman, 2000; Shepherd, Souitaris, & Gruber, 2020) and digital innovation (e.g., Fichman, Dos Santos, & Zheng, 2014; Kohli & Melville, 2019; Yoo et al., 2010). Table 1 summarizes the outcomes of this comparison. Subsequently, we discuss two important aspects for grasping digital entrepreneurship as a phenomenon.

Table 1. Differences between Entrepreneurship, Digital Innovation, and Digital Entrepreneurship

Aspect	Entrepreneurship	Digital innovation	Digital entrepreneurship
Focal Phenomenon	Focuses on creating new economic activities (Shane & Venkataraman, 2000).	Focuses on creating new and improved products, processes, or services through digital technologies (Yoo et al., 2010).	Focuses on creating new economic activities embodied in or enabled by digital technologies.
Dominant assumptions	Entrepreneurial agents exploit opportunities by assembling resources in new ventures (Shane, 2003).	Digital technologies give rise to new or improved products, processes, services, or business models (Fichman et al., 2014; Kohli & Melville, 2019).	Digital technologies blur boundaries of entrepreneurship processes and outcomes. Digital technologies disperse entrepreneurial agency across a broader range of actors (Nambisan, 2017).
Primary levels of analysis	**Individuals and ventures:** • Entrepreneurial agents (Shepherd, Wennberg, Suddaby, & Wiklund, 2019) • New ventures, typically referring to emerging, independent, and professionally funded firms (Garg & Eisenhardt, 2017) • Entrepreneurial ecosystems	**Artefacts and organizations:** • Digitized products, processes, services, and business models (Fichman et al., 2014) • Incumbent organizations • Both new and established markets	**Artefacts, ventures, and outcomes:** • Digital technology objects, such as artefacts, platforms, or infrastructure (Nambisan, 2017) • Entrepreneurial endeavors, which include new ventures and entrepreneurial pursuits in incumbent organizations • Digital environments, such as ecosystems (Autio et al., 2018) • Societal outcomes (Fang et al., 2018)
Selected foci in the literature	• Entrepreneurial opportunities • Founder characteristics • Modes of organizing • New venture characteristics and performance • Entrepreneurial strategies • Ecosystem characteristics	• Development and adoption • Technology architectures • Technology appropriation and recombination • Organizational structures and change • Business value • Competitive dynamics • Digital platforms	• Development and commercialization • Technology characteristics • Technology appropriation and recombination • Modes of organizing • Distribution and scaling of entrepreneurial endeavors • Digital platforms • Business and social outcomes

Since digital entrepreneurship focuses broadly on creating new economic activities embodied in or enabled by digital technologies, it covers a wide range of economic, societal, and organizational phenomena. Importantly, one can create new economic activity through any *entrepreneurial endeavor*—that is, any entrepreneurial effort in which one pursues an opportunity (Shepherd et al., 2019), which includes creating entrepreneurial firms, intrapreneurial projects, and social movements.

Participants agreed that digital technologies not only affect specific entrepreneurial endeavors but also produce multi-level consequences, such as social, economic, or environmental outcomes (e.g., Davidson & Vaast, 2010; Fang et al., 2018; George, Merrill, & Schillebeeckx, 2020; Selander & Jarvenpaa, 2016) because digital technologies blur traditional process boundaries and outcomes. For example, designing,

deploying, and managing digital technology in entrepreneurial ventures makes traditional concepts such as product, firm, and industry boundaries increasingly insufficient demarcations for describing entrepreneurial endeavors. Digital ventures that act as complementors and leverage open bio data infrastructures exemplify these dynamics (Rothe, Jarvenpaa, & Penninger, 2019). Other examples include entrepreneurial endeavors that build on open hardware platforms (Pujol & Wareham, 2018) and entrepreneurial social movements that form on social media to change the status quo (Young, Selander, & Vaast, 2019).

Hence, we should not confine digital entrepreneurship as a phenomenon to a particular type of venture or a specific process. Rather, we should be inclusive when considering whether a particular phenomenon constitutes digital entrepreneurship or not. For instance, while highly funded ventures that set out to reshape entire industries qualify as digital entrepreneurship, so do individual entrepreneurs who develop apps.

Since digital technologies disperse agency, the role that the digital technologies play in entrepreneurial endeavors defines the boundaries of digital entrepreneurship as a phenomenon. Participants felt that a good starting point for probing whether something constitutes digital entrepreneurship or not would be to ask: "Would this particular entrepreneurial endeavor exist without digital technology? If so, how would it be different?". These questions allow one to focus on how the capability to act—that is, agency—might differ due to the involvement of or reliance on digital technology.

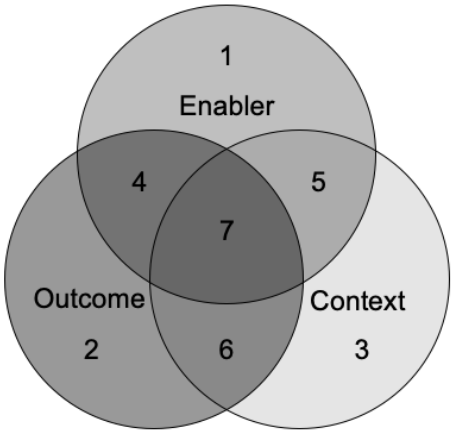
Digital technologies are broad and pervasive, which makes establishing digital entrepreneurship's conceptual boundaries an arduous task. Nevertheless, digital entrepreneurship researchers need to establish conceptual boundaries. When researchers suitably discriminate a phenomenon's instances from related but different phenomena, they increase theoretical predictions' accuracy. Table 1 above illustrates that digital entrepreneurship has some overlaps (e.g., in phenomena, foci, and levels of assumptions) with digital innovation and entrepreneurship, which highlights why conceptual discrimination has particular importance in research on digital entrepreneurship much like it has in research on digital innovation (e.g., Baiyere, Grover, Gupta, Woerner, & Lyytinen, 2017) or transformation (e.g., Wessel, Baiyere, Ologeanu-Taddei, Cha, & Blegind-Jensen, 2021).

To determine whether endeavors qualify as digital entrepreneurship or not, researchers can look at their reliance on digital technologies. For example, some well-known direct-to-consumer ventures, such as Warby Parker and Bonobos (e.g., Bell, Gallino, & Moreno, 2014), do not sell digitally enabled products (they sell traditional physical products, such as eyeglasses and clothes), but their entire operations depend on digital infrastructures. Thus, they rely on digital technology to a different degree compared to entrepreneurial endeavors such as Oculus Rift and Lockitron (e.g., Gleasure & Feller, 2016), which produce market offerings that embody some form of digital technology (they sell virtual reality headsets and smart door locks, respectively). However, as none of these ventures could exist in its current form without digital technologies, both types of endeavors qualify as digital entrepreneurship.

3 The Role of Digital Technologies in Digital Entrepreneurship

The second guiding question concerned the role of digital technologies in digital entrepreneurship. As the Venn diagram in Figure 1 illustrates, digital technologies can feature prominently in digital entrepreneurship in at least three primary ways: 1) as **digital enablers** of entrepreneurial endeavors (i.e., in activities such as prospecting, developing, scaling, or exploiting), 2) as **digital outcomes** of entrepreneurial endeavors (i.e., as the intended or realized value proposition of entrepreneurial endeavors), and 3) as **digital contexts** in which entrepreneurial endeavors occur (i.e., as a key property of the external surroundings, such as sectoral and regulatory environments).

These three ways do not mutually exclude one another but represent different lenses. For example, one could potentially look at a single entrepreneurial endeavor from any of the three perspectives. As the Venn diagram shows (intersections 4-7), one can also combine these three ways. We will elaborate on each dimension and their intersections in this section and briefly discuss potential research topics that flow from them. Table 2 summarizes the roles of digital technologies, exemplar studies, and potential research questions.



Digital technologies featuring as…

1. …enablers of entrepreneurial endeavors
2. ...outcomes of entrepreneurial endeavors
3. …contexts in which entrepreneurial endeavors take place
4. …enablers and outcomes of entrepreneurial endeavors
5. …enablers and contexts of entrepreneurial endeavors
6. …outcomes and contexts of entrepreneurial endeavors
7. …enablers, outcomes, and contexts of entrepreneurial endeavors

Figure 1. A Framework for the Role of Digital Technologies in Entrepreneurship

Table 2. Different Roles of Digital Technologies in Digital Entrepreneurship

Definition of digital technologies' role	Illustrative studies	Selected future research questions
As enablers of entrepreneurial endeavors (Section 1 in Figure 1)	Ceccagnoli, Forman, Huang, & Wu (2012), von Briel, Davidsson, & Recker (2018a)	• Which affordances can existing or emerging digital technologies provide? • Which capabilities do entrepreneurial agents require to activate these affordances? • Can digital technologies change traditional benefits derived from spatial ecosystems?
As outcomes of entrepreneurial endeavors (Section 2 in Figure 1)	West & Kuk (2016), Andersen & Ingram Bogusz (2019), Jarvenpaa & Standaert (2018)	• How does the generativity of value propositions impact the evolution of entrepreneurial endeavors? • How do digital value propositions influence pivots during emergence? • Why are some digital technology outcomes more challenging to create and commercialize than others?
As contexts in which entrepreneurial endeavors occur (Section 3 in Figure 1)	Rothe et al. (2019)	• How do digital technologies break down traditionally assumed environmental boundaries? • How do digital technologies foster traditional sectoral value chains to decompose? • How do digital technologies impact the emergence, structure, and evolution of larger entrepreneurial ecosystems?
As enablers and outcomes of entrepreneurial endeavors (Section 4 in Figure 1)	Um, Yoo, & Wattal (2015)	• Which path dependencies do digital technologies that are outcomes from one venture create for other ventures? • How does digital technologies' evolution as outcomes of entrepreneurial processes influence how enabling digital technologies evolve?
As enablers and contexts of entrepreneurial endeavors (Section 5 in Figure 1)	Kuhn & Galloway (2015)	• Which affordances do digital technologies provide to entrepreneurial endeavors that operate in a specific spatial environment? • How do ecosystems that foster digital entrepreneurship emerge? • How can digital technologies create opportunity spaces for entrepreneurial action?
As outcomes and contexts of entrepreneurial endeavors (Section 6 in Figure 1)	Huang et al. (2017)	• How is the success of entrepreneurial endeavors linked to their environment and to other entrepreneurial endeavors operating in the same environment? • How can digital technologies as outcomes of entrepreneurial processes create new opportunity spaces for entrepreneurial action in other environments?
As enablers, outcomes, and contexts of entrepreneurial endeavors (Section 7 in Figure 1)	Wessel, Thies, & Benlian (2017)	• How do digital technologies enable new ventures to transform incumbent market structures? • How do digital influence non-digital entrepreneurship endeavors and vice versa? • How can markets be designed to incentivize particular digital ventures to emerge?

3.1 Digital Technologies as Enablers of Entrepreneurial Endeavors

One perspective involves examining digital technology as an enabler that positively influences entrepreneurs' actions toward creating, distributing, and/or commercializing new value propositions. Digital technologies can act as disequilibrating forces that create room for multiple entrepreneurial endeavors and enable their processes (Davidsso, Recker, & von Briel, 2020). For example, von Briel et al. (2018a) identified advances in digital technologies for prototyping, developing, and commercializing digital hardware that make them enablers of a new wave of digital hardware ventures. They explained that the emergence of low-cost platforms for electronics development, such as Arduino or Raspberry Pie, and rapid prototyping technologies, such as three-dimensional (3D) printers or mini-mills, make physical prototyping both faster and cheaper for entrepreneurs. Furthermore, crowdfunding platforms, such as Kickstarter or IndieGoGo, allow entrepreneurs to overcome constraints during development by substituting traditional funding and market-research sources with online crowds. In addition, leveraging the existing functionalities of interconnectable devices, such as smartphones or wearables, allow entrepreneurs to reduce to reduce the costs associated with their market offerings.

Digital technologies can also enable one or several specific actions, practices, or routines that underlie individual entrepreneurial endeavors' processes. For example, Ceccagnoli et al. (2012) showed that software application platforms provide a foundation for small entrepreneurial firms to commercialize their software offerings. Focusing on SAP's software application platform, they found that small entrepreneurial firms that joined the platform increased their sales and were ultimately more likely to issue an initial public offering as the platform provided them with legitimacy and reduced uncertainty for investors regarding their potential to generate future profits.

PDW participants agreed that focusing on digital technologies as enablers raises research questions on both the macro and micro levels, such as which affordances existing or emerging digital technologies can provide to entrepreneurial agents and which capabilities the agents require to activate these affordances both in and across entrepreneurial endeavors. Researchers could also ask whether and how digital technologies can substitute for or enhance traditional benefits derived from spatial ecosystems, such as Silicon Valley or Zhongguancun (Du, Pan, Zhou, & Ouyang, 2018); what role digital collectives, such as makerspaces, play in providing access to and educating entrepreneurs about how to use digital technologies (Browder, Aldrich, & Bradley, 2019); whether and why different enabling technologies might influence success differently; and whether and how digital technologies' enabling potential differs across process stages, industry sectors, or geographical regions (Davidsson et al., 2020).

3.2 Digital Technologies as Outcomes of Entrepreneurial Endeavors

Another perspective concerns the unique materiality of digital technologies that entrepreneurial endeavors create as the core of their value propositions (Lyytinen, Yoo, & Boland, 2016; von Briel, Recker, & Davidsson, 2018b). The infusion of digital technologies into traditional products and services has opened up vast opportunities for entrepreneurs to create novel value propositions. For example, West and Kuk (2016) traced how MakerBot became a market leader in the 3D printing industry by creating a novel value proposition that comprised two distinct but complementary digital market offerings—a 3D printer and a 3D design file online repository. They explained that Thingiverse, an online repository that allows users to freely share 3D design files, helped MakerBot increase 3D printer sales because it provided a generative and free complement.

The decoupling of material form from logical function and the potential to decouple and recombine digital technologies (Yoo et al., 2010) has also given rise to new ventures that realize innovative new business models and purely non-material market offerings around digital technologies, such as artificial intelligence, augmented reality, distributed ledger technology, cloud computing, and online platforms (e.g., Ingram Bogusz et al., 2019; Muñoz & Cohen, 2018; Snihur, Thomas, & Burgelman, 2018). For example, focusing on Bitcoin-based entrepreneurial endeavors, Andersen and Ingram Bogusz (2019) found that entrepreneurs fork existing blockchain software code to create new market offerings, such as Bitcoin XT and Ethereum. These market offerings' novelty and their divergence from existing software code can span from simple adaptations (i.e., development forking) to radical divergences and spin-offs into separate technologies (i.e., hard forking).

PDW participants agreed that focusing on digital technologies as outcomes raises various research questions about, for example, the influence of their value propositions' generativity on how emerging entrepreneurial endeavors evolve (Jarvenpaa & Standaert, 2018), whether and how institutional fields

might shape entrepreneurial endeavors' processes and outcomes (Tumbas, Berente, & vom Brocke, 2017), or how the digital artifacts constituting emerging entrepreneurial endeavors' value propositions might influence pivots during emergence (McDonald & Gao, 2019). It would also be interesting to see whether some digital technology outcomes, such as artificial intelligence ventures, show different growth and scaling dynamics than other kinds of digital ventures (Iansiti & Lakhani, 2020) or whether and why some digital technology outcomes might be more challenging to create and commercialize than others.

3.3 Digital Technologies as Contexts in which Entrepreneurial Endeavors Occur

A third perspective examines digital technologies that shape and disequilibrate entrepreneurship contexts (e.g., Autio et al., 2018; von Briel et al., 2018a). As entrepreneurship never occurs in a vacuum, entrepreneurship researchers generally consider the business (e.g., automotive, healthcare, or financial sector), social (e.g., support or friend network), political (e.g., social movements, such as labor activism), spatial (e.g., ecosystem, industrial districts and clusters), or institutional (e.g., cultural, economic, or social systems) environments in which entrepreneurial endeavors occur as the entrepreneurial context (Welter, 2011). Hence, in contrast to an enabler lens that exclusively focuses on the direct and positive effects that digital technologies have on entrepreneurial action, a context lens adopts a broader view and also considers indirect and negative effects.

Digital technologies can reshape existing contexts or create new ones. They do so by, for example, opening up traditional industry sectors to new economic activity from the outside. For example, Rothe et al. (2019) showed that advances in genome sequencing technology led to vast open genome data, which gave rise to biodata ventures that used this data in new ways to solve customer issues. Specifically, biodata ventures either contextualize, de-contextualize, or re-contextualize open genome data to capture value.

PDW participants agreed that focusing on digital technologies as context raises research questions, such as whether and how digital technologies break down traditionally assumed environmental boundaries (e.g., sectoral or spatial boundaries), whether and how they encourage traditional sectoral value chains to decompose, how regulations influence and shape sectors and entrepreneurial endeavors in them, how one can upend or modify governance in digitized sectors, and how digital technologies impact the emergence, structure, and evolution of larger entrepreneurial ecosystems.

3.4 Digital Technologies as Enablers and Outcomes of Entrepreneurial Endeavors

Digital technologies are fundamentally self-referential (Yoo et al., 2010). Consequently, entrepreneurial endeavors must use existing digital technologies to create new digital technologies as their value propositions. For example, to develop software applications, digital ventures must use computers and, thus, operating systems, development environments, and so on. Therefore, a digital technology that one entrepreneurial endeavor creates as an outcome can enable other entrepreneurial endeavors. Think of electronics development platforms that entrepreneurial ventures such as Arduino, Raspberry Pi, or Electric Imp developed as digital market offering. They increasingly enable other entrepreneurial ventures to emerge by, for example, accelerating the prototyping activities of digital hardware ventures (von Briel et al., 2018a).

Another example includes application programming interfaces (APIs) through which entrepreneurial ventures can govern how third parties use (parts of) their value propositions (Um et al., 2015). Snapchat, for instance, enables other ventures to use its stories feature as part of their own value propositions. Thus, technology design decisions that one venture, such as Snapchat, makes about how it governs its API directly affect other digital ventures' trajectories (von Briel et al., 2018b).

PDW participants agreed that the intersection of digital technologies as enablers and as outcomes raises fundamental questions about interdependencies. For example, the Snapchat example above illustrates external agencies and path dependencies that originate for some new ventures from using the outcome of another venture's process (i.e., Snapchat) as their enabler (Goh & Pentland, 2019). Since digital technologies can evolve over time, their evolution as outcomes of entrepreneurial processes will influence the way in which enabling digital technologies will evolve, which will then likely influence the way in which the outcomes of digital technologies will evolve.

3.5 Digital Technologies as Enablers and Contexts of Entrepreneurial Endeavors

Digital technologies can establish and transform entrepreneurial contexts. However, emergent entrepreneurial endeavors that operate in digital contexts and that digital technologies enable do not necessarily have digital technologies as their market offerings. For example, focusing on artisan entrepreneurs who sell their products on the online marketplace Etsy, Kuhn and Galloway (2015) found that the digital platform not only enables these entrepreneurs to sell their products but also provides them with an environment to receive peer support from other entrepreneurs. Hence, while digital technology enables their entrepreneurial endeavors and provides them with a context in which to operate, the offerings themselves remain non-digital artisan products.

PDW participants pointed out that research at the intersection of digital technologies as enablers and as contexts often closely aligns with research on entrepreneurial ecosystems and raises questions such as which affordances digital technologies provide to entrepreneurial endeavors that operate in a specific spatial environment and how ecosystems emerge that foster digital entrepreneurship (Autio et al., 2018). Yet, besides altering existing boundaries, such as spatial, temporal, or sectoral limits, digital technologies can also create new contexts. For example, digital technologies can create an opportunity space for entrepreneurial endeavors in their own right. Current social movements often peruse social media platforms to scale and fuel their initiative since doing so enables them to reach a global audience. Here, digital opportunity spaces, such as those associated with the #LasTesis hashtag, effectively offer a scene for political messages and entrepreneurial action.

3.6 Digital technologies as Outcomes and Contexts of Entrepreneurial Endeavors

By their nature, digital technologies are interoperable (Ceccagnoli et al., 2012) and have the potential for infinite expansibility (Faulkner & Runde, 2019). Therefore, they give entrepreneurial endeavors the potential to operate across contexts and scale rapidly (Huang et al., 2017). Moreover, digital technologies' sensibility allows them to create vast contextualized data, which can create a context for novel entrepreneurial endeavors. Ubiquitous sensors and open data repositories exemplify such digital technologies that create contexts that allow one to establish new ventures. Digital platforms offer a good example of such digital technologies (e.g., Parker, van Alstyne, & Jiang, 2017; Tiwana, 2015). For example, focusing on WeCash, a Chinese platform venture in the financial technology industry, Huang et al. (2017) found that it rapidly scaled its user base by frequently adapting and releasing new platform versions based on contextual user data from 6,000 sources, including users' social media presence and online behavior data from mobile operators and Internet service providers.

PDW participants agreed that the intersection of digital technologies as outcomes and as context raises research questions about, for example, how entrepreneurial endeavors' success relates to their environment and to other entrepreneurial endeavors that operate in the same environment or across environments (Srinivasan & Venkatraman, 2018).

3.7 Digital Technologies as Enablers, Outcomes, and Contexts of Entrepreneurial Endeavors

Lastly, digital technologies can simultaneously be enablers, outcomes, and contexts of digital entrepreneurship. Think of crowdfunding platforms, such as Kickstarter and Indiegogo (e.g., Wessel et al., 2017). They constitute the market offerings—that is, *outcomes*—of some entrepreneurial endeavors, *enable* other entrepreneurial endeavors (be they digital or non-digital), and establish and shape broader *contexts* for entrepreneurial endeavors across multiple industry sectors. For example, digital technologies, such as electric vehicles and adaptive pricing models, that entrepreneurial ventures develop and use blur the boundaries between mobility and energy markets and enable entrepreneurial ventures to offer new value propositions, such as an improved customer mobility and grid stability (Valogianni, Ketter, Collins, & Zhdanov, 2020).

PDW participants agreed that focusing on the intersection of all three framework dimensions requires researchers to broaden their focus and adopt holistic perspectives and approaches, such as multi-level theorizing (Zhang & Gable, 2017), systems thinking (Alter, 2013), or multi-agent market simulations (Ketter, Peter, Collins, & Gupta, 2016). By doing so, they can address questions such as how digital technologies enable new ventures to enter existing markets and how one could design markets to incentivize particular digital ventures (e.g., digital ventures that focus on sustainable business models).

4 Six Strategies for Situating Digital Entrepreneurship Research in the Broader Technology and Organizing Scholarship

The third guiding question concerned ways to identify key research questions and opportunities in digital entrepreneurship research. The discussion yielded six strategies for identifying important and relevant research problems to address. Two dominant assumptions about digital entrepreneurship (see Table 1) underpin all six strategies: that digital technologies 1) blur boundaries of entrepreneurship processes and outcomes and 2) disperse entrepreneurial agency across a broader range of actors.

4.1 Evaluate which Research Questions other Disciplines Outside IS have Already Addressed or Answered

To identify key research questions and opportunities in digital entrepreneurship research, researchers can evaluate research questions that other disciplines have already addressed or answered. For example, in the strategy discipline, different growth modes such as whether a firm will grow organically, pursue acquisitions, or engage in alliances with other firms that possess complementary resources have strategic importance, and researchers have extensively studied them (e.g., Gilbert, McDougall, & Audretsch, 2006; Lockett, Wiklund, Davidsson, & Girma, 2011). One might ask how those entrepreneurial firms that have unique digital assets choose their growth mode (i.e., digital technologies as enablers) and how the digitality of those market offerings that have the potential to blur process boundaries and disperse agency realize growth modes that run contrary to the assumptions that strategists have already developed (i.e., digital technologies as outcomes).

As a second example, in the entrepreneurship discipline, researchers have long investigated the entrepreneurial agent (e.g., Grégoire & Shepherd, 2012; McMullen & Shepherd, 2006). Contemporary work environments increasingly pose new questions about agents, such as whether entrepreneurs behave and interact differently in digital technology contexts and what implications these altered behaviors might have. Digital platforms might redefine who can (or cannot) be an entrepreneur, which forms of social and/or human capital that entrepreneurial agents require, and how prospective agents pursue entrepreneurial endeavors (Nambisan & Baron, 2021).

4.2 Choose Levels of Analysis that have so far been Ignored

As different disciplines have different foci, varying the unit of analysis allows digital entrepreneurship researchers to establish connections between IS and other disciplines via jointly applying analyses and theories at different levels of abstraction. The dimensions in Figure 1 reside on three particular levels of analysis: 1) the ecosystem (i.e., digital technologies as contexts), 2) the entrepreneurial endeavor (i.e., digital technologies as enablers), and 3) the value proposition (i.e., digital technologies as outcomes). However, the fact that digital technologies blur the boundaries of entrepreneurship processes and outcomes and disperse entrepreneurial agency across a broader range of actors implicates other units and levels of analysis, such as the entrepreneurial agent or societal and environmental impacts. For example, Majchrzak and Malhotra (2019) showed how digital crowds may provide "on demand entrepreneurial mindsets" that entrepreneurial agents can leverage to address nascent and ephemeral market needs. Such "flash crowds" might require researchers to rethink not only what entrepreneurial agents are but also what crowd-based entrepreneurial organizing—its temporality, associated resources, and mobilizing power—might look like.

4.3 Focus on Novel Interactions among Levels of Analysis but also between Actors, Technologies, Enablers, Outcomes, and Context

For example, PDW participants discussed interactions between digital ventures and incumbent organizations. The literature has largely studied each organizational form separately. However, as large traditional corporations grapple with digital transformation, some have formed their own corporate venture organizations specifically to find opportunities to engage with emerging digital entrepreneurship endeavors (Anthony, 2012). Other incumbents join emerging entrepreneurial ecosystems. Consider Mercedes and Porsche—both established car manufacturers that have joined the emergent Formula E racing series (Jarvenpaa & Standaert, 2018). In essence, these established organizations with high brand value in their physical car productions sought to become part of a racing ecosystem where technical specifications

require teams to have basically the same physical car and where most differentiation between them comes from software.

This example further illustrates digital technologies' potential to blur the boundaries of entrepreneurship processes and outcomes and disperse entrepreneurial agency across actors. A focus on interactions, such as interactions between digital ventures and traditional corporations that evolve around digital technology offers a wide range of important questions that one could explore at multiple levels of analysis. For example, an increasing number of intermediaries connect corporates and digital entrepreneurial ventures. Many accelerators and incubators work closely with traditional corporations and play a broker role. While we do not know the exact nature of such brokering and the factors that influence its outcomes, researchers have found some indications that accelerators might help ventures reach key goals (Hallen, Cohen, & Bingham, 2020). Incubators and accelerators can be digital or non-digital themselves, which can raise questions about intermediaries' nature and their impact on digital entrepreneurship. Overall, PDW participants agreed that digital entrepreneurship research might be particularly conducive to better explaining different levels of entrepreneurship phenomena and their potential interactions, such as at the team, project, cohort, and crowd levels.

4.4 Focus on Outcome Variables that have Traditionally Received Minimal Attention

A different strategy could involve asking how openness (of infrastructure, data, knowledge, or ideas) that digital technology often implies might not only disperse agency but also create new risks. For example, while digital crowds might enable individuals to temporarily gather around certain problems and opportunities, one associated risk relates to the crowd's unbounded nature. Organizations must, on the one hand, satisfy digital crowds' autonomy and, on the other hand, redeem their entrepreneurial endeavors so that they create value (Selander & Jarvenpaa, 2020). Moreover, opportunities to direct and coordinate entrepreneurial action in online crowds might risk fragmenting the crowd.

As another example, research could explore how digital technologies as contexts not only offer upsides in terms of value-creation and value-appropriation infrastructures for entrepreneurs but also downsides such as a potential conflict between their roles as platform members and venture leaders (Nambisan & Baron, 2021). Research could also examine potentially harmful path dependencies (Sydow, Schreyögg, & Koch, 2009) and imprinting effects (Stinchcombe, 1965) in digital entrepreneurship. For instance, initially valuable digital technology may not only enable but also increasingly constrain a venture's growth prospects given certain technological inflexibilities and lock-ins. Furthermore, using freelancing and micro-tasking platforms, which constitute enabling digital technologies for entrepreneurs (getting services, such as programming or marketing, quickly and cheaply), can also lead to exploitation and precarious work arrangements (Lewchuck, 2017). Lower work costs for entrepreneurs (and other firms) also mean lower taxes and contributions to healthcare and other social costs in local communities. Hence, research on digital entrepreneurship might also be able to make contributions to important phenomena, such as responsible innovation (George et al., 2020; Owen, Bessant, & Heintz, 2013).

4.5 Revisit, Problematize, and Update Assumptions about Established Core Concepts

Many disciplines share certain concepts such as value, temporality, or agents. For example, many digital entrepreneurship endeavors, such as AirBnB, Airtasker, and Uber, focus on disrupting existing markets through novel digital technology offerings (i.e., digital technologies as outcomes) to create value for users and themselves (e.g., Gerwe & Silva, 2020). However, these ventures do not necessarily and unequivocally create value for society at large: consider AirBnB, which has exacerbated the housing-affordability issue that many residents in major cities face due to owners' efforts to reappropriate long-term living spaces into short-term AirBnB rentals.

Moreover, many digital entrepreneurship endeavors do not even manage to capture value for themselves but rely on the hope that rapid scaling will eventually allow them to capture value at some point in the future. In some cases, however, the market that they enter does not permit many disruptions, which makes it inherently difficult for digital entrepreneurship endeavors to capture value consistently even if they grow to a large scale (Kenney & Zysman, 2019). For example, the traditional taxi industry has never enjoyed large margins. Thus, ventures such as Uber had to avoid regulatory overhead and suppress drivers' income, who act as complementors to "create value" for users.

As another example, digital entrepreneurship might offer the opportunity for researchers to expand the scant attention that they have previously given to temporality (Lévesque & Stephan, 2020; Mitchell & James, 2001; Saunders & Kim, 2007). Digital technologies have peculiar temporal implications for organizing and work (MacCormack, Verganti, & Iansiti, 2001). Moreover, time tends to be among the scarcest resources in entrepreneurial endeavors, which raises certain questions about how digital technologies might change or shape organizing's temporal aspects, such as work's sequence or concurrency and how digital technologies might shape time, timing, or expectations thereof (Jarvenpaa & Valikangas, 2020).

4.6 Address Larger Societal Issues and Global Challenges

Researchers could address grand challenges, such as responses to pandemics, environmental crises, and poverty, through research on digital entrepreneurship. For example, investigating digital entrepreneurship endeavors that have emerged as a response to the coronavirus disease of 2019 (COVID-19) crisis could provide fertile ground to address a contemporary global issue where dispersed agency plays a role, while digital entrepreneurship itself might provide fertile ground to critically reflect on implicit assumptions about who constitutes an entrepreneurial agent. Research on gender equality (Sundermeier, Wessel, & Davidson, 2018) suggests that the purportedly "neutral" Internet might not be free from offline inequalities that affect whether entrepreneurial endeavors emerge (Dy, Marlow, & Lee, 2017). Women remain underrepresented in entrepreneurship. As Laguia, García-Ael, Wach, and Moriano (2019, p. 749) state, "think entrepreneur, think male". Thus, research could investigate whether digital technologies might bear the potential to rectify gender imbalances by equalizing venture-creation processes and, thereby, change how we understand entrepreneurs. In addition, questions about the digital divide and socially marginalized groups remain relatively unexplored and require empirical attention (McAdam, Crowley, & Harrison, 2019).

Likewise, digital entrepreneurship offers opportunities to level out traditional privileges and disadvantages that result from perceived lower barriers to entry, disembodied entrepreneurial actors, and the absence of markers that visibly signal disadvantage online. Meanwhile, digital technologies might help exacerbate rather than alleviate the productivity gap between emerging and developed nations due to uneven access to technology infrastructure (United Nations, 2019).

5 Using Novel Data and Methods to Investigate Digital Entrepreneurship

The fourth guiding question concerned suitable data and methods for investigating digital entrepreneurship. IS research has grown into a pluralistic, inclusive discipline. Consequently, digital entrepreneurship researchers have the full range of qualitative, quantitative, design, and mixed methods at their disposal. PDW participants recognized opportunities in the mixed methods space in particular for researchers to fully use digital capabilities to investigate nascent phenomena, such as digital entrepreneurship (e.g., Fielding, 2012; Whelan, Teigland, Vaast, & Butler, 2016).

In particular, participants saw research opportunities for researchers who employ both qualitative and quantity methods in the various types and vast amounts of digital trace data that many digital entrepreneurship endeavors create. For example, Securities and Exchange Commission (SEC) filings often include information about the type of technology that digital entrepreneurship endeavors use in their market offerings (i.e., digital technologies as outcomes). Online sources, such as StackShare or ProgrammableWeb, provide information about different digital assets that digital entrepreneurship endeavors use to build and offer their market offerings (i.e., digital technologies as enablers; e.g., Schulte-Althoff, Lee, Schewina, & Fürstenau, 2020). Some digital entrepreneurial endeavors even start on open source platforms, such as GitHub (i.e., digital technologies as contexts; e.g., Andersen & Ingram Bogusz, 2019). Others leverage blockchains to engage in initial coin offerings (i.e., digital technologies as enablers; e.g., Fisch et al., 2019), which leaves yet another type of digital trace data about entrepreneurial endeavors at different analytical levels (e.g., about artifacts, entrepreneurs, and investors). The growing accessibility and availability of such data sources in combination with advances in computational tools for data collection and analysis provide many new opportunities for researchers interested in generating and testing digital entrepreneurship theory (Freelon, 2014; Pentland, Recker, Wolf, & Wyner, 2020). At the same time, such data can also enable more inductive and explorative data-driven analyses of new

economic activity in entrepreneurship ecosystems (e.g., Basole et al., 2015; Rubens, Still, Huhtamäki, & Russell, 2011; Schulte-Althoff, et al., 2020; Schulte-Althoff, Schewina, & Fürstenau, 2019).

However, PDW participants pointed out that digital entrepreneurship researchers need to find ways to leverage and benefit from novel methods and data while adhering to traditional rigor standards. Since digital technology-enabled entrepreneurial endeavors inevitably produce digital traces, digital entrepreneurship researchers are well positioned to explore novel investigative approaches that align with the strong theory-building traditions in the social sciences while relying on the promises that novel data sources and computational approaches hold (Pentland et al., 2020).

Using adequate tools to collect and analyze such novel data enables digital entrepreneurship researchers to capture phenomena that they could not observe or that simply did not exist in the past (Agarwal, Gupta, & Kraut, 2008; Hedman, Srinivasan, & Lindgren, 2013). Therefore, digital entrepreneurship researchers could exercise pragmatic freedom by combining novel methods to understand patterns and relationships in empirical material. Of course, that does not mean that researchers should adopt an "anything goes" approach to research design (Wicks & Freeman, 1998; Xu, Zhang, & Zhou, 2020). Rather, researchers should focus on the contributions they can make to knowledge on digital entrepreneurship by appropriating and recombining methods.

6 Key Challenges in Advancing Digital Entrepreneurship Research

The fifth guiding question concerned key challenges that researchers will face when studying digital entrepreneurship. PDW participants underlined that some researchers look at digital technology and see everything as new, while others look at digital entrepreneurship and see nothing new at all (Baiyere et al., 2017). Both perspectives have some validity. We believe that digital entrepreneurship does represent a distinct phenomenon but that it somewhat overlaps in foci, assumptions, and levels of analysis with related phenomena (we summarize our perspective in Table 1).

Therefore, researchers need to study digital technology in such a way that it reveals its unique capabilities during entrepreneurial endeavors without assuming that all capabilities stemming from digital technology are necessarily unique. Researchers must balance the need to be contextual—that is, to understand what digital technology actually changes during entrepreneurial endeavors—and the need to be abstract—that is, to derive generalizable conclusions. PDW participants identified three guiding questions that can help researchers address this challenge:

- Which analytical levels do researchers need to focus on to appropriately capture the phenomenon's uniqueness?
- What role do researchers assign to digital technology at or across these levels?
- How can researchers ensure that their choice of levels does not limit their horizon and makes them miss important insights?

To illustrate the relevance of asking these questions, consider that many researchers in disciplines other than the IS discipline have only slowly begun to acknowledge the need to incorporate digital technology into their theorizing (e.g., Murra, Rhymer, & Sirmon, 2020; Nambisan, 2017). At present, digital entrepreneurship research outside the IS discipline often focuses only digital ventures based on multi-sided platforms (i.e., digital technologies as contexts). However, some fully integrated digital ventures, such as Tesla, leverage and benefit from other unique affordances that digital technology provides, such as their potential to create market offerings that can evolve continuously (i.e., digital technologies as outcomes).

PDW participants also recommended looking at non-traditional outcome and impact measures that go beyond financial performance. For example, researchers could study evolutionary speed, social performance, or inclusiveness as outcomes of entrepreneurial endeavors. A focus on such measures would allow researchers to develop novel insights and make important contributions even in samples of digital entrepreneurship endeavors that seem trivial at first sight. The potentially distinct roles that digital technologies play (i.e., their roles as enabler, outcome, and/or context) might then reveal themselves as byproducts.

Finally, to establish a vibrant and growing digital entrepreneurship research community, PDW participants proposed that digital entrepreneurship researchers also need to communicate their work in a way that makes it accessible to junior researchers in particular, which includes doctoral students. By doing so, they

can enable junior researchers to conduct follow-up studies and provide a foundation for a cumulative body of knowledge in digital entrepreneurship research. A strategy for researchers to establish a cumulative body of knowledge in digital entrepreneurship could be to not only focus on developing new theory but also to try to falsify existing theory (Burton-Jones, Recker, Indulska, Green, & Weber, 2017). Further, well established research programs about, for example, the technology adoption model, trust, auctions, or online reviews and ratings can serve as useful examples of how researchers can establish and nurture flourishing scholarly communities.

7 Conclusion

Digitalization has enhanced social interest in several phenomena such as digital entrepreneurship that, due to their nature, also interest IS scholarship. Entrepreneurial endeavors of both emergent and incumbent organizations, where digital technologies play an important role as enablers, outcomes, and/or contexts, increasingly penetrate economic activities and private lives, create business and societal opportunities, and even play a role in efforts to solve grand challenges.

Researchers across the technology and organizational sciences have naturally begun to focus more on digital entrepreneurship as its prevalence has grown. Accordingly, IS researchers have both an opportunity and obligation to not only participate but also take a leading role in conducting research on this phenomenon. If IS research led digital entrepreneurship research, IS research would grow in impact and recognition across many disciplines.

In this report, we delineate digital entrepreneurship from related phenomena, provide wide-reaching references to literature in this area, and identify research opportunities and strategies for identifying interesting new phenomena to study. Furthermore, we lay fertile ground by planting the initial seeds for research ideas on digital entrepreneurship that researchers can now develop further.

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About the Authors

Frederik von Briel is a lecturer in Strategy and Entrepreneurship at UQ Business School. Most of Frederik's current research focuses on digital entrepreneurship and digital innovation. He received his PhD from City University of Hong Kong for his work on business accelerators and high-tech start-ups. Prior to joining academia, he worked as a business intelligence consultant at Hewlett-Packard and as a customer relationship management specialist at IBM.

Jan Recker is an AIS fellow, Alexander-von-Humboldt fellow, chaired professor of Information Systems and Digital Innovation at the University of Hamburg, and adjunct professor at Queensland University of Technology. His research focuses on systems analysis and design, digital innovation and entrepreneurship, and digital solutions for sustainability challenges.

Lisen Selander is Associate Professor of Information Systems Management at University of Gothenburg, Sweden. Her research and teaching interests relate to digital transformation, digital entrepreneurship, and contemporary collective action. Her published research has appeared in such academic journals as the *MIS Quarterly*, the *Academy of Management Discoveries*, *Information Systems Journal*, and the *Journal of Information Technology*.

Sirkka L. Jarvenpaa (Sirkka.jarvenpaa@mccombs.utexas.edu) is Professor of Information Systems and Bayless/Rauscher Pierce Refsnes Chair in Business Administration at the McCombs School of Business, University of Texas at Austin. She focuses on inter-organizational and inter-personal collaboration and innovation in fast paced and technologically advanced environments with regulatory and policy implications.

Philipp Hukal is an assistant professor at Copenhagen Business School. His research examines digitally enabled innovation within and across organizations covering topics such as digital platforms, open source software development, and digital ventures. He holds a PhD in Information Systems and Management from Warwick Business School, University of Warwick.

Youngjin Yoo is the Elizabeth M. and William C. Treuhaft Professor in Entrepreneurship and Professor of Information Systems at the department of Design & Innovation at the Weatherhead School of Management, Case Western Reserve University. An Association of Information Systems Fellow, he is also WBS Distinguished Research Environment Professor at Warwick Business School, UK, and a Visiting Professor at the London School of Economics, UK. He is the founding faculty director of xLab at Case Western Reserve University. He has worked as Innovation Architect at the University Hospitals in Cleveland, overseeing the digital transformation efforts at one of the largest teaching hospital systems in the country. He studies digital innovation and has published at leading academic journals such as *MIS Quarterly*, *Information Systems Research*, *Organization Science*, the *Communications of the ACM*, and the *Academy of Management Journal,* and others.

Julian Lehmann is assistant professor of digital entrepreneurship and innovation at the KIN Center for Digital Innovation, Vrije Universiteit Amsterdam. His research focuses on the design of novel digital products and services by incumbent and entrepreneurial firms in both established and emerging industries.

Yolande E. Chan is Associate Dean (Research and PhD-MSc Programs) and E. Marie Shantz Professor of MIS at Queen's University in Canada. She holds a PhD in Business Administration from Western University, an MPhil in Management Studies from Oxford University, and SM and SB degrees in Electrical Engineering and Computer Science from MIT. She is a Rhodes Scholar. She studies IT strategy, knowledge strategy, digital innovation, and digital entrepreneurship, and publishes in leading journals such as *MIS Quarterly*, *Information Systems Research*, *Information Systems Journal*, *Journal of the AIS*, *Journal of Information Technology*, *Journal of Management Information Systems*, and *Journal of Strategic Information Systems*. She has served on boards of journals such as *Information Systems Journal*, as an associate editor for journals such as *MIS Quarterly*, and as senior editor for *Journal of Strategic Information Systems* and *MISQ Executive*. She is a Fellow of the Association for Information Systems. At Queen's University, she received research awards, the Commerce Teaching Excellence Award, the Commerce Professor Student Life Award, the Queen's Excellence in Graduate Supervision Award, and the Queen's Distinguished Service Award.

Hannes Rothe is an assistant professor at the Digital Entrepreneurship Hub, Freie Universität Berlin, where he is responsible for coordinating the university's entrepreneurship education. He has been a

visiting researcher at University of Cambridge (UK) and TU Graz (Austria). His research focus lies on digital entrepeneurship, organizing data & knowledge, and digital infrastructures and ecosystems. Among others, his work has been published in journals such as the *Journal of the Association for Information Systems*, the *Information Systems Journal*, *Communications of the Association for Information Systems*, and presented at leading information systems conferences. He was runner-up and winner of multiple paper awards, including the Claudio Ciborra Award for the most innovative paper in 2019.

Paul Alpar is Professor at Philipps University of Marburg, Department of Mathematics and Computer Science. He received his doctoral degree from Goethe University Frankfurt. He has been a faculty member at University of Illinois, Chicago, and a Visiting Scholar at the universities of Frankfurt, Germany; New Mexico, Albuquerque; Tel-Aviv, Israel; California, Berkeley; Georgia State, Atlanta; and VGU, Vietnam. His research interests include evaluation of IS value, decision support, and electronic business. He has published in *Journal of MIS*, *Decision Support Systems*, *Journal of Organizational Computing*, *International Journal of Electronic Commerce*, *IEEE Transactions on Engineering Management*, *Information and Management*, *International Journal of Research in Marketing*, *Journal of Productivity Analysis*, and many other journals. He is also (co-)author of five books on IS issues (in German). He currently serves on the editorial boards of *European Journal of IS* and *IS Management*.

Daniel Fürstenau is an Assistant Professor at FU Berlin's Department of Information Systems and the Einstein Center Digital Future. He received his PhD from FU Berlin in 2014. His research focuses on IT architecture, IT governance, as well as digital platforms and ecosystems (especially in healthcare). His research has been published in journals such as *Information Systems Research*, *Electronic Markets*, *Business & Information Systems Engineering*, *BMC Health Services Research*, and the most important information systems conferences.

Bastian Wurm is a PhD student with the Institute for Information Business at Wirtschaftsuniversität Wien (WU Vienna), Austria. He is interested in topics at the intersection of information systems and organization science. In particular, his research is centered around business process change and the development of holacratic organizations. His work is published in the leading information systems conferences, such as the European Conference on Information Systems, the International Conference on Business Process Management, and the Hawaii International Conference on System Sciences. He has also been a presenter at the European Group for Organizational Studies. His master thesis has won the Best Master Thesis Award by the University of Liechtenstein and the Young Scientist Award by the Austrian Society for Process Management.

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