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Literature review: Understanding information systems strategy in the digital age

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ABSTRACT

IT/IS strategy is of central importance to practice and many well-developed lines of research have contributed to our understanding of IT/IS strategy. However, throughout the last decade, digitalization has fundamentally transformed the business world and put into question traditional strategy wisdom. As information technologies are the driver of this digital transformation, we can expect an even more fundamental change in IT/IS strategy thinking. To verify this expectation, we undertook an in-depth, extensive review of the academic literature on this topic. Our review, which is time-framed to the years 2008–2018, distils five different directions in the development of IT/IS strategy research. It also identifies a shift in how IT/IS strategy is defined and investigated over this period. Moreover, we present an emerging debate on how digitalization challenges traditional IT/IS strategy wisdom. As this debate is still in its infancy, we take it further by entering into the larger discussion on digitalization, including digital innovation, digital ecosystems, and digital transformation. Building on this, we derive at deeper insights on how IT/IS strategy could, should, or should better not be understood in the digital age.

Introduction

Digitalization is in full swing. The advent and ubiquitous presence of digital technologies and the pace of technologically-driven innovations are transforming organizations, the economy, and the society at large. Although driven by technology, digitalization is not a mere technological phenomenon but has fundamental economic and societal consequences that can be seen in many aspects of our professional and private lives (Hess et al., 2016; Legner et al., 2017).

Given the far-reaching socio-technological impacts, practitioners are intensely discussing the managerial challenges imposed by digitalization. Management consultancies are meanwhile documenting their capability to give detailed advice on how to address these challenges in a plethora of publications (Stockhinger and Teubner, 2018). In comparison, researchers are just beginning to investigate the new challenges in depth (Legner et al., 2017; Riedl et al., 2017).

Despite the nascent state of research on digitalization, there is consensus among academics that the related change puts traditional management wisdom into question (Nambisan et al., 2017). This is especially true for strategy concepts and modes of strategy development (Venkatraman, 2017) as evidenced by management journals devoting special issues to this topic (recent examples are the 2018 calls for papers for special issues on “Strategizing in a digital world” by Long Range Planning, “Strategies in the Global Digital Economy” by the Global Strategy Journal, and the 2019 Special Issue on “Strategy in the Digital Age” issued by Strategy Science).

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Given that digitalization challenges strategy thinking in general, we can expect it to have an even more profound impact on IT/IS strategy thinking. The reason is simple: it is (digital) information technologies that lever digitalization. Several special issues in prestigious IS journals support this conclusion (e.g., JSIS 20th Anniversary Special Issue (2012), JSIS Special Issue (2014), and MISQ Special Issue (2013)). As a case in point, the editors of the MISQ special issue are convinced that "it is clearly time to rethink the role of IT strategy" and its relation to business strategy (Bharadwaj et al., 2013, p. 472). These authors assert that traditional notions of IT/IS strategy are too narrow in a digital world and call for a view of strategy that "reflects a fusion between IT strategy and business strategy": a digital business strategy (Bharadwaj et al., 2013). Other scholars disagree; they expect digitalization to increase the importance of IT/IS strategy making, which, in their eyes, becomes an obligatory exercise for every digital organization (Peppard and Ward, 2016). Irrespective of the point of view taken, we suggest that digitalization challenges traditional notions of IT/IS strategy, thus providing impetus for the development of more contemporary conceptions of IT/IS strategy and their relations to business strategy.

Taking this as a motivation, we undertook a review of the latest research on IT/IS strategy and the discussion surrounding it to identify new ways of making sense of the concept. We time-framed our study to the period from 2008 to 2018 when the phenomenon of digitalization took shape in the academic debate. Researchers (Tilson et al., 2010; Yoo et al., 2010) and textbook authors (Lemke and Brenner, 2015; Laudon and Laudon, 2018) concur that digitalization is a new phenomenon of the last decade. Prior to this period, the term digitalization was not commonly used and had a rather technical meaning in the cases where it occurred (Tilson et al., 2010). This makes the years from 2008 until present a highly relevant period for studying possible effects of digitalization on IT/IS strategy. The year 2008 also lends itself to marking the beginning of a digital era in everyday life: it was in the years 2007/08 when Apple introduced the first iPhone. The iPhone represents a culmination of breakthrough digital technology developments in photography, mobile telephony, wireless data communication, high-resolution displays and touchscreens. Hence, it is for good reasons seen as the prototype of the modern smartphone, which has changed our lives so dramatically, including the ways we work and consume.

The objective of our literature review is to uncover whether, and if so how, digitalization has found its way into IT/IS strategy research and the academic debate surrounding it. In particular, we pose the following three research questions building on one another in terms of depth of investigation:

RQ1: In terms of *research activity*: Does digitalization impact the debate on IT/IS strategy quantitatively? More specifically, has digitalization had an inciting effect on the interest and attention researchers pay to the strategic role of IT/IS?
RQ2: In terms of *topics and key concerns investigated*: Does digitalization raise new questions for IT/IS strategy research? And does digitalization alter the way researchers frame known issues and well-researched problems concerning, for example, the competitive impacts of IT, the alignment of IT and business strategies, or strategy development?
RQ3: In terms of the *conceptualization of IT/IS strategy* in research: Have definitions and conceptualizations changed in the context of digitalization? Even more fundamentally, does digitalization put into question our traditional perceptions of IT/IS strategy?

We start by answering the most general research question RQ1 in the following, second section. In the subsequent third section, we dive deeper into the particular topics that have attracted the attention of academics in the last decade (RQ2). Our answer to RQ3 is in two parts. We first analyse in more detail how the academic view on and the understanding of IT/IS strategy have changed during the last, "digital" decade and investigate, if and how researchers have challenged traditional IT/IS strategy conceptions (fourth section). Building on this analysis and extending it with insights from the larger discussion on digitalization, we finally derive insights on how IT/IS strategy could, should, or should not be understood in the digital age (fifth section). In the conclusion we summarize how these insights can inform future research.

Each of the following sections starts with a short introduction to the specific research methodology used for answering the respective research question RQ1 to RQ3 before it introduces the readers to our findings. The appendices A-C provide additional and more detailed information on the research methodology and the publications selected for and included in our analysis.

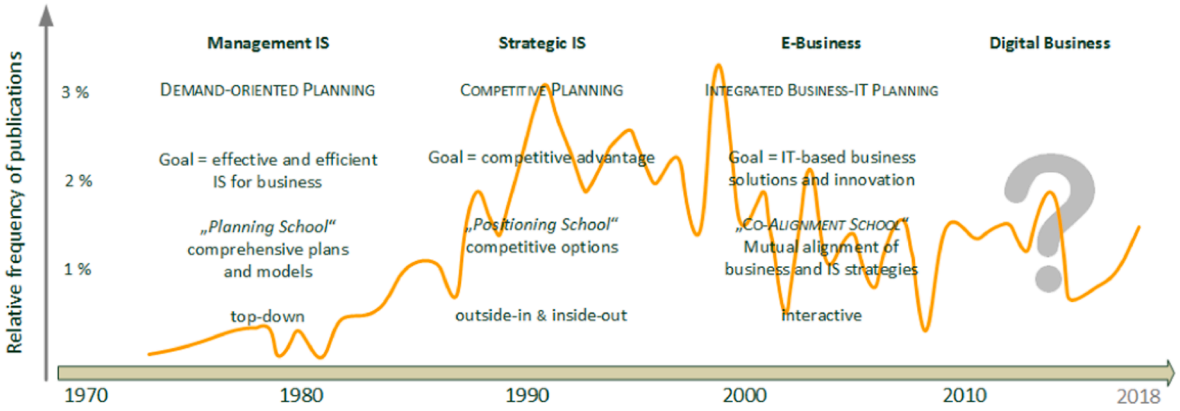

Fig. 1. The evolution of the academic debate on IT/IS strategy and strategy development (Teubner (2013, p. 245) with the addition of the results of our study for the years 2008–2018).

IT/IS strategy research and publication activity in the "Digital Era"

To get a first idea of how digitalization might have affected research on IT/IS strategy and strategy development, we compared the research and publication activity in the years 2008–2018 with that of prior years. For this purpose, we used a controlled sample of scholarly articles published in top-ranking IS and business management journals. For the periods before 2008, we used the work of Teubner and Mocker (2008) and Chen et al. (2010). The authors of these studies analysed the publication activity on IT/IS strategy, strategy formulation, implementation, and impact using a defined sample of renowned IS and management journals. We extended their study to the next decade. A diligent replication of their search and selection procedure provided us with a set of N = 66 additional articles for the years 2008 to 2018. All of these articles were closely related to the IT/IS strategy concept in that they used the terms "information", "information technology", or "information systems" together with the term "strategy" (including abbreviations) in the heading, abstract, or keywords. Appendix A lists the articles included in our quantitative analysis. These articles comprised 1.1% of the overall number of articles published in the selected journals in the period from 2008 to 2018.

Fig. 1 follows Teubner (2013) in roughly dividing IT/IS strategy research until 2008 into three eras: management IS, strategic IS, and e-business. Teubner's framing of the third era as the "e-business era" with no mention of the term "digitalization" implicitly supports our regarding of this period as a "pre-digitalization era". Merali et al. (2012), in their review of research on IT/IS strategy and its development, characterized research in that time period as the era of "webs and networks", again without any reference to digitalization. As we perceive digitalization to go beyond "webs and networks" or "e-business", we expect a new impetus for the debate on IT/IS strategy development post-2008.

In terms of publication activity, the study by Teubner (2013) brought to light that IT/IS did not become a managerial concern until the late 1970s; this concern emerged with advances made in data processing and telecommunications technology and increased use of IT in business throughout the 1980s. By the end of the 1980s and during the 1990s, the business potential of IT and its competitive impacts resulted in researchers focusing their attention on "strategic information systems". Another major research topic that emerged at that time was the alignment of IT/IS strategies and business strategies. As a result, research and publication activity peaked in the 1990s. However, around the turn of the century publication activity slowed (Teubner and Mocker, 2008). This downturn coincided with several researchers denying that IT had the potential to achieve sustainable competitive advantages and proposing that IT be considered a commodity (Carr, 2003; McAfee and Brynjolfsson, 2008).

There was a rise in publication activity towards the end of the first decade of the millennium, though the publication numbers do not come close to the peak rates of the "golden age" of IT/IS strategy research (the "strategic IS" period). Our analysis of the decade after 2008 shows that with an average of 1.1% publications per year and a peak of about 2%, there is evidence that the downtrend in interest in IT/IS strategy has ended. This momentum, however, is carried to some extent by three special issues on the larger field of IT/IS strategy published during this time (JSIS 20th Anniversary Special Issue 21(2) in 2012; JSIS Special Issue 23(1) in 2014; MISQ Special Issue 37(2) in 2013). The revival of research and publication activity we observed motivated us to take a more in-depth look into the concerns that have attracted the attention of academics and inspired discussion in the last decade.

Impacts of digitalization on the IT/IS strategy discourse

For answering research questions RQ2 and RQ3, we extended our literature review beyond the controlled but small sample of leading IS and business management journals used for RQ1 to a larger body of literature, which we look upon as representing the broader academic discussion on this topic. We did not restrict this literature body to publications in journals but included conferences as well. While research outlets are central, the discussion is not limited to them. Academic anthologies and textbooks might also include relevant views and ideas, which have not found their way into research yet. Professional outlets may also publish findings from applied (academic) research, but we excluded non-academic publications, since we found discussions by practitioners and consultants to be surrounded by buzz, which renders attempts to conceptualize and theorize difficult (Stockhinger and Teubner, 2018).

We expected that academic articles or book chapters making a relevant contribution to the IT/IS strategy discussion would use terms such as "information", "technology", and "system" in direct relation to "strategy" in their title, abstract, or keywords, which is why we constructed our search string as illustrated in Appendix B. In this respect, our study follows the study of Chen et al. (2010), which has only recently been replicated by Williams et al. (2018, 2020). Our strict focus on IT/IS strategy is what distinguishes this review from the more general ones of Merali et al. (2012) and Moeini et al. (2019).

For capturing the specific influence of digitalization on the IT/IS strategy discourse, we combined two approaches. First, we time-framed our review to the decade from 2008 to 2018. Second, we investigated the literature with particular attention to the use of the term "digitalization" and related terms such as "digitization" or "digital transformation". As we could not expect all authors to use these terms, we also formulated a working definition of digitalization. Based on this definition, we decided whether concerns discussed in the IT/IS strategy debate were in effect related to digitalization or not, even when the authors did not use this term explicitly.

The driver and core characteristic of digitalization is a specific set of information technologies that many contemporary authors refer to using the acronym "SMAC – social, mobile, analytics, and cloud" (Peppard and Ward, 2016; Sebastian et al., 2017). Though SMAC technologies are the driver, digitalization is not a mere technical phenomenon, but also an economic and societal one. For this reason, we clearly distinguish between the technical phenomenon of digitization and the larger, socio-technical one of digitalization. Though the terms are often used interchangeably (Hess et al., 2016; Bloomberg, 2018), digitization in a strict definition means converting the physical representation of information from an analogous one to a digital one in bits and bytes. Representing information in a digital form is not a new idea, electronic computers have always stored and processed data in that form. What is new, however, is the homogenization of the digital representation of information of different types, including computer data, music, videos,

books, and telephone calls. This homogenization has removed the tight coupling between information representation and the devices required for processing, storing, and transmitting it – a phenomenon, which Yoo et al. (2010) call "digital convergence".

The impact of digital convergence is leveraged by the pervasiveness of digital technologies. Continuing miniaturization paralleled with enormous increases in processing power, storage capacity, and network bandwidth have made digitization ubiquitous. Technology development still follows Moore's well-established law, which predicts progress in miniaturization and computing power of digital technologies in an exponential scale over time at constant cost (Moore, 1965). This development has bestowed us with high power devices at reasonable prices, which we now use in all spheres of our life.

Substantial improvements in network capacity and broad (mobile) network coverage have further accelerated the effects of convergence and ubiquity (Adner et al., 2019). It is well-known that the value of a network increases exponentially with the number of users (as described in Metcalfe's Law (Gilder, 1993)). In parallel to the diffusion of small, cheap, and powerful digital devices, which have allowed digital substitutes for material goods (e.g. books), connectivity has shifted to "always-on". In combination with the increased network capacity it allows for delivering digital goods in real-time. Digital technology has also been used to enrich physical products so that they have the capacity to collect and process information. Powerful networks, in addition, allow the collection and exchange of this information as is the case for the "Internet of Things (IoT)" (Wortmann and Flüchter, 2015).

Digital convergence, ubiquity, and connectivity in concert with the broad adoption and usage of digital technologies in multiple social and institutional contexts have rendered these technologies "infrastructural" (Tilson et al., 2010; Henfridsson and Bygstad, 2013). Their use is so deeply embedded in social routines that we often take it for granted. In most instances, they remain invisible unless they breakdown (Star and Ruhleder, 1996; Ciborra, 2001; Pipek and Wulf, 2009; Hanseth, 2010). In fact, as infrastructures, digital technologies are deeply and ambiently embedded in our daily routines and have become a constituent of our business and private lives. Hence, we use the term "digitalization" to refer to the socio-technical change invoked by digital technologies and their confluence in digital infrastructures. Unlike digitization, which is a mere technical phenomenon, digitalization has impacts on society and the economy through fostering, for example, communication, mobility, speed, virtualization, dissolution of boundaries, interconnectedness, market transparency, and competition.

> *"Digitalization refers to the interplay between digital technologies and social and institutional processes that render these technologies infrastructural so that they eventually shape our modern society and economy and are shaped by it."*

With the above definition of digitalization in mind, we first studied textbooks to see whether and how digitalization has influenced teaching on IT/IS strategy. We used textbooks engaging specifically with the (strategic) management of IT/IS. To ensure academic relevance, we focused on textbooks already established in the market in editions three or higher (see Appendix B for more details). This choice also allowed for analysing the changes made to the editions over time within the period of interest. Our analysis showed that digitalization had found its way into all the textbooks we studied but in different ways. Peppard and Ward (2016) had even added the subtitle "building a digital strategy" to their book. This, however, does not mean that they have fundamentally rewritten their textbook. Instead, they seem to have replaced the term "IT/IS strategy" with the more prominent term "digital strategy" but use both terms interchangeably. This use contrasts with other authors who make a clear distinction between IT/IS strategy and digital strategy. The textbook by McKeen and Smith (2019), for example, displays an overhauled agenda when compared to the 2012 edition. The authors have added new chapters on digital-, data-, and cloud strategies and introduced additional topics to existing chapters, including IT-driven innovation, digital customer experiences, big data, and business intelligence. Dubey (2018) presents an updated understanding of IT/IS strategy. Whereas Dubey in the 2010 edition based his conceptualization of IT/IS strategy on Earl's (1989) "triangle model", he extends this model to involve cloud adoption and enterprise data management strategies in the 2018 edition. Pearlson et al. (2016) re-contextualize their IT/IS strategy model rather than replace it. In the later edition they stick to what they call the "Information Systems Strategy Triangle", composed of business, organizational, and information strategy but they embed their strategy triangle into the new socio-technical context of digitalization. The current edition of the book also presents big data and data analytics in some depth and includes a new chapter on security.

Our textbook study served as a preparatory exercise for analysing research papers. It gave us an initial idea of topical IT/IS strategy concerns that might have also attracted the attention of researchers. Following the procedure described in Appendix B (Fig. 3) we identified 141 research articles that contribute to the larger IT/IS strategy debate (Table 7). In our study of these articles we found that research on IT/IS strategy has changed if compared to research in the earlier time periods (Chen et al., 2010; Merali et al., 2012; Teubner, 2013), but not fundamentally. We found that only a small portion of articles explicitly referred to the phenomenon of "digitalization" in the heading or abstract (e.g., El Sawy et al., 2010; Yeow et al., 2018). Well-known topics such as IT and competitive advantage, strategic alignment, and the impacts of IT/IS strategy on business success are still dominant, whereas the impact of digitalization on IT/IS strategy research remains subtle. It is more an issue of taking on new perspectives in answering well-known research questions than about changing the research agenda.

Rather than finding a revolution in IT/IS strategy research, we identified five new research trends as an answer to our second research question (RQ2). First, researchers explicitly acknowledge that IT/IS strategy-making must not stop at the borders of the organization or industry, but should involve a broader, cross-industry business context. Second, researchers pay specific attention to the accelerated environmental change driven by digital technologies. Third, while researchers have traditionally investigated the exploitation of IT in support of business strategies, IT/IS strategy is increasingly acknowledged as being corporate-wide and enabling business strategy. Accordingly, recent research is interested in the exploration of new valuable uses of IT as opposed to exploiting the potential of IT in known ways. Fourth, we observed the tendency in the development of resource-based theories to extend the view from IT resources and capabilities to business capabilities enabled by IT; these resources are not conceptualized as separate sets of IT

assets and skills but are associated with co-specialized business capabilities, especially with those capabilities assumed critical in the digital age. Fifth, the concept of IT/IS strategy has widened to acknowledge the interconnectedness of business and IT. Some scholars even propose to replace IT/IS strategy with the broader concept of a "digital (business) strategy". In the following sections, we introduce exemplary literature in support of the five research trends identified.

From organizational to supra-organizational strategies

In their research commentary on IT/IS strategy research, Tanriverdi et al. (2010, p. 823) point out that IT-based interconnectedness has fused into the fabric of products, services and business processes, which has increased the "diversity, adaptiveness, interconnectedness, and interdependencies of firms". In response, Tanriverdi et al. (2010) introduce the notion of CABS – complex adaptive business systems – as a new supra-organizational perspective to research. They claim that CABS increase the complexity of strategy development to a level where the traditional quests in IT/IS strategy research (the strategic alignment quest, the quest for integrating IT and business processes, and the quest for sustained competitive advantage through IT) have lost relevance and need reframing.

Several studies investigating firm interrelatedness take the competitive advantage quest to a higher level. A study by Chi et al. (2010), for example, investigates alliance networks and how their structure affects a company's competitive position. They find that a company's capability to use IT effectively influences its potential to tap into valuable knowledge and resources in business networks. A complementing study by Rai et al. (2012) analyses how IT helps co-create relational value in inter-firm relationships. Tan et al. (2015), on the other hand, highlight the increasing importance of inter-network competition as opposed to inter-firm competition in the digital age. In their study, they ask how the IT capabilities of a platform sponsor support and co-evolve with the development of the related network and ecosystem of producers, intermediaries, customers, and suppliers of complementary products and services whose transactions it supports.

The ecosystem as a new lens for studying strategy making is also present in studies concerned with the role of IT in creating complementarities between products and services and in enabling co-operation between the independent companies offering them (Weill and Woerner, 2015; Nan and Tanriverdi, 2017). In line with an ecosystems view, Seo (2017) argues that digital technologies allow companies to move beyond the boundaries of their ancestral industries in that they enable them to enter new markets with (digital) products and services without the need for owning additional industry-specific resources. In this new situation, which she calls "digital business convergence", she urges a more comprehensive analysis of an organization's business environment. Rather than taking a narrow vertical, horizontal, or single-industry perspective, she warns, researchers should conceive of the competitive environment of companies as a set of contested fields for strategic actions (Seo, 2017, p. 691). Her warning does not put into question vertical and horizontal strategies per se but cautions against restricting the view to these traditional fields for strategic action. As demonstrated by the study of Qrunfleh and Tarafdar (2014), traditional supply chain strategies are still valid with IT/IS strategies having moderating effects.

We also spotted a disposition of researchers to consider opening the internal strategy development process to external groups, as is the case with open strategy development (Cui et al., 2015; Tavakoli et al., 2017). Other researchers taking an ecosystems view caution against revealing IT/IS strategies to potential competitors (Grover and Kohli, 2013) or mandate formulating an explicit "transparency strategy" to "selectively disclose information outside the boundaries of the firm" for competing in a digital world (Granados and Gupta, 2013, p. 637).

From reasonably ponderable to turbulent environments

The concept of complex adaptive business systems (CABS) that Tanriverdi et al. (2010) introduced to IT/IS strategy research represents a supra-organizational perspective on IT/IS strategy, but also acknowledges the specific challenges of strategy development in "rugged" competitive landscapes where digital technologies are accelerating change. Nan and Tanriverdi (2017) dive deeper into the dynamics in CABS by formally modelling the causal paths between IT innovation at the firm level and hyperturbulence at the collective level. In simulations, the researchers find support for their hypotheses that both firm-level innovations in IT components and IT architecture affect hyperturbulence, with the component effects being less pronounced and persistent than architectural ones. A research commentary by El Sawy et al. (2010, p. 835, 837) introduces a similar concept, "digital ecodynamics", to the discussion, which the authors expect to "fuel the next leap in knowledge in the IS strategy arena". Digital ecodynamics is related to CABS in that it incorporates the mutual interplay of IT systems, organizational capabilities, and the turbulent environments that today's organizations face. In these environments, the authors argue, it is crucial for organizations to build dynamic capabilities with IT/IS being a vital lever to do so. The increased use of IT/IS in organizations, in turn, has accelerating effects on the overall business environment. Agarwal and Tiwana (2015, p. 473) have introduced the term "Red Queen competition" to refer to such an accelerated competitive environment where a company has to evolve "progressively faster just to keep up with its cohort of rivals".

Environmental turbulence has also become an explicit variable in much of the recent empirical research. Newkirk et al. (2008), for example, investigate whether and how rapid IT and business change affect the horizon for strategic IT/IS planning. Pavlou and El Sawy (2006) study IT-enabled competitive advantage under the specific conditions of turbulent environments. Leidner et al. (2011) investigate turbulence as a variable moderating the essential relationship between the IT/IS strategy type firms pursue and its effect on performance. Environmental turbulence has also significantly influenced research on strategic IT/IS alignment. While alignment is traditionally looked upon as critical and having positive effects, Tallon and Pinsonneault (2011, p. 464) ask whether it "helps or hurts" organizational agility; they define organizational agility as the ability to detect and respond to environmental "opportunities and threats with ease, speed, and dexterity". Their survey finds that agility positively affects firm performance under conditions of both

stability and turbulence, but the effect is more significant for turbulent environments. Results also show a general and positive effect of alignment on agility, regardless of market volatility. Other authors use measures that are more sophisticated and receive more nuanced results. While Tallon and Pinsonneault use a proxy for strategic alignment, i.e. by the use of IT in five principal business processes, Liang et al. (2017) develop dedicated measures for alignment on an intellectual and social level. They find that strong intellectual alignment, i.e. the formal integration of business and IT/IS strategies, tends to create inertia inhibiting organizational alignment. Communication and shared decision-making in strategy formulation and other forms of social alignment, in contrast, work against inertia and improve coordination, thus ultimately furthering agility.

From exploitation to exploration

Recent research on strategic alignment not only acknowledges agility as a critical ability for responding to turbulent environments but also re-evaluates the role of IT/IS strategy. While research has long looked upon IT/IS strategy as following and being somehow subordinate to business strategies, it now explicitly acknowledges its role in driving business change. Researchers emphasize IT/IS strategy to be a strategy in its own right capable of enabling and leading business strategy (Chen et al., 2010). Tanriverdi et al. (2010), for example, speak in favour of strong IT/IS strategies, which they believe can open up new business opportunities and provide access to profitable markets in digital business environments. This idea is in line with the findings of Teubner (2013), who observed that IT/IS strategies are sometimes used as "innovation agendas" by CIOs selling their issues to top management. Research by Johnson and Lederer (2013), Lo (2016), and Lo and Leidner (2018) dives deeper into innovative IT/IS strategies and how they affect organizational performance. Findings so far suggest that innovative strategies positively affect the IT/IS contribution to business performance.

The overall shift towards more innovative IT/IS strategies is also reflected in research on "IT/IS strategizing" (e.g., Galliers, 2006, 2011; Marabelli and Galliers, 2017), which studies the making of strategy through a "strategy-as-practice lens" (Whittington, 1996, 2014). In line with research findings on innovative IT/IS strategies, the IT/IS strategizing research extends strategy development from the exploitation of existing technologies for well-known business purposes to the innovative exploration of new technologies and options for use. The exploitation mode of strategy development, which has prevailed in the past, "(…) bears many of the hallmarks of mainstream and earlier thinking on IS strategy" (Galliers, 2011, p. 335). Exploitation is analytic and results in deliberate strategies. Exploration, in contrast, is associated with "bricolage", "improvisation", and "muddling through" to allow for learning and experimentation, although with a sense of direction and purpose. It aims at fathoming IT's potential to open up new ways of doing business (Galliers, 2011). Peppard et al. (2014) argue that strategizing, which is not restricted to decision-making at the top management level but includes micro-level activities at all levels of the firm, is particularly suitable to meet the demands of the ever-increasing digitization of business where IT is embedded into products and services, customer interactions and experiences, business operations, supply chains, as well as into relationships with investors and regulators. The distinction between exploitation and exploration strategies also finds empirical support in Gregory et al. (2012) and the studies of Lo (2012) and Lo and Leidner (2012); these studies highlight the effectiveness of ambidextrous IT/IS strategies. Ambidexterity combines the cautious adoption of technologies and the refinement of existing solutions for efficiency with the exploration of new technological opportunities in pursuit of business innovations. Accordingly, Dixon et al. (2017) propose that IT/IS ambidexterity should be looked on as a dynamic capability that enables companies to meet the competing demands of IT exploitation and exploration under conditions where there is fierce competition and revolutionary change at the same time.

From IT/IS capabilities to IT-enabled business capabilities

Research on IT/IS capabilities is rooted in the resource-based theory (RBT) of the firm, which suggests that an organization's resource endowment is key to superior performance (Barney, 1991). Early research examining whether IT can be classified as a resource that yields competitive advantage found that in most cases it is not technology per se but the ability to deploy and use IT effectively that has the potential to provide a sustainable advantage (Mata et al., 1995). In response, researchers expanded their understanding of IT resources to include the "capacities to deploy resources, usually in combination, using organizational processes, to effect a desired end" (Amit and Schoemaker, 1993, p. 35). The vast majority of contemporary research follows this understanding making "IT capabilities" their object of study, rather than IT resources in a narrow sense (Seddon, 2014). This shift from IT resources to capabilities also allowed for introducing a dynamic view; researchers no longer stop at investigating IT resources and capabilities at a specific point in time but they also examine how good organizations are in creating, extending, or modifying their IT resource and capability base to respond to shifts in the business environment (Bhatt and Grover, 2005; Piccoli and Ives, 2005). Unlike conventional capabilities, such dynamic capabilities describe an organization's ability to purposefully renew its resource base and the ways of using it (Teece et al., 1997). Accordingly, researchers tend to use the concept of dynamic capabilities as opposed to ordinary capabilities when it comes to studying changing technological, economic, and societal conditions (Baker et al., 2011; Rowe et al., 2017).

More recent than the trend to take a dynamic perspective on IT capabilities is the tendency to dissolve the boundaries between IT capabilities and business capabilities. Researchers are increasingly interested in the relation between IT capabilities and co-specialized business capabilities. Such capabilities, which are considered as critical in today's environments, include research and development, marketing, operations improvement, and quality management capabilities (Chen et al., 2012; Pérez-Aróstegui et al., 2015). More generic than these functional capabilities is absorptive capacity (Roberts et al., 2012), which fosters adaptability and responsiveness to changing environmental conditions (Chen et al., 2017) as well as agility, innovativeness, knowledge (Joshi et al., 2010; Ravichandran, 2018), and organizational learning (Chan et al., 2016). Many of these IT-enabled business capabilities studied by researchers relate to digitalization directly or indirectly (Drnevich and Croson, 2013; van de Wetering et al., 2017), so that they are sometimes seen as

integral "digital capabilities" (Kohli and Grover, 2008; Roberts et al., 2012; Sandberg, 2014). There is, for example, a close relation between agility as an IT-enabled business capability and digital innovation (Overby et al., 2006; van Oosterhout et al., 2006). Agility represents the ability of organizations to sense and respond to a changing environment (Ravichandran, 2018). As agility includes the competence to detect opportunities for innovation and to seize new opportunities in a competitive market (Chakravarty et al., 2013), it furthers innovativeness. Several studies highlight the role of IT for business innovation in general (Ashurst et al., 2012; Devece et al., 2017) and digital business innovation in particular (Chen et al., 2015).

From IT/IS strategy to digital strategy

Analogous to extending IT capabilities to integrated IT-enabled business capabilities, scholars also suggest thinking of IT/IS strategy and business strategy in a more integrative manner in the face of digitalization. As digital technologies have become an integral part of the products and services, customer interactions, and business models of contemporary firms, many scholars argue that digital technologies need to be considered as an integral part of business strategy development. Ross et al. (2016, p. 3) and Sebastian et al. (2017, p. 198) characterize digital strategy as being "(…) inspired by the capabilities of powerful, readily accessible technologies (like SMACIT), intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions". Several case studies (El Sawy et al., 2016; Hess et al., 2016; Sia et al., 2016; Mocker and Ross, 2018) and the comparative field study work of Ross et al. (2016) and Sebastian et al. (2017) add to this view. Ross et al. and Sebastian et al., who studied 25 large and established companies embarking on digitalization, reveal some common patterns. While digital technologies (e.g. SMAC) were the driving force in some companies, others focused on their customers and the use of media and technology for better engaging with them. Irrespective of the approach, most companies pursued the development of an efficient and reliable operational IT/IS backbone in parallel to developing solutions in an agile and flexible way to seize new market and customer opportunities opened up by digitalization and to respond swiftly to a changing environment (Ross et al., 2019).

The term "digital strategy" is also highly popular in academic textbooks and the consulting literature (Peppard and Ward, 2016; Phillips and Moutinho, 2018; McKeen and Smith, 2019). Peppard and Ward (2016, p. 32) look upon digital strategy as "an emerging convenient label for what we have traditionally called IS and IT strategies". The majority of authors, however, use the term more broadly to refer to business strategies that aim at addressing the opportunities of digitalization and current challenges imposed by it (El Sawy et al., 2016; Kane et al., 2016).

Though definitions are still far from consistent, the more specific concept of digital business strategy (DBS) has come to the fore in the recent academic debate (Holotiuk and Beimborn, 2017; Kahre et al., 2017). A special issue of MIS Quarterly in 2013 popularized the term originally coined by Mithas and Lucas (2010) and Mithas et al. (2012). In this special issue, Bharadwaj et al. (2013, p. 472) define digital business strategy as an "organizational strategy formulated and executed by leveraging digital resources to create differential value". DBS is seen as a "(…) business strategy (…) for the digital era" (Bharadwaj et al., 2013, p. 473), which inherently builds on the potential of digital technologies. The DBS concept promotes a confluence of business and IT/IS strategy that renders an explicit alignment of both strategies obsolete. In line with this view, Tanriverdi et al. (2010) recommend dropping the traditional alignment quest in favour of following a path on which IT and business capabilities co-evolve with the developments occurring in a company's digital ecosystem. Yeow et al. (2018) add to this view by suggesting alignment becomes an iterative and continual process of perpetually reconfiguring organizational and IT/IS resources and developing them in concert. Yeow et al. (2018) also suggest that sensing, seizing, and transforming capabilities are essential for carrying out this process effectively. The concept of DBS has also been applied to specific organizational settings and industries in case study research (Oestreicher-Singer and Zalmanson, 2013; Setia et al., 2013).

The conceptualization of DBS seems to break with the well-established tradition of strategic alignment research, which has studied the interdependencies and interactions of IT/IS and business strategy making in detail (Chan and Reich, 2007; Coltman et al., 2015). While there is a close relation to IT/IS strategy, DBS dismisses a conceptual distinction between business strategy and IT/IS strategy and thus puts into question the validity of IT/IS strategy as a concept in its own right (Chen et al., 2010).

How digitalization is changing our understanding of IT/IS strategy

The third and ultimate objective of this review (RQ 3) is to identify how the academic discussion on digitalization has influenced – and is still influencing – traditional IT/IS strategy wisdom. Given the fundamental changes that we face in the digital age, we can expect changes in the way scholars discuss IT/IS strategy. To verify our expectation, we analysed in more depth the notions of IT/IS strategy prevailing in the publications of the decade 2008–2018. For this purpose, we narrowed down our sample to publications that defined IT/IS strategy explicitly or implicitly, thus making our review more focused on the concept of IT/IS strategy than the study of Williams et al. (2020) (see Appendix C for more details).

In total, we were able to distil definitions from only 47 publications out of the previously identified 141 publications included in our relevant body of literature. This also means that two-thirds of the articles left the reader in doubt about their specific understanding of IT/IS strategy. We coded the 47 publications according to the strategy conceptions used. We adopted the classification of Chen et al. (2010) for this purpose who analysed, systematized, and re-conceptualized the notions of IT/IS strategy in the literature to provide a unified understanding of the conceptions prevailing at the time. The study by Williams et al. (2018, 2020) confirmed the relevance of this classification scheme for literature published between 2008 and 2018. Applying the classification proposed by Chen et al. (2010) does not ignore other possible conceptualizations, as we included a residual class in our coding to account for novel conceptualizations.

In the following subsections, we present the findings from our analysis as part of an answer to RQ3. We first clarify what we mean

by traditional perceptions of IT/IS strategy building on Chen et al. (2010). Against this background, we then present our findings concerning the use of IT/IS strategy concepts and contents in the more recent debate. By comparing our findings with those of Chen et al. (2010), we derive indications on how the discussion might have changed in the last decade, which we look upon as the "digital" one.

Traditional conceptions of IT/IS strategy

Historically, IT/IS strategy has been seen as a set of IT-based application systems developed in support of achieving a company's business goals (Teubner, 2013). As Earl (2003, p. 59) asserts, it "is conventional wisdom and practice to think of the information systems plan as an applications development portfolio". Beyond the basic agreement that application systems are at its core, there is some heterogeneity in the interpretation of IT/IS strategy and strategy contents (Ward, 2012). This heterogeneity is evident from the variety of labels used. While some authors speak of "IS strategy" (Galliers, 1991), others call it "IT strategy" (Gottschalk, 1999), while again others use terms such as "strategic information plan" (Lederer and Salmela, 1996), or "information strategy" (Smits et al., 1997). To be inclusive and to avoid a specific bias towards technology, systems, or information, we use the combined designation "IT/IS strategy" in this literature review.

The Chen et al. (2010) study identified three different conceptions of IT/IS strategy prevailing in the literature: (1) "the use of IT to support business strategy", (2) "the master plan of the IS function", and (3) "the shared view of the IS role within the organization". The first conception looks upon IT/IS strategy as instrumental and as an "extended arm" of business strategy. Its purpose is to define the IT support required for executing strategic business initiatives. The second conception describes an IT/IS strategy as a general plan ("master plan") for the build-out of an organization's IT/IS infrastructure and capabilities. Teubner and Mocker (2008) and Teubner (2013) further separate this second conception according to whether scholars assume the master plan to be corporate-wide or restricted to the IT/IS department. The third conception defines IT/IS strategy as a shared view, or, in the words of Teubner (2013), as a basic managerial attitude towards the adoption of IT and as the consensually accepted role it is to play in the company. According to Chen et al. (2010, p. 237), this concept provides an "organizational perspective on the investment in, deployment, use, and management of information systems". Table 1 summarizes the four conceptualizations distinguished in the traditional literature.

IT/IS strategy conceptions prevailing in the digital age

Based on the traditional IT/IS strategy concepts, we coded our sub-sample of publications according to the strategy understanding the papers exhibited. We were able to assign all of the papers in our sample to one or more of the traditional conceptions presented in Table 1 (see Appendix C, fourth column of Table 9); there were no new conceptions of IT/IS strategy. This was unexpected, however, the study of Williams et al. (2018, 2020) supports our findings. Rather than new conceptualizations of IT/IS strategy, we found discussions of new concepts such as "digital (business) strategy".

Although we did not find a fundamental upheaval, our findings suggest that the traditional use of IT/IS strategy in the literature is shifting. We observed both quantitative shifts (Table 2) and qualitative shifts: researchers are using traditional conceptions in new ways and extending them. The following subsections discuss the quantitative and qualitative shifts we observed in more detail.

Shared managerial view

Accounting for more than half of the articles in our sub-sample, most studies undertaken since the publication of the seminal paper

Table 1
"Traditional" IT/IS strategy concepts (Teubner, 2013, p. 247).

Criterion conception	Central question to be answered	Intended effect	Position adopted	Relation to business strategy
IT/IS strategy as a basic (managerial) attitude towards IT	What is the role of IT for our business? What is our disposition towards investments in, use, and management of IT/IS?	Establish an organization-wide consensus on the importance and use of IT as well as on IT/IS investments.	Organization-centric conviction-based	IT/IS strategy is self-contained and distinguishable from business strategy.
IT/IS strategy as an extended arm of business strategy	For a given business strategy, how can IT be used to support it? In particular, how can companies use IT to gain and sustain an advantage over competitors?	Provide the IT facilities necessary for the implementation of the business strategy and for achieving competitive advantages.	Business-centric business demand-oriented	IT/IS strategy is subordinated to business strategy. It is an extension of business strategy rather than a strategy in its own right.
IT/IS strategy as master plan	Which technological and IT human resources are required to support the business organization? How to develop and deploy IT and related assets?	Provide the IT facilities and capabilities that enable the organization to do successful business in the future.	Information processing centric build-out oriented	IT/IS strategy is a strategy in its own right; it is deployed in alignment with the business strategy.
IT/IS strategy as a departmental plan	Which are the tasks that the IT/IS organization has to carry out in the next planning period? Which resources are required to do so?	Identify necessary IT resources and ensure their timely and reliable acquisition and allocation so that the business can run smoothly.	Department centric execution-oriented	IT/IS strategy is an operationalization of business strategy on the level of the IT/IS department.

Table 2
Shift in the use of strategy conceptions.

	Chen et al. (2010)	Change (in %)	Our study	
Shared view	9 (16.0%)	⇧ (+37.2%)	25 (53.2%)	Managerial attitude
Business strategy support	20 (35.7%)	⇩ (−22.9%)	6 (12.8%)	Extended arm of business strategy
Master plan	27 (48.2%)	⇘ (−14.1%)	10 (21.3%) 6 (12.8%)	Corporate master plan Departmental plan

by Chen et al. (2010) followed the recommendations made there and use the interpretation of IT/IS strategy as a "shared-view of the IS role within the organization". Several researchers who adopted this interpretation have tested the different effects of "innovator" and "conservative" strategies and verified their impacts. Their studies yield strong evidence that innovative IT/IS strategies, in contrast to conservative strategies, are particularly able to respond to digital environments and lead to superior firm performances (Leidner et al., 2011; Sitoh et al., 2013). Performance effects are not direct but partly mediated by what Chen et al. (2015) define as an innovative business orientation. Further research finds that "innovative" and "conservative" strategies are not necessarily mutually exclusive but are reconcilable as in the case of "ambidextrous" strategies. Lo and Leidner (2012) find such ambidextrous strategies to be as effective as pure innovative strategies in turbulent environments. Their findings are in line with the assumptions made by Galliers' strategizing framework (Galliers, 2011; Marabelli and Galliers, 2017), which emphasizes the dual character of IT/IS strategies: exploring the business potential of IT while at the same time exploiting IT in well-known ways.

Though the understanding of IT/IS strategy as a shared managerial perspective on the investment in and the development, deployment, and use of IT/IS is prevalent in the research of the decade 2008–2018, a critical discussion of its potential and shortcomings for strategy development is missing so far.

Business strategy support

Although not widely used, the "business strategy support" perception is still present in the literature with a share of 12.8%. One study by Chan et al. (2016) explicitly builds on this understanding. These authors investigate strategies that small and medium-sized enterprises (SMEs) in Canada employed to create, transfer, and apply knowledge as well as the resulting impacts on firm performance; they analyse realized strategies rather than plans. Other studies ground their understanding on the "strategy support" concept implicitly, for example, the Henfridsson and Lind (2014) study investigating how far IT/IS strategizing activities contribute to the realization of novel business strategies.

Though still present in research, scholars criticize the "strategy support" concept for making IT/IS strategy subordinate to business strategy, i.e. for degrading it to an extended arm or appendix of business strategy (Teubner, 2013). Instead of subordinating it, several researchers propose to develop IT/IS strategy in conjunction with the business strategy in a digital context (Tanriverdi et al., 2010; Bharadwaj et al., 2013). As IT shapes a company's digital business and competitive environment, IT/IS strategies should be able to foster innovation and put established business strategies into question. In this regard, Sebastian et al. (2017, p. 198) implicitly speak to the "strategy support" concept's potential for linking digital strategy with IT/IS strategy, when they define the former as a "high-level business strategy" and the latter as being "set to enable [such] a business strategy".

Corporate master plan

We found the master plan concept to be still common in research (21.3%) with two contributing streams. First, there is research on the intellectual alignment of the contents of IT/IS and business plans including general business strategies and functional strategies such as those for logistics (Dinter, 2013) and marketing (Al-Surmi et al., 2016). Second, the corporate master plan concept of IT/IS strategy is also a concern of enterprise architecture management (EAM) research. Established EAM methodologies tend to ignore IT/IS strategy in favour of deriving IT/IS models directly from business strategy. This is true for both, academic methodologies such as Business Engineering (Winter and Fischer, 2007) and industry standards like TOGAF – The Open Group Architecture Framework (The Open Group, 2010). Some scholars, however, criticize such an approach and argue for the role of IT/IS strategy in both, implementing and fuelling business strategy with IT-based innovations (Teubner, 2003). In response, they have attempted to include IT/IS strategy in EAM (Bartenschlager and Goeken, 2009; Cuenca et al., 2011), which demands explicit modelling of the contents of IT/IS strategies. IT/IS strategy in the context of EAM is not restricted to functional boundaries but incorporates the whole enterprise as indicated by the literal "E" in the acronym "EAM".

There is no explicit discussion about the master plan concept in the literature, but there are at least some indications for its viability in the digital age. Stockhinger and Teubner (2019), for example, build their research on the master plan concept and related IT/IS strategy models from the literature to provide a structure for their investigation of IT/IS strategy issues raised by digitalization. Similarly, Qian and Palvia (2013) build on this concept to capture the specific impact of cloud computing on organizational IT/IS strategies.

Departmental plan

The perception of an IT/IS strategy as a departmental plan is still present (12.8%) but has lost relevance in the recent debate. Articles employing this conception mostly relate to practice (Teubner, 2013; Goeken et al., 2017). The work by Goeken et al. (2017), for example, intends to support practice with a framework they call "StratIT", which exhibits potentially relevant areas for

departmental planning. They ground the StratIT framework on frameworks and issue-lists from academia and combine them with concerns from industry standards. Other authors acknowledge that departmental strategies are still relevant in practice, but without giving further evidence (Ebner et al., 2016).

Proponents of digital business strategy, however, have put into question the viability of departmental IT/IS strategies. Bharadwaj et al. (2013), Drnevich and Croson (2013), and Woodard et al. (2013) criticise much of the earlier research on IT/IS strategy as inaccurately framing IT as only a functional-level strategy. In line with these authors, Hess et al. (2016) and Chanias and Hess (2016) point out that departmental IT/IS strategies traditionally "concentrate on the management of IT infrastructures and application systems […] and often lack a transformational business-centric orientation that is needed to realize the potential within a company's business model, products, and processes". They advise that scholars should shift their understanding "from a functional strategy […] to an organizational strategy that leverages a firm's digital resources to create differential value" (Hess et al., 2016, p. 125).

How does digitalization affect our thinking about IT/IS Strategy?

Our empirical findings so far do not suggest the revolution in IT/IS strategy thinking we initially expected but parallel those of Li et al. (2016) who, in their review of the recent strategic alignment literature, were not able to unearth novel, "digital" models or theories. The finding that there is no fundamental change in IT/IS strategy thinking so far, however, does not mean by default that such change is not necessary.

For our further investigations, we analysed the 47 articles that defined IT/IS strategy in more depth to identify the subset of articles that also dealt with digitalization. Fourteen out of the 47 articles made no references to digitalization at all, leaving us with 33 articles that might provide us with discussion on IT/IS strategy in the digital age (Appendix C, Table 9). Of these, nine publications explicitly discussed IT/IS strategy in relation to digitalization. The remaining 24 publications investigated IT/IS strategy in a digital context. We analysed these 33 publications for whether they voiced arguments and underpinning empirical evidence challenging traditional IT/IS strategy wisdom.

Bharadwaj et al. (2013) is the one paper in our sample that questions traditional IT/IS strategy conceptions most fundamentally. Starting from the premise of a world fundamentally transformed by digital technologies, they say:

> "Across many firms spanning different industries and sectors, digital technologies […] are fundamentally transforming business strategies, business processes, firm capabilities, products and services, and key interfirm relationships in extended business networks. Accordingly, we argue that the time is right to rethink the role of IT strategy, from that of a functional-level strategy – aligned but essentially always subordinate to business strategy – to one that reflects a fusion between IT strategy and business strategy." (p. 471)

If examined closely, this criticism of Bharadwaj et al. (2013) does not render traditional IT/IS strategy thinking obsolete but is directed against the conception of IT/IS strategy as a "departmental plan". This conception has always been deficient since departmental plans lack the distinctive features of strategies in general: they are not always fundamental for an organization's survival and success, they do not necessarily impact competitiveness, they seldom affect the whole corporation or a significant portion of it, and they are not difficult to alter or revise. Most departmental plans have a time horizon of one to two years or even less while strategies aim at long-term success and firm survival.

> *Insight 1:* Departmental plans are not IT/IS strategies in their own right and must not be confused with IT/IS strategy or used as substitutes in a digital world. The fact that digitalization renders the conception of IT/IS strategy as departmental plan obsolete, however, does not void traditional strategy theory in general.

The literature supports the above insight in that even researchers who uphold the departmental plan concept of IT/IS strategy admit that it does not provide an adequate response to digitalization and digital transformation (Goeken et al., 2017). The reason is that digital IT/IS is now at the heart of doing business and thus cannot be delegated to a specific function or department. While we agree with Bharadwaj et al. (2013) on the need for a corporate-wide IT/IS strategy that is closely related to business strategy, merely coining new terms such as "digital strategy" or "digital business strategy" is not an adequate answer. The literature suggests that at times these terms are used as convenient labels for what we have traditionally called IT/IS strategy (Peppard and Ward, 2016, p. 32) or as fashionable labels for up-to-date business strategies (Gupta, 2018). We suggest using the term "digital business strategy" (DBS) in a more specific way to refer to new concerns in business strategy making raised by digital technologies. Our suggestion acknowledges that it is digital technology that enables DBS. This fact, however, does not make DBS a technology strategy. On the contrary, our review has revealed that both academic and practitioner kinds of literature tell us that DBS is mostly perceived as a business rather than a technology strategy. Hence, we conclude that DBS should, above all, account for the economics of digitalization. With this understanding in mind, we support Bharadwaj et al. (2013) and others (e.g., Woodard et al., 2013; Leischnig et al., 2017), who characterise digital strategy as a business strategy for the digital age.

> *Insight 2:* Digital business strategy (DBS) deals with new concerns in business strategy making that arise from digitalization. It is devoted to the role of digital technologies in enabling new products and services, new forms of organizational cooperation and, ultimately, new opportunities of value generation and capture in a digital business environment.

Unlike traditional information technology, digital technology permeates the core of products, services and firm operations in

unpreceded ways. New, "digitized" versions substitute for established physical products as is the case for traditional books and Amazon's Kindle (Yoo et al., 2010). Even more important, digital technologies are used to "enrich" traditional physical products (Novales et al., 2016), making them "programmable, addressable, sensible, communicable, memorable, traceable, and associable" (Yoo et al., 2010, p. 725). Digital technologies thus present the opportunity of making physical products smart and connected via global telecommunication infrastructures. This development has led to the rise of what is now called the Internet of Things (IoT). Simply speaking, what distinguishes the IoT from the traditional Internet is that the Internet connects computer systems and telecommunication devices, while the IoT also involves myriads of digitally enriched physical objects. Projections suggest that by 2020, the number of "things" connected to the IoT will be twice as high as the number of computers, smartphones, tablets, and TVs (Phillips and Moutinho, 2018).

Porter and Heppelmann (2015) emphasize that digital objects and, in particular, smart, connected products are able to generate data about product status, use, and users in unforeseen ways. If integrated with existing firm data and data from other external and open sources, they bear the potential to "alter every activity in the value chain" and become a "key source of competitive advantage" (Porter and Heppelmann, 2015, pp. 99). Smart, connected products thus "raise a new set of strategic choices about how value is created and captured, how companies work with traditional and new partners, and how they secure competitive advantage" (Porter and Heppelmann, 2014, p. 66). Digitalization goes far beyond product and service innovations, changing the organization of economic value generation within and between firms fundamentally. This is perhaps best exemplified with the rise of digital ecosystems.

Digital ecosystems are composed of "(…) providers of complementary innovations, products, or services, who might belong to different industries and need not be bound by contractual arrangements" (Jacobides et al. 2018, p. 2258). Such ecosystems may support product innovation and open up new ways of serving customers and markets alike. Suseno et al. (2018. p. 336) refer to ecosystems that support product innovation as "digital innovation ecosystems", which they characterize as coordinating "(…) interactions and relationships between organizations and stakeholders in creating new products and services using digital technologies". Digital market ecosystems (Jacobides et al., 2018), in comparison, are an inter-organizational form of collaboration for catering specific markets. What is particular about market ecosystems is that their participants co-operate in serving some markets while they compete head-to-head on other fronts at the same time (Yoo et al., 2010, p. 724). Organizations collaborating in such ecosystems often "fall outside the traditional value chain of suppliers and distributors that directly contribute to the creation and delivery of a product or service" (Iansiti and Levien, 2004, p. 69). Ecosystems are also more dynamic than traditional supply chains as new firms can join and leave without putting value generation at risk. The reason is that the contributions of ecosystem participants are complements to rather than inputs required for value creation, as is the case for traditional supply chains. Customers, accordingly, can choose among different components offered by ecosystem participants and can also, in many cases, decide how to combine them (Jacobides et al., 2018).

As illustrated by the above examples of digital and digitalized products and services, digital innovation, and digital ecosystems, DBS concerns are typically on a business level (Leischnig et al., 2017; Woodard et al., 2013; Keen and Williams, 2013). This fact has led many researchers to adopt the idea of a fusion between business and IT/IS strategy in form of a DBS (Bharadwaj et al., 2013; Drnevich and Croson, 2013; Woodard et al., 2013), which now is to the fore of research (Kahre et al., 2017).

We fully subscribe to the need for thinking about digital technologies and business in an integrated manner on a strategic level. We also subscribe to the view that technology "directly affects the mechanisms through which [firms] create and capture value to earn profit" (Drnevich and Croson, 2013, p. 483). However, we disagree with the conclusion to fuse IT/IS and business strategy in research. Instead, irrespective of a close intertwinement of both strategies in today's organizations, we follow Chen et al. (2010, pp. 234) who suggest that "(…) IS strategy needs to be examined independently of the examination of business strategy due to the argument that IS strategy can both support and lead business strategy". The idea of fusing can be misleading from a research point of view. Fig. 2 illustrates three views of the relationship between business strategy and IT/IS strategy and their fusion/intersection in a DBS.

The relationship between IT/IS and business strategy as perceived in traditional strategy research focusing on alignment is illustrated in the first view (Fig. 2, left hand). The alignment view became popular during the 1990s. It can arguably be looked upon as the classical view on the interrelation of business and IT/IS strategy. While it suggests that the business strategy puts demands on the IT/IS strategy, it does not deny the possibility of technology enabling new business options. In the 1990s, the seminal work of Henderson and Venkatraman (1993) highlighted this possibility as the "technology transformation strategy". It is for this reason that the alignment model seems to have remained valid and is still applicable in research (Coltman et al., 2015; Reynolds and Yetton, 2015). What may be

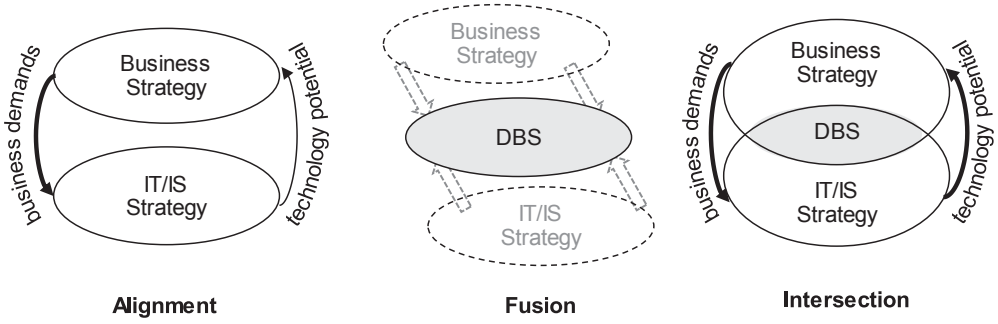

Fig. 2. DBS between the poles of business and IT/IS strategy.

restricting for the alignment view, though, is that the strategies are related to each other in a hierarchical manner with business strategy dominating.

The fusion view (middle of Fig. 2) rejects the idea of conceptually distinguishing IT/IS and business strategies. Taking this view could come at the cost of making obsolete traditional alignment research and the well-established knowledge base developed so far. The proposed fusion view assumes that alignment research looks upon IT/IS strategy as "(…) aligned but essentially always subordinate to business strategy" (Bharadwaj et al., 2013, p. 472). While this assumption might be true for the "departmental plan" and "strategy support" conceptions of IT/IS strategy, it does not hold for those prevailing in research, namely the "shared view" and the "master plan" conception (Table 2).

While we share concerns about subordinating IT/IS strategy, a fusion of both strategies might easily shoot over the mark as it opens the doors to making "IT and business strategy indistinguishable" (Coltman et al., 2015, p. 96). The suggested fusion implies a "blurring of the distinction between business and IT strategies" (Yeow et al., 2018, p. 43), which may easily lead to a "confusion" rather than paving the way for a better understanding of their interplay. Our literature review did not yield a single publication about how to flesh out and measure digital business strategy in the fusion view. Hence, unlike Bharadwaj et al. (2013), we propose an intersection of both strategies to account for their close intertwinement in the field of DBS (Fig. 2, right hand).

> *Insight 3:* Digital Business Strategy is not an upgrade of IT/IS strategy, nor must it be equated with a more contemporary form of business strategy. Both strategies follow a logic of their own that, however, intersects and interrelates where IT is vital for value creation.

Unlike the fusion view, which suggests a union of business and IT/IS strategy, we propose to conceive of DBS as an intersection of both strategies (Fig. 2, right). The intersection is where digital technologies are directly and deeply involved in value creation as opposed to having a merely supporting role. This is the case for digital technology being the core production technology or even part of the product. The latter is the case for for pure digital products and services (Hess et al., 2016) as well as smart, connected products (Porter and Heppelmann, 2014) with digital technology being embedded in physical products (Novales et al., 2016). In other words, DBS is "(…) inspired by the capabilities of powerful, readily accessible technologies (like SMACIT)" (Sebastian et al. 2017, p. 198) in relation to value creation and capture (Bharadwaj et al., 2013; Pagani, 2013) and new revenue and value-producing opportunities (Keen and Williams, 2013; Dang and Vartiainen, 2019).

Further support for our third insight comes from the latest research on the organization of digitalization initiatives in practice. Such initiatives are only in rare cases organized under the roof of IT/IS departments (Legner et al., 2017), and their leadership is mostly assigned to a new management role called "Chief Digital Officer (CDO)" (Haffke et al., 2016; Singh and Hess, 2017; Tumbas et al., 2017). The role of the CDO is that of a boundary spanner often acting "as a buffer between the business and the IT unit" (Tumbas et al., 2017, p. 132). Such a boundary spanner is particularly crucial in organizations where the CIO fulfils a traditional "supply-side role", taking responsibility for ensuring that the IT/IS function delivers cost-effective services that run seamlessly (Chen et al., 2010; Haffke et al., 2016). As any digitalization initiative has strong ties with IT/IS, there is a need for the CDOs to co-operate with the CIO. At the same time, CDOs have to build strong ties with the business units where digitalization initiatives take place (Haffke et al., 2017).

In much the same way as the CDO role complements traditional CIO and business manager roles rather than fusing them or making them obsolete, we see DBS as a complement and extension to conventional IT/IS and business strategies. Our interpretation of a DBS does not assume a hierarchical relation between IT/IS strategy and business strategy, but IT/IS strategy may well open up new opportunities for value creation and thus expand the organization's "choice space" for doing business within current markets and beyond (Keen and Williams, 2013).

For answering the question of how these two strategies intersect, it is necessary to clarify the domain of the IT/IS strategy further. IT/IS strategy traditionally deals with technology and systems as well as with the information resources stored, processed, and exchanged by these (Earl, 1989, 2003; Galliers, 1991; Peppard and Ward, pp. 33, 2016). Teubner and Mocker (2009) have conceptualized information, systems, and technology as components of a collective, technology-based infrastructure for organizational information and communication, which they term "information infrastructure" (Ciborra, 2001; Lewis and Byrd, 2003). The concept of an information infrastructure has proved to be viable in recent years and has attracted increased attention and received much conceptual clarification (Pipek and Wulf, 2009; Hanseth and Lyytinen, 2010; Henfridsson and Bygstad, 2013). Several scholars have even proposed to make infrastructure studies a core of future IS research (Bowker et al., 2010; Tilson et al., 2010). Hence, we see good reasons for IT/IS strategy research to keep its traditional focus on information infrastructure even under the changing conditions of digitalization. Doing so can help avoid the danger that researchers are absorbed in the multi-faceted, multi-disciplinary, and overwhelming discussion on digitalization at large.

> *Insight 4*: The development of the corporate information infrastructure as the original concern of IT/IS strategy will remain of utmost importance to research in the digital age.

Digital platforms are a typical information infrastructure concern and at the same time a core issue in DBS (Bharadwaj et al., 2013; Markus and Loebbecke, 2013; Bughin and van Zeebroeck, 2017). For this reason, they may serve us as an example to illustrate the interplay between business strategy and IT/IS strategy (Insights two and three) in the domain of information infrastructure strategy (Insight four). The platform is a long-standing concept in the context of product development (Wheelwright and Clark, 1992). It has received a more specific interpretation in the context of IT/IS and, in particular, digitalization. Constantinides et al. (2018, p. 381) define a digital platform "as a set of digital resources – including services and content – that enables value-creating interactions

between external producers and consumers". Gawer (2014) further clarifies the concept by distinguishing an economic and an engineering view as two different yet interrelated perspectives on digital platforms. This distinction is in line with our conceptualization of an intersection of business and IT/IS strategy in the domain of DBS.

From a business strategy perspective, platforms have been conceptualized as two- or multi-sided markets that mediate transactions across various client groups (Rochet and Tirole, 2003; Eisenmann et al., 2006). As such, they exhibit network externalities, so that the platform's value increases with the number of clients participating on all market sides, which can unleash winner-takes-it-all-dynamics (Cennamo and Santalo, 2013; Liu et al., 2015). Success thus depends on the platform's ability to quickly attract clients and grow in size. It is thus critical for platforms to solicit powerful suppliers and complementors on the supply-side as well as to attract high volumes of potential customers on the demand-side from the outset (Montealegre et al., 2019). Platforms, in other words, "(…) must create ecosystems that attract participants" to be successful (Kenney et al., 2019, p. 873). The ecosystem perspective highlights the role of partners, complementors, and clients in value co-creation throughout the different phases of platform evolution (Constantinides et al., 2018; Jacobides et al., 2018; Hodapp et al., 2019), and this is what makes it specifically viable for platform strategy development.

Literature taking an IT/IS perspective on platforms, in comparison to the business perspective, focuses on the infrastructure that enables digital platform business as envisaged by a DBS. Some authors look upon platforms as a specific type of digital infrastructure while others perceive them as being embedded into or built on infrastructures (Constantinides et al., 2018; de Reuver et al., 2018). The technical literature conceptualizes platforms as "(…) purposefully designed technological architectures" (Baldwin and Woodard, 2011; Gawer, p, 2014. 1243), with the main architectural objectives being scalability, flexibility, and openness to foster the positive network externalities that are the key to economic success. These objectives are, however, not absolute but must be balanced with potential risks for platform reliability, integrity, and security. Platform architectures that are open to attaching diverse technologies and client systems are necessarily also more prone to intrusion and fraud than closed architectures. Openness comes along with the need to make architecture more visible (Grover and Kohli, 2013) thus inviting hostile approaches to copy, break, reverse engineer it, or to build *meta*-platforms (Constantinides et al., 2018). The most prominent architectural approach to deal with these trade-offs is that of

Table 3
Business and IT perspectives on exemplary DBS concerns.

Domain	Business-related concerns	IT/IS-related concerns	References
Digitized product smart, connected products	Tapping into new sources of value with data (e.g. monetizing data) Personalization and bundling of products and services, servitization Datafication-based design and management of products/services Data-driven product innovation	Remote data capture and secure transmission Data collection (data lakes) and integration (data warehouses) New technology stack for data Business intelligence competency Privacy, identity, security	Yoo et al., 2010; Porter and Heppelmann, 2014, 2015; Novales et al., 2016
Digital platforms	N-sided markets (N > 1) Leveraging positive network externalities Value (co-)creation between external providers and consumers Digital value generation, capture, and distribution between platform leaders and complementors	Platform architecture, protocols and interface design Architecture (in-)visibility, boundary resources as "lingua franca." Architecture governance Usability, convenience for clients Openness, scalability and evolution Stability, integrity, and security	Gawer, 2014; Constantinides et al., 2018; Karhu et al., 2018; de Reuver et al., 2018; Kenney et al., 2019; Ceccagnoli et al., 2012; Hodapp et al., 2019
Digital ecosystems	Value co-creation, orchestration of supplier, complementor, and customer contributions Attracting and integrating partners, attracting and retaining customers Value capture and fair distribution Co-opetition and co-innovation Co-specialization of resources and capabilities, intellectual property	Co-investing in and sharing of IT resources Interconnecting with partners and crossing-over infrastructures Lightweight infrastructures, protocols for cooperation Flexibility and responsiveness to change vs. stability and reliability Transparency vs. opaqueness	Iansiti and Levien, 2004; Tiwana et al., 2010; Jacobides et al., 2018; Suseno et al., 2018; El Sawy et al., 2010
Digital innovation	Using digital technologies to create new market offerings (generativity) New, digital products call for a new logic of organizing the business Open innovation, orchestrating partners and processes in innovation ecologies Sharing knowledge freely without violating intellectual property	Distributed infrastructure governance and control Open infrastructure to customers and innovation partners Building infrastructures and defining protocols to handle knowledge heterogeneity and discontinuity Protecting customer data and partner knowledge against abuse (IPR)	Nambisan et al., 2017; Yoo et al., 2010, 2012; Fichman et al., 2014
Digital transformation	Digital disruption Business model and organizational transformation Digital Transformation Strategy: Strategizing the adoption of digital technologies and related organizational change Digital business capabilities	Introducing new, digital technologies to the organization Digital infrastructure (r-)evolution Developing digital technology competencies (e.g. data analytics, agile development) Organizing the information function to enable change (ambidexterity)	Besson and Rowe, 2012; Hinings et al., 2018; Chanias et al., 2019; Vial, 2019; Hess et al., 2016

using explicit boundary resources and clearly defined interfaces for external access to a platform (Ghazawneh and Henfridsson, 2013; Karhu et al., 2018). Irrespective of such technical solutions, there is much agreement in the literature that the trade-offs in platform architecture cannot be resolved on a technical level alone. Instead, they call for complementary solutions for platform governance (Montealegre et al., 2019). Tiwana (2014) and Constantinides et al. (2018), for example, highlight three governance questions that need answers is: The first question concerns the distribution of decisions rights between the platform owner and other parties, the second concerns the control mechanisms to be used by the platform owner, and the third the incentive structures for co-operation.

The example of digital platforms may serve to illustrate the possibility of distinguishing the business from the IT/IS perspective even for concerns at the heart of DBS. Both perspectives complement each other and add up to a more comprehensive understanding of how to conduct a successful platform business. Our example and the underpinning literature support our understanding of DBS as an intersection of business and IT strategy rather than a fusion. Table 3 summarizes further DBS concerns from different domains of digital business research and distinguishes them in a business and an IT/IS perspective.

The third column of Table 3 indicates that digitalization raises many new concerns, even if IT/IS strategy research keeps its traditional focus on infrastructure (Insight four). The reason is that the infrastructure required in a digital context is different from that deployed ten or more years ago. The new information infrastructure, often referred to as "digital infrastructure", has been characterized as "(…) shared, unbounded, heterogeneous, open, and evolving" (Tilson et al., p. 478, 2010; Constantinides et al., 2018). Table 4 summarizes peculiarities of digital infrastructure from the literature.

The characteristics of digital infrastructure impose new challenges on IT/IS strategy research. For example, digital infrastructures need to be designed in ways that are "simultaneously stable and flexible" (Tilson et al., 2010, p. 753), thus constituting a paradox. On the one hand, they need to be inherently open and scalable to allow for the enrolment of new technologies and actors and ultimately for extraordinary growth in scale and scope. However, infrastructure development always starts from an installed base, from something that "is already there" (Hanseth and Lyytinen, 2010); it is constrained by prior architectural decisions and investments, which may restrict flexibility and future evolution, thus making infrastructure development path-dependent. The most promising concept for overcoming path-dependency and constraints in infrastructure development so far is that of a "modular, layered architecture" (Meyer and Webb, 2005; Yoo et al., 2010; Constantinides et al., 2018). A modular, layered architecture is hierarchically organized in homogenous technical layers and, vertically, in functional modules. Defined interfaces then allow for quickly adding or replacing components as well as for (re-)combining them. Modular, layered architecture also paves the way for what is called "lightweight infrastructure", which embraces the flexible integration of mobile applications, end-user devices, and cloud-services (Bygstad, 2017).

A second paradox, which is related to that of stability and flexibility, exists at the planning level, given the opposing challenges of dynamic evolution (Henfridsson and Bygstad, 2013; Grisot et al., 2014) on the one hand and strategic development and infrastructure integrity on the other (Constantinides et al., 2018). This second paradox has a lot to do with the control mode and the tensions between centralized authority and individual autonomy (i.e. distributed control) (Tilson et al., 2010, pp. 754). Digital infrastructures call for specific investments and specialized capabilities that the investing organizations will want to protect. At the same time, they are used by diverse individuals, groups, and other organizations to co-create value. These heterogonous actors and their preferences can shape infrastructure development, redistributing control away from the owners of infrastructure assets (Grisot et al., 2014).

A third paradox is the openness of digital infrastructures for new users and uses; this openness also makes them vulnerable to intrusion and abuse. In the absence of clearly defined boundaries, protection is much harder than for closed infrastructures, around

Table 4
Characteristics of digital infrastructure in the literature.

Characteristic	Description	Literature
Building on an installed base	The "installed base is considered to be 'what is already there'. Theorizing infrastructure evolution from an "installed base cultivation" perspective "[…] acknowledges the existence of the installed base, and it seeks to address change in an incremental and gradual manner."	Grisot et al., p. 200, 2014; Henfridsson and Bygstad, 2013
Unbound and open	Digital infrastructures "cannot be defined through a distinct set of functions (unlike specific systems), or strict boundaries (unlike applications)."	Tilson et al., 2010, p. 749
	Unlike earlier corporate information infrastructures, the new (digital) infrastructure "[…] cannot be easily bounded and separated from the industry- and society-wide infrastructures."	Yoo et al., 2010, p. 732; Henfridsson and Bygstad, 2013
	Digital infrastructures "are distinct from other types of infrastructures because of their ability to collect, store, and make digital data available across a number of systems and devices."	Constantinides et al., 2018, p. 382; Karhu et al., 2018
Malleable and evolvable	"Digital infrastructures have the capacity to efficiently change to serve new purposes and emerging possibilities."	Agarwal and Tiwana, 2015, p. 473
	"[…] digital infrastructures 'are built on the notion that they are never fully complete, that they have many uses yet to be conceived of […]"	Tilson et al., 2010, p. 750
	"Successful infrastructures […] have the capacity to anticipate and embrace the future."	Koutsikouri et al., 2018, p. 1003; Henfridsson and Bygstad, 2013; Grisot et al., 2014
Shared	"Digital infrastructures become shared across multiple communities in myriad and unexpected ways."	Hanseth and Lyytinen, 2010, p. 4
Ambient, socially deeply embedded	"Digital infrastructures herald a new stage in the evolution of IT, reflecting the fact that IT has become deeply socially embedded, is coordinated through diverse socio-technical worlds and numerous standards, and is most visible during breakdowns."	Tilson et al., 2010, p. 749, Grisot et al., 2014, Øvrelid and Bygstad, 2019

which "fire" walls can be erected. To resolve such paradoxes, technical solutions on an architectural level have to go hand in hand with governance solutions on an organizational level.

> *Insight 4a*: As digital infrastructures are becoming the backbone of digital business, they raise new questions for IT/IS strategy research, in particular concerning architecture and governance.

Further support for insights 4 and 4a comes from our analysis of IT/IS management textbooks. In their latest editions, most textbooks includ topics that are closely associated with digital infrastructures such as the cloud, big data, and risk and security. IT/IS strategy research dealt with similar topics, for example, the development of cloud sourcing strategies for infrastructure flexibility and scalability (Hahn et al., 2013; Qian and Palvia, 2013), big data, business intelligence, information logistics and information transparency strategies (Dinter, 2013; Granados and Gupta, 2013; Watson, 2014), IT/IS strategies in networks and ecosystems (Rai et al., 2012; Qrunfleh and Tarafdar, 2014; Tan et al., 2015), and security and risk mitigation strategies (Kayworth and Whitten, 2010; Seeholzer, 2012, 2015).

Irrespective of these contributions, many concerns in developing strategies for digital infrastructure remain unresolved and call for close attention in future research. The research agenda set up by Tilson et al. (2010) and the editorial by Constantinides et al. (2018) may serve for initial orientation, as most of the critical research issues raised there are inherently strategic or at least have immediate strategic implications.

Finally, it is essential to note that infrastructure as a primary strategy concern entails a secondary, derivative concern. Organizations that intend to set-up a digital infrastructure also have to make sure that they possess the skills and resources necessary to operate, maintain, and further develop such an infrastructure. This issue predates the era of digitalization. Responding to this derivative concern, Earl (1989) calls for the development of an "IT/IS management strategy"; this strategy answers the question of "who" takes responsibility for IT/IS in the organization and "guides how the organization should run IS/IT activities" (Earl, 1989, p. 117). In much the same way, Galliers (1991) speaks of an "information management strategy", which he later renamed to "information service strategy", presumably because IT/IS activities should serve the business (Galliers, 1999). Teubner and Mocker (2009) speak of an "information function strategy", where "function" refers to a set of tasks including the planning, building, operating, and maintaining of an organization's (digital) information infrastructure. We follow Teubner and Mocker and refer to "information function strategy" because the term, unlike the terms above, is not loaded with any connotation about the type of tasks performed (management vs. operational or administrative tasks) or how IT/IS tasks are organized (e.g. as a service centre).

It is essential not to confuse the information function strategy with a functional or departmental conception of IT/IS strategy; the information function strategy is a corporate plan for sourcing, staffing, and organizing tasks for infrastructure development and operations. Given the close relationship between infrastructure strategy and information function strategy, it is impossible to implement or indeed formulate one without having the other in mind (Teubner and Mocker, 2009).

> *Insight 5:* The particularities of digital infrastructure call for new capabilities and ways of organizing the information function, which is a derivative area of concern for IT/IS strategy in the digital age.

The interrelatedness of the digital infrastructure and the information function is underlined by the work of Ross et al. (2016) and Sebastian et al. (2017), who found that organizations that rebuilt their infrastructure for digitalization also reconfigured their IT/IS organization. The researchers found that organizations, in their attempt to "design and execute digital strategies", segmented their infrastructure into an "operational backbone" and a "digital services platform". While the operational backbone provides the "capabilities that ensure the efficiency, scalability, reliability, quality and predictability of core operations", the digital services platform "facilitates rapid innovation and responsiveness" (Sebastian et al., 2017, pp. 201). In a similar way, Teubner and Ehnes (2018) distinguish between information function capabilities required to run and maintain traditional transactional systems ("systems of record") reliably and those for the agile development of small, modular applications in response to changing customer and market opportunities ("systems of engagement"). The different but complementary capabilities required for managing digital infrastructure are also nicely reflected in the paradigm of a "bimodal" or "two-speed" IT/IS function (Horlach et al., 2016; Urbach et al., 2017). This paradigm "(…) decomposes the IT function into two modes, traditional and agile; the former focused on stability, the latter on the speed and experimentation necessary to support innovative uses of IT in digital business contexts" (Haffke et al., 2017, p. 101).

The close relationship between infrastructure strategy and the set-up of the information function also becomes apparent for architecture concerns. In response to the growing strategic importance of architecture for building digital infrastructures (Insight 4a), an increasing number of organizations have begun to develop unique competencies and set-up dedicated teams for enterprise architecture management (Löhe and Legner, 2014; Abraham et al., 2015). A study by Shanks et al. (2018) unveils the particular contribution that EAM can make to an organization's flexibility and innovativeness.

The information function is also affected by cloud sourcing, which is often framed as a key technology trend of digitalization (SMAC). On closer inspection, cloud sourcing impacts the infrastructure and information function equally. It allows organizations to establish "lightweight" infrastructures (Bygstad, 2017) by building on external (technical) resources. In parallel, however, organizations are freed from having to acquire additional personnel resources and develop particular skills to develop and maintain such an infrastructure, which can be a time-consuming process. According to Aubert et al. (2015) cloud sourcing and agile outsourcing contracts thus help spawn innovation.

The above examples, however, are not meant to give the impression that digitalization is something that happens within the information function. Digitalization is equally – if not predominantly – driven by the business, as indicated by the discussion on the organization of digitalization initiatives and the role of the CDO already presented above. While the information function has

traditionally been organized in one or more IS departments, we can expect it to become more distributed across the organization and perhaps partly decentralized in business functions.

Summary, conclusions, and limitations

Our comprehensive literature review on IT/IS strategy documents a moderate revival of strategy research during the decade 2008–2018. We were able to identify new trends in the discussion: discussion of supra-organizational strategies; of strategy in turbulent environments; of explorative and innovative strategies; and the discussion of (digital) technology-enabled business capabilities. In addition, we found the concept of "digital business strategy" being introduced to the discussion, which challenges traditional IT/IS strategy wisdom.

Our analysis of the IT/IS strategy concepts underlying the latest research did not indicate the revolution in strategy thinking we initially expected. We were able to observe a shift in using traditional conceptions, but no fundamental break with their use. As this observation was contrary to our expectations, we dove into the literature and specifically into debates on the concept of digital business strategy and how it challenges and relates to traditional notions of IT/IS strategy. By analysing these debates against the backdrop of the latest digitalization research, we arrived at deeper insights on how IT/IS strategy could, should, or should not be understood in the digital age.

Our analysis calls into question the idea of fusing business and IT/IS strategy, which has been brought up by proponents of the new concept of a "digital business strategy". By fusing both business and IT/IS strategy, we see the risk of making them indistinguishable. From a conceptual point of view, amalgamating IT concerns with business concerns is not the best way for research to respond to the increasing business relevance and impact of digital technologies. Instead, a comprehensive and coherent IT/IS strategy, rather than being rendered obsolete, may become more vital than ever in an increasingly digitalized world. This is not to deny the close and ever-increasing intertwinement of IT/IS and business strategy in digital business. Since this tight intertwinement calls for new ways of analysing the interplay between IT and business, we propose to conceptualize digital business strategy as an intersection of IT/IS and business strategy.

Our conceptualization preserves the traditional focus of IT/IS strategy research on the corporate information infrastructure, but highlights the specific challenges associated with the development of digital infrastructure in relation to new ways of doing business. We illustrated the interplay between digital infrastructure and new business strategies with digital platforms as a case in point. Our example suggests that IT/IS strategy could focus on platform architecture and interfaces, technologies and sourcing, data collection, protection, and exploitation, leaving room for business strategy to consider the market logic and competitive effects of doing platform business.

We conclude that, in principle, traditional IT/IS strategy concepts are viable to a lesser or greater extent. This conclusion is strongly supported by the literature, which did not indicate any fundamental break with these conceptions except with that of a departmental plan, which is rendered obsolete in relation to DBS. The same is not necessarily true for the "business strategy support" concept, which is both valid and misleading at the same time. It is valid in emphasizing the active link between business and IT/IS strategy, but it is misleading in assuming a hierarchical relationship between the strategies.

The shared view conception is still valid and insightful since the top management team's orientation is essential to understand a company's investment in, management of, and use of IT/IS. This conception has already proved to be capable of explaining (digital) business success through innovation and ambidexterity; it is comprehensive and highly applicable in research at the same time. These advantages are, however, at the cost of concreteness. Hence, we propose to complement this concept in research with that of a master plan. A master plan sets the frame for and guides the development of the corporate information infrastructure along with the corresponding IT/IS function. As such, it is capable of addressing pressing questions that arise in the context of digitalization. These include, among others, the integration of SMAC technologies, the development of flexible and modular infrastructure and digital platform architectures, IT/IS investments in multi-actor settings, and the need to balance the demand for the openness of digital infrastructure with complexity and security restrictions.

Independent of the strategy conception used, our research highlights the importance of distinguishing between the exploitation of technologies and the exploration of new, digital technologies for business innovation. Moreover, given the transformational effects of digital technology, we suggest including considerations about IT-induced change and its management in IT/IS strategy considerations.

Our study, though comprehensive, inevitably has limitations, the most important one being perhaps our focus on the IT/IS strategy literature, a focus that we successively narrow down to conceptualizations of IT/IS strategy. With this focus, we cannot exclude having overlooked publications from other fields of research that might discuss related issues without using the label IT/IS strategy. Our findings, however, remain valid for IT/IS strategy research.

Appendix A. Literature sample used for statistical analysis

To get a first idea of the development of IT/IS strategy research from 2008 on and for answering RQ 1, we extended the literature study of Teubner and Mocker (2008) by replicating their procedure for searching and selecting publications. For the statistical analysis (see Fig. 1), we included the same journals in our search: MIS Quarterly, Information Systems Research, European Journal of Information Systems, Journal of Management IS, Information & Management, Journal of Strategic Information Systems, Management Science, Harvard Business Review, and Strategic Management Journal. We also cross-checked the following top-ranked IS journals, which, just like the study of Teubner and Mocker (2008), did not yield relevant hits: Communications of the ACM, Decision Sciences, and Decision Support Systems. We applied the search string "(Info* OR IT OR IS) AND strateg*" to search titles, abstracts and

keywords. We reviewed the resulting list to select academic papers that make a significant research contribution thus excluding, for example, short contributions of less than five of pages such as opinion pieces, editorial comments and the like. We then studied the abstracts of the remaining papers to ascertain that the articles contributed to the broader field of IT/IS strategy and strategy development. We assumed that articles intending to contribute to IT/IS strategy research would use the term "strategy" explicitly and in close relation to IT/IS or information. Accordingly, we only included articles which met this criterion.

Table 5 provides a full list of the resulting 66 publications contributing to IT/IS strategy research including concept and contents, (competitive) impacts, as well as the process of strategy development and implementation (Teubner and Mocker 2008).

Table 5
List of articles included in the initial, quantitative study.

Author	Year	Title
Journal of Strategic Information Systems		
Arvidsson, Viktor; Holmström, Jonny; Lyytinen, Kalle	2014	Information systems use as strategy practice: A multi-dimensional view of strategic information system implementation and use.
Aversa, Paolo; Cabantous, Laure; Haefliger, Stefan	2018	When decision support systems fail: Insights for strategic information systems from Formula 1.
Baker, Jeff; Song, Jaeki; Jones, Donald R.	2017	Closing the loop: Empirical evidence for a positive feedback model of IT business value creation.
Benlian, Alexander; Haffke, Ingmar	2016	Does mutuality matter? Examining the bilateral nature and effects of CEO–CIO mutual understanding.
Besson, Patrick; Rowe, Frantz	2012	Strategizing information systems-enabled organizational transformation: A transdisciplinary review and new directions
Buhl, Hans Ulrich; Fridgen, Gilbert; König, Wolfgang; Röglinger, Maximilian; Wagner, Christian	2012	Where's the competitive advantage in strategic information systems research? Making the case for boundary-spanning research based on the German business and information systems engineering tradition.
Bulchand-Gidumal, Jacques; Melián-González, Santiago	2011	Maximizing the positive influence of IT for improving organizational performance.
Chuang, Shu-Hui; Lin, Hong-Nan	2017	Performance implications of information-value offering in e-service systems: Examining the resource-based perspective and innovation strategy.
Gable, Guy	2010	Strategic information systems research: An archival analysis
Henfridsson, Ola; Lind, Mikael	2014	Information systems strategizing, organizational sub-communities, and the emergence of a sustainability strategy.
Huang, Jimmy; Newell, Sue; Huang, Jingsong; Pan, Shan-Ling	2014	Site-shifting as the source of ambidexterity: Empirical insights from the field of ticketing.
Leidner, Dorothy E.; Lo, Janice; Preston, David	2011	An empirical investigation of the relationship of IS strategy with firm performance.
Leonard, Jenny; Higson, Helen	2014	A strategic activity model of Enterprise System implementation and use: Scaffolding fluidity.
Lowry, Paul Benjamin; Wilson, David	2016	Creating agile organizations through IT: The influence of internal IT service perceptions on IT service quality and IT agility.
Merali, Yasmin; Papadopoulos, Thanos; Nadkarni, Tanvee	2012	Information systems strategy: Past, present, future?
Nolan, Richard L.	2012	Ubiquitous IT: The case of the Boeing 787 and implications for strategic IT research.
Peppard, Joe; Galliers, Robert D.; Thorogood, Alan	2014	Information systems strategy as practice: Micro strategy and strategizing for IS.
Ravichandran, T.	2018	Exploring the relationships between IT competence, innovation capacity and organizational agility.
Renaud, Alexandre; Walsh, Isabelle; Kalika, Michel	2016	Is SAM still alive? A bibliometric and interpretive mapping of the strategic alignment research field.
Seddon, Peter B.	2014	Implications for strategic IS research of the resource-based theory of the firm: A reflection.
Street, Chris; Gallupe, Brent; Baker, Jeff	2018	The influence of entrepreneurial action on strategic alignment in new ventures: Searching for the genesis of alignment.
Tavakoli, Asin; Schlagwein, Daniel; Schoder, Detlef	2017	Open strategy: Literature review, re-analysis of cases and conceptualisation as a practice.
Ward, John M.	2012	Information systems strategy: Quo vadis?
Whittington, Richard	2014	Information Systems Strategy and Strategy-as-Practice: A joint agenda.
Yeow, Adrian; Soh, Christina; Hansen, Rina	2018	Aligning with new digital strategy: A dynamic capabilities approach.
MIS Quarterly		
Bharadwaj, Anandhi; El Sawy, Omar A.; Pavlou, Paul A.; Venkatraman, N.	2013	Digital Business Strategy: Toward a Next Generation of Insights.
Chen, Daniel Q.; Mocker, Martin; Preston, David S.; Teubner, Alexander	2010	Information Systems Strategy. Reconceptualization, Measurement, and Implications.
Drnevich, Paul L.; Croson, David C.	2013	Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective.
Gerow, Jennifer E.; Grover, Varun; Thatcher, Jason; Roth, Philip L.	2014	Looking Toward the Future of IT-Business Strategic Alignment through the Past: A Meta-Analysis.
Grover, Varun; Kohli Rajiv	2013	Revealing your hand: Caveats in implementing digital business strategy.
McLaren, Tim S.; Head, Milena M.; Yuan, Yufei; Chan, Yolande E.	2011	A Multilevel Model for Measuring Fit Between a Firm's Competitive Strategies and Information Systems Capabilities.
Mithas, Sunil; Rust, Roland T.	2016	How Information Technology Strategy and Investments Influence Firm Performance: Conjecture and Empirical Evidence.
Mithas, Sunil; Tafti, Ali; Mitchell, Will	2013	How a Firm's Competitive Environment and Digital Strategic Posture Influence Digital Business Strategy.
Nevo, Saggi; Wade, Michael R.	2010	The Formation and Value of IT-Enabled Resources: Antecedents and Consequences of Synergistic Relationships.

(*continued on next page*)

Table 5 (*continued*)

Author	Year	Title
Ning, Nan; Tanriverdi, Hüseyin	2017	Unifying the Role of IT in Hyperturbulence and Competitive Advantage Via a Multilevel Perspective of IS Strategy.
Oestreicher-Singer, Gal; Zalmanson, Lior	2013	Content or Community? A Digital Business Strategy for Content Providers in the Social Age.
Ping-Ju Wu, Shelly; Straub, Detmar W.; Liang, Ting-Peng	2015	How Information Technology Governance Mechanisms and Strategic Alignment Influence Organizational Performance: Insights from a Matched Survey of Business and IT Managers.
Setia, Pankaj; Venkatesh, Viswanath; Joglekar, Supreet	2013	Leveraging Digital Technologies: How Information Quality Leads to Localized Capabilities and Customer Service Performance.
Su, Ning	2013	Internationalization Strategies of Chinese IT Service Suppliers.
Tallon, Paul P.; Pinsonneault, Alain	2011	Competing Perspectives on the Link Between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model.
Woodard, C. Jason; Ramasubbu, Narayan; Tschang, F. Ted; Sambamurthy, V.	2013	Design Capital and Design Moves: The Logic of Digital Business Strategy.
European Journal of Information Systems		
Benitez-Amado, Jose; Walczuch, Rita M.	2012	Information technology, the organizational capability of proactive corporate environmental strategy and firm performance. A resource-based analysis.
Fink, Lior	2011	How do IT capabilities create strategic value? Toward greater integration of insights from reductionistic and holistic approaches.
Gerow, Jennifer E.; Thatcher, Jason Bennett; Grover, Varun	2015	Six types of IT-business strategic alignment: An investigation of the constructs and their measurement.
Kaarst-Brown, Michelle	2017	Once upon a time: Crafting allegories to analyze and share the cultural complexity of strategic alignment.
Katzy, Bernhard R.; Sung, Gordon; Crowston, Kevin	2016	Alignment in an inter-organisational network: The case of ARC transistance.
Newkirk, Henry E.; Lederer, Albert L.; Johnson, Alice M.	2008	Rapid business and IT change: Drivers for strategic information systems planning?
Piccoli, Gabriele; Lui, Tsz-Wai	2014	The competitive impact of information technology: Can commodity IT contribute to competitive performance?
Queiroz, Magno	2017	Mixed results in strategic IT alignment research: A synthesis and empirical study.
Yayla, Ali Alper; Hu, Qing	2012	The impact of IT-business strategic alignment on firm performance in a developing country setting: Exploring moderating roles of environmental uncertainty and strategic orientation.
Information & Management		
Bechor, Tamir; Neumann, Seev; Zviran, Moshe; Glezer, Chanan	2010	A contingency model for estimating success of strategic information systems planning.
Cui, Tingru; Ye, Hua; Teo, Hock Hai; Li, Jizhen	2015	Information technology and open innovation: A strategic alignment perspective.
Ding, Fang; Li, Dong; George, Joey F.	2014	Investigating the effects of IS strategic leadership on organizational benefits from the perspective of CIO strategic roles.
Johnson, Alice M.; Lederer, Albert L.	2010	CEO/CIO mutual understanding, strategic alignment, and the contribution of IS to the organization.
Joshi, Anant; Bollen, Laury; Hassink, Harold; Haes, Steven de; van Grembergen, Wim	2018	Explaining IT governance disclosure through the constructs of IT governance maturity and IT strategic role.
Lee, Jae-Nam; Choi, Byounggu	2014	Strategic role of IT and its impact on organizations.
Journal of Management Information Systems		
Dulipovici, Alina; Robey, Daniel	2013	Strategic Alignment and Misalignment of Knowledge Management Systems: A Social Representation Perspective.
Grover, Varun; Chaing, Roger; Liang, Ting-Peng; Zhang, Dongsong	2018	Creating Strategic Business Value from Big Data Analytics: A Research Framework.
Tallon, Paul P.	2011	Value Chain Linkages and the Spillover Effects of Strategic Information Technology Alignment.
Wang, Nianxin; Liang, Huigang; Zhong, Weijun; Xue, Yajiong; Xiao, Jinghua	2012	Resource Structuring or Capability Building? An Empirical Study of the Business Value of Information Technology.
Information Systems Research		
El Sawy, Omar A.; Malhotra, Arvind; Park, YoungKi; Pavlou, Paul A.	2010	Seeking the Configurations of Digital Ecodynamics: It Takes Three to Tango.
Preston, David S.; Karahanna, Elena	2009	Antecedents of IS Strategic Alignment: A Nomological Network.
Ravishankar, M. N.; Pan, Shan L.; Leidner, Dorothy E.	2011	Examining the Strategic Alignment and Implementation Success of a KMS: A Subculture-Based Multilevel Analysis.
Tanriverdi, Hüseyin; Rai, Arun; Venkatraman, N.	2010	Reframing the Dominant Quests of Information Systems Strategy Research for Complex Adaptive Business Systems.
Harvard Business Review		
Porter, Michael E.; Heppelmann, James E.	2017	Why Every Organization Needs an Augmented Reality Strategy.
Porter, Michael E.; Heppelmann, James E.	2015	How Smart, Connected Products Are Transforming Companies.

Appendix B. Methodology for the literature review

For answering RQ 2, we extended the literature base for our review to a broader range of journals, conference papers, and textbooks. To specifically capture the discussion on IT/IS strategy and digitalization, we have time-framed our review to the decade from 2008 to 2018. Moreover, we have restricted our review to contributions to the "academic debate", since we found discussions by

Table 6
Characteristics of the literature review.

Attribute	Categories			
Research Interest	Research Outcomes	Research Methods	Theories	Practices or Applications
Goal	Integration & Synthesis	Criticism	Central issue	
Perspective	Neutral Representation	Espousal of Position		
Organization	Historical	Conceptual	Methodological	
Coverage	Exhaustive	Representative	Exhaustive with Selective Citation	Central or Pivotal
Audience	Specialized Scholars	Practitioners or Policy Makers	General Scholars	General Public

practitioners and consultancies to be fuzzy and surrounded by some buzz, which renders attempts to conceptualize and theorize difficult (Stockhinger and Teubner, 2018). Excluding non-academic sources, however, does not mean that we had a narrow focus on research papers. We also included academic textbooks and, when cited in the research literature, professional publications with an academic background. Textbooks already established in the market in editions three or higher, for example, provided us with rich insights on how the perception of IT/IS strategy has changed over the last decade. Irrespective of the type of publication included, we held a clear focus on the Information Systems discipline while controlling for related discussions in management and strategy studies.

With the qualifications mentioned above, our review aims at being comprehensive. Table 6 describes our literature review approach along the six dimensions proposed by Cooper (1988). Our interest was in new arguments and empirical evidence presented in the latest research that influence our understanding of IT/IS strategy. Our primary objective was to provide the reader with an overview of the latest academic debate. Hence, we did not bias our review by taking a specific point of view ex-ante. Our primary target audience is IS scholars, though we might also provide some practical insight. Our literature review intends to be exhaustive with respect to the IS research included. As far as non-research publications and management journals are concerned, we strove for representativeness.

In relation to Rowe's (2014) taxonomy, our review is best described as being *focused* in the sense that it has a specific interest in the latest debates on IT/IS strategy. The goal of our review lies in *describing* concerns in the ongoing academic discussion and making sense of them in a way that contributes to future *theorizing*. In terms of Paré et al. (2015), our review is more precisely characterized as a *scoping* review with ambitions to future *theorizing*. Such a combination is possible because scoping and theorizing reviews share common key characteristics. Both have a broad scope, seek for comprehensiveness as concerns the literature included, taking account of both, conceptual and empirical contributions, they follow an explicit selection process and finally analyse the literature included for content and themes. Irrespective of any taxonomy, our review complies with the demands made by Schryen (2015) for literature reviews that intend to make an "epistemological contribution", i.e. to add to the academic knowledge base.

The initial body of relevant academic sources included the most prestigious IS journals, as well as other IS journals with strong management or strategy orientation. We collected these sources from academic databases like Scimago and journal rankings released by the professional IS associations such as the AIS and others (e.g. ABS, ACPHIS).

We also included proceedings of IS conferences that have taken place in the last five years to account for ongoing and recent quality research that has not made its way into journals due to long review cycles. Above all, we surveyed the global ICIS conference and the international ECIS conference, but we also considered the AMCIS and PACIS conferences to take account of regional differences in the IS community.

Despite our focus on IS research, we did not ignore discussions in the management and strategy disciplines. To take account of these discussions, we included a selected set of management journals composed of both leading journals (Academy of Management Journal, Strategic Management Journal, Management Science) and of journals that lean towards IS research (Sloan Management Review, Harvard Business Review). The resulting set of management journals served us as a "control sample" to ensure that we did not miss essential concerns and arguments from the management community. Moreover, it allowed for better relating the IS discussion to debates in these cognate disciplines.

Finally, we also considered academic textbooks and professional publications referring to and contributing to the academic debate. While we did not search for the latter specifically, we surveyed professional publications when they were cited in the references of relevant research articles or textbooks. Indications for identifying a publication as having an academic outlook included, for example, an academic publisher (e.g., Oxford Press or practice-oriented articles published by MIT CISR) or authorship by academic scholars.

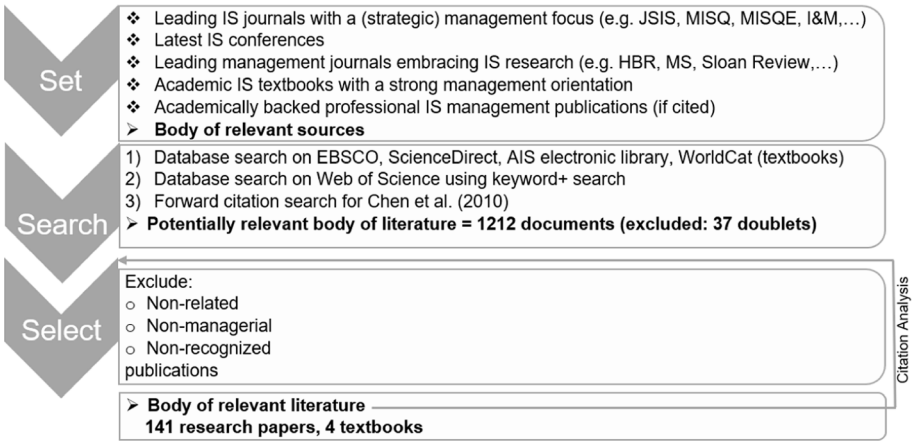

Fig. 3. Approach for the identification and selection of relevant literature.

To identify relevant academic research articles, we used the string "(Info* OR IT OR IS) AND strateg*" on the title, abstract, and keywords to search the relevant academic sources for publications issued during the years 2008 – 2018. The electronic databases of EBSCO, ScienceDirect, and the AIS electronic library provided us with access to all these publications. In addition, two steps were conducted to expand the sample.

First, we complemented our sample by extending our search to the Web of Science to ensure we did not miss relevant articles beyond our choice of outlets. Our search, however, was targeted on the use of the keywords + functionality of the Web of Science using the keywords "IT strategy", "IS strategy", "Information Technology strategy, "Information System strategy" on the "topic" field on Web of Science.

Second, we undertook a forward reference search for Chen et al. (2010), who have taken on the task to analyse, systematize, and re-conceptualize traditional notions of IT/IS strategy. We assumed that newer studies on IT/IS strategy would probably refer to this seminal article.

The search yielded a large number of hits so that we skimmed titles, abstracts, keywords, and, where needed, full texts, to sort out irrelevant articles. We discarded publications that were:

- Non-related: We excluded articles that used the strings "information technology", "information systems", "IT" and "IS" (case sensitive), together with "strategy" or "strategic" somewhere in the abstract but were not concerned with IT/IS strategy.
- Non-managerial: We excluded publications that used the string "strategy", but not in a managerial sense (e.g. "strategies for designing communication protocols").
- Non-recognized: We only considered articles that were published in peer-reviewed, broadly/ internationally available journals in the field of IS and strategic management, listed on Scimago.

Finally, we conducted a backward reference search for the publications cited in the articles initially identified. To this end, only articles that did not violate one of the three criteria mentioned above were eligible for being included in the final sample.

Following the procedure described above (see Fig. 3), we identified a sample of publications that definitely contributes to the IT/IS strategy debate. This body of relevant literature was the basis for conducting the in-depth literature analysis in the next step. Table 7 documents the search and selection process in quantitative terms, which resulted in 141 papers that constitute our "relevant body of literature".

We analysed our body of literature in a five-step coding process. We began by looking through the titles and abstracts of all

Table 7
Sampling process for journal papers.

Search and selection activity	Result
Search for IT/IS strategy publications for selected IS journals	+636
Search for IT/IS strategy publications for selected IS conferences	+174
Search for IT/IS strategy publications for selected management journals	+93
Search Web of Science via keyword+	+251
Forward search for Chen et al. (2010) (excluding doublets)	+58
Discard non-recognized, non-related, non-managerial articles	−1086
Backward citation search	+15
Total (body of relevant literature)	**=141**

publications to identify a subset of papers, which treated IT/IS strategy as the key research object. We used this subset to compile an initial list of topics that deviated from the major topics that had been discussed and researched in the pre-digital debate (see Teubner (2013) and Teubner and Mocker (2008) for the topics discussed in the pre-digital era). We then used this list of "new" topics to code our whole body of relevant literature. For this purpose, we tagged each paper with a maximum of three codes in descending order of relevance. In the next step, we used the primary tags to build broad clusters of publications, which we look upon as the main research streams. Each stream includes several sub-sets of papers that deal with related, more specific concerns and are tagged accordingly. For example, the cluster "supra-organizational view" includes three sub-sets of papers that are tagged as "new business environment", "inter-organizational arrangements", and "open strategy". The cluster "exploration", as a second example, includes, among others, papers tagged as "innovative IT/IS strategies", "ambidextrous IT/IS strategies", and "IT/IS strategizing".

To select relevant academic textbooks, we used the electronic library of WorldCat because it also includes textbooks. We used WorldCat's keyword search with the keywords and time frame mentioned previously. The initial search provided us with a list of 68 hits. However, this list contained several hits with no relevance for us, including practice-oriented textbooks without academic backing or single teaching cases. We then dived deeper into the remaining academic textbooks' abstracts, blurbs, and table of contents and discarded books not jointly concerned with strategy and IS in at least one chapter. The final criterion for being included in our analysis lies in the textbooks' maturity; we selected textbooks in edition 3 or higher, only. Table 8 displays the editions we used for analysis as well as the edition we compared it to.

Table 8
Academic textbooks included in the analysis.

ID	Authors	Year	Title	Ed.
1a	Dubey, Sanjiva Shankar	2010	IT Strategy and Management	2
1b	Dubey, Sanjiva Shankar	2018	IT Strategy and Management	4
2a	McKeen, James; Smith, Heather A.	2012	IT Strategy: Issues and Practices	2
2b	McKeen, James; Smith, Heather A.	2019	IT Strategy: Issues and Practices	4
3a	Pearlson, Keri E.; Saunders, Carol S.	2009	Managing and Using Information Systems: A Strategic Approach	4
3b	Pearlson, Keri E.; Saunders, Carol S.	2016	Managing and Using Information Systems: A Strategic Approach	6
4a	Ward, John; Peppard, Joe	2007	Strategic Planning for Information Systems	3
4b	Peppard, Joe; Ward, John	2016	The Strategic Management of Information Systems: Building a Digital Strategy	4

Appendix C. Literature sample used for the in-depth literature review

For the in-depth analysis of RQ 3, we narrowed down our sample to publications that (1) defined IT/IS strategy either explicitly or implicitly and (2) related it to – or in the best case argued for it in the light of – digitalization. For our investigation of whether, and if so, how digitalization has impacted traditional IT/IS strategy conceptions, we analysed the full text of the publications included in our body of relevant literature and coded the articles in our sample along the following dimensions:

- Interest in IT/IS strategy: This dimension refers to the question of whether IT/IS strategy is the central research object or rather a contextual factor. We coded publications as "*key*" when IT/IS strategy was treated as the main research object, and as "*concern",* when IT/IS strategy was investigated although the thematic focus of the research was on a related topic (such as strategic alignment or strategic IT/IS planning). We coded articles as "*marginal*" in cases where IT/IS strategy was only mentioned or treated as a minor side aspect.
- IT/IS strategy understanding: This dimension gives some indication of the IT/IS strategy understanding of the authors. We classified articles according to the conceptions distinguished by Teubner (2013): as a *basic disposition towards IT/IS,* the *support of business strategy,* the *corporate master plan,* and the *departmental plan* (see Table 1). No new understandings were found for the articles in our sample. However, we coded articles that discussed various conceptual understandings without settling on one specific definition as *diverse*. In several articles, the authors did not make their understanding explicit, although we could draw conclusions from the context (e.g. by examining the theoretical basis, research questions, and content of these articles). We marked those publications with their underlying understanding as "*implicit*". However, most articles shed no light on their perception of IT/IS strategy at all (neither explicitly nor implicitly).
- Justification of the IT/IS strategy concept: For those articles explicitly displaying their IT/IS strategy understanding, we recorded whether the definition used was somehow justified or discussed by the authors. In this dimension, we tagged publications as "*set*" when the authors just defined their understanding without referring to possible other definitions or perceptions. On the other hand, if the authors argued their choice against the backdrop of further possible definitions, articles were coded as "*argued*". In cases where the authors explicitly discussed their choice against the backdrop of digitalization, we tagged the article as "*discussed*".
- Relation to Digitalization: This dimension refers to the question of whether the publication relates to the changes induced by digitalization, either explicitly or implicitly. Whereas articles tagged as "*explicit*" directly relate their research to digitalization or digital transformation, the "*implicit*" tag insinuates an indirect relation. We identified such implicit relations whenever we found statements that related to our definition of digitalization or when authors referred to a facet of digitalization, such as a specific technology associated with digitalization (e.g. SMAC) or technology-mediated turbulent business environments.

Overall, we coded 141 publications that we used for the descriptive statistical analysis of how IT/IS strategy is understood in the latest research. We further investigated this sample for debates challenging traditional IT/IS strategy wisdom. The above coding helped us to identify publications that raise such debates so that we could exclude papers from the body of relevant literature that were only marginally relevant to IT/IS strategy, or left the reader in doubt about their understanding of IT/IS strategy, or had no relation to digitalization. Only 47 out of the 141 publications we analysed met the first two conditions, with only 33 of this 47 also referring to digitalization. Table 9 displays the 33 publications, which met all three conditions so that we included them in a more in-depth analysis.

The first part of Table 9 displays publications that dwell on IT/IS strategy as a key issue. Overall, we identified 15 articles dealing with IT/IS strategy at their heart. The remaining 18 articles listed in the second part of the table treated IT/IS strategy as a concern while focussing on a related topic. A large portion of these publications had a focus either on the digital business strategy or the digital transformation strategy concept (see tags "DBS" and "DTS" in column six, Table 9).

Table 9
Articles included in the in-depth analysis of IT/IS strategy debates.

Author (year)	Title	Outlet	Understanding of IT/IS strategy	Justification given for concept	Relation to Digitalization
Interest in IT/IS strategy = "key" (15 articles)					
Chan et al. (2016)	Competing Through Knowledge and Information Systems Strategies: A Study of Small and Medium-Sized Firms	Journal of Information & Knowledge Management	extended arm	set	implicit
Chen et al. (2015)	From Innovative IS Strategy to Customer Value: The Roles of Innovative Business Orientation, CIO Leadership and Organizational Climate	Data Base for Advances in Information Systems	basic disposition	set	implicit
Goeken et al. (2017)	StratIT – A Framework Describing the Contents of IT Strategies. Background and Approach	AMCIS 2017	departmental plan	set	explicit
Johnson and Lederer (2013)	IS Strategy and IS Contribution: CEO and CIO Perspectives	Information Systems Management	basic disposition (implicit)	argued	implicit
Leidner et al. (2011)	An empirical investigation of the relationship of IS strategy with firm performance	The Journal of Strategic Information Systems	basic disposition	set	implicit
Lo (2016)	Factors Facilitating Strategic Information Systems Innovativeness	AMCIS 2016	basic disposition	set	implicit
Lo and Leidner (2012)	Extending the is strategy typology: An assessment of strategy impacts on capabilities development and performance	ICIS 2012	basic disposition	argued	implicit
Lo and Leidner (2018)	Are Dynamic Capabilities the Missing Link Between the IS Strategy and Performance Relationship? A Model and Exploratory Test at Three Levels of Environmental Dynamism	Data Base for Advances in Information Systems	basic disposition (implicit)	set	implicit
Merali et al. (2012)	Information systems strategy: Past, present, future?	The Journal of Strategic Information Systems	diverse	set	implicit
Nan and Tanriverdi (2017)	Unifying the role of IT in hyperturbulence and competitive advantage via a multilevel perspective of IS strategy	MIS Quarterly	basic disposition	set	implicit
Qian and Palvia (2013)	Towards an Understanding of Cloud Computing's Impact on Organizational IT Strategy	Journal of Information Technology Case and Application Research (+AMCIS 2013)	master plan / departmental plan (implicit)	discussed	explicit
Sitoh et al. (2013)	Information system strategy for opportunity discovery and exploitation: Insights from business model transformation	ICIS 2013	basic disposition (implicit)	–	explicit
Tanriverdi et al. (2010)	Reframing the Dominant Quests of Information Systems Strategy Research for Complex Adaptive Business Systems	Information Systems Research	diverse	discussed	implicit
Ward (2012)	Information systems strategy: Quo vadis?	The Journal of Strategic Information Systems	diverse	discussed	implicit
Zelenkov (2015)	Critical regular components of IT strategy: Decision making model and efficiency measurement	Journal of Management Analytics	basic disposition	argued	implicit
Interest in IT/IS strategy = "concern" (18 articles)					
Baker et al. (2011)	Conceptualizing the dynamic strategic alignment competency	Journal of the Association of Information Systems	master plan/ departmental plan (implicit)	–	implicit
Bharadwaj et al. (2013)	Digital Business Strategy: Toward a Next Generation of Insights	MIS Quarterly	departmental plan	discussed	explicit (DBS)
		PACIS 2016	departmental plan	–	explicit (DTS)

(*continued on next page*)

Table 9 (*continued*)

Author (year)	Title	Outlet	Understanding of IT/IS strategy	Justification given for concept	Relation to Digitalization
Chanias and Hess (2016)	Understanding digital transformation strategy formation: Insights from Europe's automotive industry				
Chanias (2017)	Mastering Digital Transformation: The Path of a Financial Services Provider towards a Digital Transformation Strategy	ECIS 2017	basic disposition	discussed	explicit (DTS)
Dinter (2013)	Success factors for information logistics strategy - An empirical investigation	Decision Support Systems	master plan	argued	implicit
Drnevich and Croson (2013)	Information Technology and Business-Level Strategy: Toward an Integrated Theoretical Perspective	MIS Quarterly	departmental plan	set	explicit (DBS)
Henfridsson and Lind (2014)	Information systems strategizing, organizational sub-communities, and the emergence of a sustainability strategy	The Journal of Strategic Information Systems	extended arm (implicit)	–	explicit
Hess et al. (2016)	Options for formulating a digital transformation strategy	MIS Quarterly Executive	departmental plan	discussed	explicit (DTS)
Landaeta Olivo et al. (2016)	IT innovation strategy: managing the implementation, communication and its generated knowledge through the use of an ICT tool	Journal of Knowledge Management	master plan (implicit)	–	explicit
Lee and Mithas (2014)	IT Investments, Alignment and Firm Performance: Evidence from an Emerging Economy	ICIS 2014	basic disposition (implicit)	–	implicit
Li et al. (2016)	e-Leadership through strategic alignment: An empirical study of small- and medium-sized enterprises in the digital age	Journal of Information Technology	departmental plan (implicit)	–	explicit
Newkirk et al. (2008)	Rapid business and IT change: drivers for strategic information systems planning?	European Journal of Information Systems	extended arm (implicit)	–	implicit
Peppard et al. (2014)	Information systems strategy as practice: Micro strategy and strategizing for IS	The Journal of Strategic Information Systems	diverse	discussed	explicit
Reynolds and Yetton (2015)	Aligning business and IT strategies in multi-business organizations	Journal of Information Technology	departmental plan (implicit)	–	explicit
Sebastian et al. (2017)	How Big Old Companies Navigate Digital Transformation	MIS Quarterly Executive	extended arm	set	explicit (DBS)
Tallon (2012)	Value Chain Linkages and the Spillover Effects of Strategic Information Technology Alignment	Journal of Management Information Systems	extended arm (implicit)	–	implicit
Tallon and Pinsonneault (2011)	Competing Perspectives on the Link Between Strategic Information Technology Alignment and Organizational Agility: Insights from a Mediation Model	MIS Quarterly	extended arm	set	implicit
Woodard et al. (2013)	Design Capital and Design Moves: The Logic of Digital Business Strategy	MIS Quarterly	departmental plan	set	explicit (DBS)

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