Strategizing in a digital world:

Overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms

Henk W. Volberda

Amsterdam Business School, University of Amsterdam, The Netherlands

h.w.volberda@uva.nl

Saeed Khanagha

Free University Amsterdam, The Netherlands,

s.khanagha@vu.nl

Charles Baden-Fuller

Cass Business School, UK

c.baden-fuller@city.ac.uk

Oli R. Mihalache

Free University Amsterdam, The Netherlands

r.o.mihalache@vu.nl

Julian Birkinshaw

London Business School, UK

jbirkinshaw@london.edu

Strategizing in a digital world:

Overcoming cognitive barriers, reconfiguring routines and introducing new organizational forms

Abstract

As digital technologies such as cloud and edge computing, machine learning, advanced artificial intelligence (AI), and the internet of things (IoT) unfold, traditional industries such as telecoms, media, entertainment, and financial services are being reconfigured and new sectors are emerging. In this new competitive landscape we observe new organizational forms and new business models, including the emergence of platforms and multi-sided markets. This emergence has required a strategic response from incumbent firms, including both well-established firms and some first-generation digital enterprises. With these advances in digital technology, the very nature of strategy is changing. Fundamentally, the use of digital technologies may provide new opportunities for efficiency gains, customer intimacy, and innovation. However, without the right mindset for change, appropriate digital routines, and structural changes, digital transformation efforts will fail. We therefore present a framework for strategizing in this new digital competitive landscape that underscores the importance of the interplay between (1) the cognitive barriers faced by managers when trying to understand this new digital world and envision new digital business models, (2) a need to reconfigure and extend digital routines, and (3) new organizational forms that are better equipped to creating value and gaining competitive advantage. From this framework of essential pillars, we derive four journeys of digital transformation for companies that were formed in the pre-digital economy. We also describe the management roles required by top, middle, and frontline managers, depending on whether the digital migration is evolutionary or transformative and whether the firm is responding to or attempting to shape the ecosystem. Although digital transformation is technically all about technology, the more important issue is how companies make their way through this strange new digital world in which they find themselves. Ultimately digital transformation is as much about strategizing as it is about technology.

Keywords: *Digital transformation, digital technologies, platforms, business models, cognitive frames, routines, new organizational forms*

Strategizing in a digital world: Overcoming cognitive barriers, reconfiguring routines, and introducing new organizational forms[i]

Introduction

New digital technologies such as social media, mobile data analytics, and cloud computing are challenging existing ways of doing business, and organizations may rise to prominence or disappear, depending on their ability to strategize in this new competitive landscape. It has been said that we now face the fourth industrial revolution, one based on a fusion of technologies that integrate digital, physical, and biological environments (Schwab, 2017). Technologies that were previously separate, such as artificial intelligence and machine learning, cloud and edge computing, robotics, nanotechnology, and 3D printing, have come together and built on one another. Such trends engender digital ecosystems in which traditional companies and those created in the digital era collaborate and compete with one another to create and capture value (Constantinides et al., 2018; Jacobides et al., 2018). This results in novel strategic management challenges for academics and practitioners. Digital technologies are changing the 'rules of the game' in many industry sectors in terms of where and how to compete, what business model to choose, and the relative importance of creating versus capturing value. Digital technologies are also enabling changes in how firms structure and organize their activities internally (Birkinshaw, 2018) and how they achieve the fluidity and routines required in digital environments (Rossi et al., 2020). These new emerging norms affect all players – established firms, large 'born digitals' such as Google and Amazon, and smaller start-ups. However, the challenge of embracing these new ways of operating is particularly acute for the established firms that grew up with a very different set of structures and norms, inherited from the industrial era of the early twentieth century. For such firms, the most important item on their strategic agenda is digital transformation – shifting from a set of principles and norms inherited from that earlier era to ones that are relevant for the new digital world (Autio et al., 2021; Matt et al., 2015; Verhoef et al., 2021; Vial, 2019).

Digital transformation is challenging as many firms fail to realize the need to compete in new ways, and even many of those that do attempt to transform themselves end up failing. Moreover, the COVID-19 crisis is pushing companies to accelerate their digital transformation efforts and has made it harder for companies that were already lagging behind to catch up. In this introductory article, we develop an

integrative perspective on digital transformation, which provides a structure for thinking how to compete in the new digital world and serves as a compass for embarking on digital transformation. We begin by noting how digital technology has created new ways of competing, new ways of thinking about the context of strategy, and new ways of making strategy. We then move to our central contribution, the development of an integrative model of digital transformation that includes the shifts in cognition required and the adjustments to routines and structures that firms need to make. We attribute success in digital transformation to firms' ability to shift to new mental models of competition, to develop the supporting digital routines, and to implement new organizational structures in such a way that these elements support one another. In short, digital transformation is not just about adopting digital technology, but also about framing the way it is to be conceived, adopted and exploited, and building the supporting digital routines and new organizational forms. In addition, we advance understanding of the managerial dynamics of digital transformation by putting forward a typology of digital transformation journeys. Our typology is based on the type of change, which can be either transformative or evolutionary, depending on the speed and scope of change (which is itself based on the three key elements of cognition, routines, and structure), and on the firm's strategic orientation to the ecosystem, which can be either to shape it or to respond to changes. Understanding the type of transformation journey is important for successful digital transformation efforts; for each type of journey, our model suggests ways in which managers can deal with shifts in cognition, routines, and structure, and it also provides guidance on which key partners to involve in the ecosystem.

We further advance strategy research with a discussion of how the nine studies in this special issue relate to our integrative model and how they contribute to a new understanding of the strategy content, context, and process in the digital era. Taken together, these nine contributions provide a comprehensive picture of new digital strategies, covering areas such as platform competition, new ways to define and engage with the ecosystem, and new ways to develop strategies by reconsidering the actors involved in strategy-making and the role of traditional strategists.

The Impact of Digital Technologies on Strategizing

Advances in digital technologies are creating new challenges and possibilities for strategizing in several ways (Fitzgerald et al., 2014; Hanelt et al., 2020; Rogers, 2016). They often affect all functions of the firm and

even go beyond firm boundaries, impacting products, business processes, sales channels, supply chains, and ecosystems (Matt et al., 2015). First, altering the *content* of corporate strategies, digital technologies create new challenges and dilemmas for strategists. These technologies have enabled firms to compete in new ways, by using platform- and ecosystem-based business models, for example, and they have changed the nature of collaboration and competition within and across industries (Jacobides et al., 2018; Kretschmer et al., 2020). Due to increasing industry convergence, firms are changing their collaborative and competitive behavior as they take part in digital ecosystems that include unconventional actors from previously unrelated industries. Co-opetition and co-creation are increasingly common in such ecosystems (Hannah and Eisenhardt, 2018) because of the complex interdependencies between actors (Adner and Kapoor, 2010). There is also an increasing tension between openness and control, as firms need to build relationships with others by being open but still need to maintain a degree of control that allows them to appropriate and capture value (Boudreau, 2010). Also, many traditional products and services have become commoditized, and value creation for customers often now rests on delivering digital offerings in fundamentally new ways through business model innovation (Foss and Saebi, 2017; Volberda et al., 2018). Our knowledge of these new dimensions of strategy is still in its infancy.

Second, because of these new competitive dynamics and associated dilemmas, many established firms need to undertake change initiatives, and for scholars this creates a highly relevant *context* for studying strategic change. We cannot rely solely on earlier research, as the speed, scale, and scope of these latest changes (Bharadwaj et al., 2013) and the high level of ambiguity in digital ecosystems (Dattée et al., 2018) renders many of the traditional assumptions about strategy irrelevant (Khanagha et al., 2018; Van Alstyne et al., 2016). Piecemeal strategies may be ineffective. Instead, firms need to fundamentally reconsider how they create and capture value (Priem et al., 2018). As observed by Venkatraman and Henderson (2008, p. 260), "it is no longer adequate to innovate in narrow domains – products, processes and services […] we need to innovate more holistically – namely: the entire business model." In today's dynamic business environments, there has been an increasing focus on how to create distinctive business models and how to change them in order to sustain competitive advantage (McGrath, 2013). The speed with which digital technologies evolve forces firms to innovate their business model continually (Teece, 2010). The scope of change often goes beyond the boundaries of the firm and entails enabling value creation and capture at the

ecosystem level (Adner, 2017). Our understanding of the pathways and mechanisms that facilitate business model choice and change, particularly in the context of ecosystems, is in need of further development.

Third, new technologies influence the *process* of strategy-making, ushering in changes in *how* strategy-making and organizational change occur. The volume of information available to decision-makers is increasing exponentially, and this has major implications for long-standing theories of managerial cognition and action (Van Knippenberg et al., 2015). New technologies such as big data provide new ways of tackling management problems (George et al., 2016). More transparent and inclusive approaches to strategy are more appropriate when dealing with the new social media technologies and interdependent ecosystems (Hautz, Seidl, and Whittington, 2017). Digital technology challenges the traditional role of strategists, turning them from makers of strategy into coordinators of the strategy process. Opening up the strategy process to employees at lower levels of the hierarchy provides wider and fresh perspectives in an increasingly volatile and uncertain business environment, and involving external actors allows organizational boundaries to be blurred and creates different kinds of interdependencies with ecosystem members. Thus, digital technology affects not only how decision-makers make use of and respond to information but also the roles of different actors in strategizing and organizational change. Scholars have yet to give due attention to the implications of digital technologies for strategy formulation and execution processes.

In short, the fundamental questions of what constitutes effective competitive strategy formulation and implementation and who are the central strategic actors in this process need to be revisited, in the light of the digital revolution.

The Challenge of Digital Transformation

For executives in established firms, the pervasive nature of the shifts to new digital technologies requires them to look carefully at all aspects of their operations, and in many cases to embark on an integrative programme of digital transformation. This is considered here to be a firm-level process of change (Verhoef et al., 2021; Smith and Beretta, 2021), which involves re-examining the cognitive dimension of the business model (how managers seek to create and capture value), the routines, and the operating model (how internal activities are structured and managed). While many firms embark on digital transformation, the evidence

suggests their efforts to achieve this often fail to meet their goals (Gurbaxani and Dunkle, 2019; Hess et al., 2016; Shallmo et al., 2017; Vial, 2019).

Why do so many attempts at digital transformation fail? While it is tempting to assume that success is achieved through technological superiority, there is ample evidence to suggest that this is neither necessary nor sufficient (Kane et al., 2019). The failure of Kodak is a vivid example of the fact that investing in technology is not enough: Kodak was a leader in almost all of the relevant technologies (as measured by patents, for instance) required to achieve leadership in the digital photography industry, and yet it failed (Gavetti et al., 2005). At the same time, we note that some digital winners manage to outsource almost all of their digital processes, focusing on only a few core components. It seems therefore that the difference between winners and losers in a digital landscape is in large part down to managers individually and collectively recognizing what particular organizational and behavioral factors are required and combining them appropriately with the right advanced technologies. This requires managers not only recognising individually what is happening, but also ensuring that there is collective sensemaking about their perceptions (see for instance Gavetti, 2005, and Teece, 2007). Consider the new sharing business models (e.g., Uber, Airbnb, Helpling, Peerby, and Taskrabbit) that have disrupted the taxi, hotel, cleaning, and DIY sectors. While each of these platforms leveraged available technological infrastructure and applications, their success has been based to a very large extent on introducing new mechanisms for value creation and capture and then supporting them with appropriate routines, organizational forms, and cognitive models at the company and ecosystem level. For example, Uber's taxi-booking app has been highly successful, whereas TomTom introduced a similar app earlier but it failed to take off, which suggests that a number of other factors were also at play. Equally, the failure of Polaroid and Kodak, both of which invested large amounts of money in digital imaging, is a reminder that paying attention to technology will not necessarily make a firm able to cope with disruption (Tripsas and Gavetti, 2000). An appropriate but not necessarily leading level of technology, combined with a superior business model, can deliver more value than superior technology paired with an inappropriate business model (Birkinshaw et al., 2008; Teece, 2010; Volberda et al., 2018).

In this introductory article, we develop an integrated perspective on the challenge of digital transformation by considering three key dimensions: cognition (i.e., how executives look at the world, frame their decisions, and share this framing with relevant key actors), routines (i.e., the everyday patterns of

behavior of employees), and organizational forms (i.e., the formal structures and responsibilities that make coordinated effort possible). Reflecting those three dimensions, we define digital transformation as:

the use of new digital technologies to enable company-wide change (evolutionary versus transformative), involving the reframing of cognitive models of management (by envisioning new digital business models), the building of new digital routines (for the seizing of digital opportunities), and the implementation of new organizational forms (for setting up and integrating digital operations) for creating and appropriating new value in an established or new ecosystem.

Three pillars: Cognitive frames, routines, and organizational forms

As we have noted, digital technologies often enable new business models (Baden-Fuller and Haefliger, 2013; Chesbrough et al., 2013; Johnson et al., 2008), because they open up new opportunities (e.g., Holmqvist, 2003; Wu and Shanley, 2009). These new opportunities challenge executives to think differently and so trigger the firm to change its existing business model (Foss et al., 2013; Voelpel et al., 2005). For example, awareness of advances in technology prompted Amazon executives to renew the firm's business model, moving it from an online bookseller to an online retailer, publisher, and media content organization. Paradoxically, success in dealing with digital technologies is by and large down to non-technological factors that enable firms to create value and compete effectively through the use of new business models.

For a firm to transform itself for today's digital world, embracing new technologies is necessary but not sufficient on its own. Simply selecting and implementing the right digital technologies (the so-called "technology fallacy") is unlikely to lead to success (Furr and Shipilov, 2019; Kane et al., 2019; Tabrici et al., 2019). Our premise is that the cognitive aspects of business models, along with routine-centered and structural concepts, need to be incorporated into research in order to reveal the important mechanisms that affect the success and failure of digital strategies (see Figure 1). Organizations do indeed require strong routines to compete in the digital era, but identifying what constitute appropriate routines for creating and capturing value, and how these can be implemented effectively, is very closely tied to other cognitive factors. Furthermore, these processes occur within organizational hierarchies that face new needs and opportunities created by digital technologies. In true strategy fashion, the technology alone may not provide a long-term advantage since new technologies are becoming easier and easier to acquire. It is rather the fact that the technology is intertwined with a particular organizational context, made up of cognition, routines, and

structure, that provides firms with a competitive advantage. Although the importance of jointly considering the three key elements of cognition, routines, and hierarchy has strong roots in management research (Gavetti, 2005), this has generally not been given due consideration in the emerging research on digital strategy. This article builds on and takes forward research that shows digital transformation to be a process of experimentation and discovery that is subject to cognitive, routine-based and structural barriers. We now consider each of these three in turn.

<Insert Figure 1 about here>

The cognitive pillar of digital strategies – new business model thinking

Managers need to make sense of vast quantities of data from dispersed organizational nodes. Given the increasing speed of change, they need to be able to make credible interpretations of the environment and focus their attention on relevant information. Although digital technologies such as smart decision support systems and artificial intelligence can help to broaden the scope of their attention, enabling them to take notice of a wider range of things, information overflow may make it difficult for them to process and use data for decision making. Poorly executed information systems that utilize technologies such as machine learning in the wrong way can give out confusing signals, resulting in strategy paralysis.

On the other hand, the arrival of advanced digital technologies, coupled with improvements in connectivity such as 4G and 5G, has allowed firms to transform their offerings to consumers and to engage quite differently with their ecosystem. Before, most firms could thrive by making only minor changes to their old "pipeline-product" models, which had weak links to complementarities on the customer side. Once the new technologies arrived, however, customer complementarities drove significant changes to ecosystems and business models (see Figure 2). For example, Uber upended the traditional taxi service business by creating tight linkages between drivers, taxi customers, credit card companies, and the firm. It did so by using strong web-based connectivity and simple (but computationally demanding) machine learning algorithms to complete actions that had previously been done manually (such as locating taxis for passengers). Established taxi companies found it hard to respond to Uber not just because of the investment required but, more significantly, because it was cognitively demanding to work out an appropriate response

when that would involve not just one firm but a series of other ecosystem partners on whom it would be reliant. In this case that involved reaching out to rival taxi firms to form clubs to invest in common systems that could offer similar features as Uber. Similarly, in the B2B sphere, connectivity and advances in digital technologies have allowed capital-intensive industries to transform themselves, so that many now offer servitized solutions that guarantee performance and monetize through mechanisms that are based on use and performance from the customer perspective, rather than traditional 'product sale'. This reduces the risk in a large part of their customers' businesses and integrates a myriad of service providers into a single, tight ecosystem, making the existing business models of both producers and service providers no longer viable (see, for instance, Visnjic Kastalli and van Looy, 2013).

<Insert Figure 2 about here>

Incumbents rarely create new digital business models; they are more likely to use digital technologies to extend or improve their existing activities in an evolutionary manner (Foss and Saebi, 2018; Volberda et al., 2018; Warner and Wäger, 2019). It is rather difficult to fundamentally alter a business model so that it reflects the changes brought about both by new digital technologies and changing customer needs and competitive dynamics (Chesbrough, 2010). Research on the adoption of new technologies indicates that the process is affected by cognitive barriers; managers may not fully understand the structural impediments to change, and dominant logics within the firm may prevent people from adopting new ways of thinking (Chesbrough, 2010; Chesbrough and Rosenbloom, 2002). In fact, as the process of adopting digital technology is one of experimentation, trial-and-error learning, and discovery (see, for example, Frankenberger et al., 2013; McGrath, 2010), the speed with which new digital business models are envisioned and the direction taken hinge critically on decision-makers' cognitive make-up, which determines their awareness and understanding of the key issues and the range of possibilities for refashioning the business model (cf. Chesbrough, 2010; Sosna et al., 2010). Recent research by Narayan, Sidhu, and Volberda (2020) shows that the cognitive diversity of top management teams (TMT) affects their attention scope when it comes to digital technologies; greater diversity expands the range of a TMT's awareness, thus helping remove the blinkers that may prevent top managers from seeing either impediments

or opportunities. Consistent with the notion put forward by Martins et al. (2015) that new business models start as a change in cognitive schemas, their study points to TMT diversity as the factor that began the process of envisioning new online business models in the publishing industry. This is because cognition is situated, and our perceptions are conditioned by factors in our immediate surroundings. Most managers are aware of digital needs and opportunities, but translating awareness into the correct actions often requires cognitive hurdles to be overcome before any action can be taken. Microsoft CEO Satya Nadella (De Smet et al., 2021) describes this as "I have a new hypothesis, let's go test it, see if it's valid, ask how quickly can we validate it. And if it's not valid, move on to the next one." Shifting the collective mindset from "know it all" to "learn it all" facilitates new digital business models. Here, the business model is viewed in a cognitive way, as a mediating instrument of enquiry that reflects and directs our thinking (Baden-Fuller and Morgan, 2010), so changing it is often the first critical step.

For established firms, crucial for overcoming the cognitive barriers is the availability of high-quality information, which may be fragmented or may already have been carefully curated. Strategic human resources such as data analysts and technical experts are vital elements in this process of managing and curating information for the organization. But these groups face other sorts of challenges. With the growing trend of using machines for critical processes, it is vital to document and digitalize the tacit knowledge held by experts and to transfer it into automated systems or systems that are based on artificial intelligence. However, many specialist jobs may be eliminated afterwards and encouraging people to support such transformation processes therefore becomes something of a dilemma. Also, although virtual workspaces provide flexibility and efficiency, they may also lead to frustration and to a lack of motivation as employees are unable to interact with colleagues in a physical environment (Eden et al., 2019).

What happens at the firm level also needs to happen at the ecosystem level. At the firm level, transformation to a new business model often requires those within the organization to let go collectively of their existing mindsets, culture, and identity and to develop new ones that are appropriate for the digital context. Digital companies need to go beyond their own organizational boundaries; they need to manage complex identities and cultures both within the firm and in the ecosystem as they rapidly scale up or change the scope of their business– for example by moving to a new sector. In the digital age, managing cognitive factors goes beyond organizational boundaries, as high levels of interdependence between ecosystem actors

requires perceptions to be managed and approval to be gained. In order to manage cognitive elements effectively within and across organizational boundaries, it is pertinent to develop novel routines and organizational forms. We summarize our thinking in Figure 2 below.

The routine-based pillar of digital strategies – design of new practices

While a shift in cognitive mindset expands a firm's attention scope in relation to new digital business models, the process of enacting the new business model is achieved through new behavioral routines. The concept of routines that provide structure and focus to day-to-day activities has been around for a long time (Nelson and Winter, 1982), but our focus here is on the idea that firms increasingly need to develop 'digital routines' that are suited to the digital age. For example, digital routines incorporate large amounts of real-time analysis of internal and external information, thereby enabling faster decision making and better resource allocation. They also provide new ways of connecting to customers, suppliers, and employees and a greater capacity for data gathering and analysis, enabling managers to make more inclusive, agile, and informed strategic decisions. Digitally mature firms (Kane et al., 2017) are incorporating more and more digital technologies into their operational routines, with the effect that the difference between routines and capabilities may vanish, since routines based on digital technologies are very easily adaptable (Hanelt et al., 2020). These routines mobilize resources to address digital needs and seize opportunities and allow a firm to capture value from doing so (Vail, 2019). In their study of digital transformation of incumbent firms in Germany, Warner and Wäger (2019) highlighted various dynamic routines, including rapid prototyping (the ability to quickly release minimum viable online versions), balancing digital portfolios (e.g., the ability to combine platform business models with existing product- or service-based business models), and strategic agility (Teece et al., 2016; Sambamurthy et al., 2003) in the form of customer agility (e.g., the ability to co-create based on user experiences), partnering agility (e.g., the ability to coordinate a network of external partners), and operational agility (e.g., the ability to do things fast and cost-effectively).

It is widely accepted that new routines are essential for digital strategy and innovation. The speed, scope, and scale of changes in a digital context are considerably greater than in traditional settings. Every once in a while, we observe innovative start-ups such as Salesforce and Uber that manage to displace long-established companies in a relatively short period of time and to expand across industries and markets. For

example, Airbnb entered the hotel industry, scaled up rapidly to take market share from traditional players, and changed the scope of its work by focusing on tourism and other related activities. Both incumbents and new entrants will require organizational routines that enable them to compete and survive in the digital context.

Because of the need for speed, scope, and scale (Bharadwaj et al., 2013), existing routines that were developed when the pace of change was slower and changes were less far-reaching often prove to be ineffective. Widely used processes for formulating yearly and multi-year strategy plans are becoming less and less relevant. In the digital context, many of the assumptions that form the basis of strategy-making evolve, sometimes in the span of few months – and sometimes in remarkable ways. To address the rate of change, effective strategy requires a more fluid process that ensures the company has an overall direction but allows assumptions and priorities to be continually reconsidered. For instance, executive team members at Volvo Cars developed a clear vision of the broad parameters of the firm's digital transformation efforts, even though they did not know much about the specifics (Svahn et al., 2017). There is a high degree of ambiguity associated with this type of activity, resulting from intensive and intertwined changes, and that makes it difficult for CEOs to come up with a unified vision for their company. This implies that a company may need to embrace different, even inconsistent, strategies in order to expand the array of options open to it. This, in turn, requires broader and more flexible strategy-making and execution routines for initiating various strategic actions as the change unfolds. In their study on Ericsson's adoption of Cloud computing, Khanagha et al. (2018) found that the company's flexible routines for managing misalignment allowed it to cope with inconsistencies in strategic direction and resource configuration.

In addition to routines used for strategy-making, those used for innovation require reconsideration (Nambisan et al., 2017). The drastic reduction in information-processing costs due to digitalization has pushed innovation increasingly outside of firm boundaries and challenged the received wisdom on the nature of innovation (Benner and Tushman, 2015). First, as the speed of innovation increases, traditional stage-gate models for innovation become less and less effective, and iterative processes based on minimum viable products and rapid prototyping become increasingly relevant and popular. For instance, as its digital transformation unfolded, Ericsson found it more effective to run hundreds of parallel experimental projects with small cross-functional teams to see what gained traction. At Volvo Cars executives realized that to

achieve digital innovation, they had to break away from the firm's conventional product development routines. Leveraging the new opportunities afforded by digital technologies would require a fundamental shift in the company's routines that would affect Volvo's identity and culture. The executive team created the Connectivity Hub, a cross-functional team responsible for developing new innovation routines for connected cars (Svahn et al., 2017). These required the firm to move away from market-push processes and internal innovation activities and to engage instead in more collaboration and co-creation of value with customers, partners, competitors, and other ecosystem actors. To cope with digital disruption created by new market entrants, many firms try to create value collectively through co-creation with external partners (e.g., Chesbrough, 2003; Van Haverbeke et al., 2008). Dealing with misalignment between the firm and its ecosystem partners requires a greater degree of flexibility in routines and can tend to involve tension and conflicts; these routines allow digital incumbents to be aware of and deal with the tensions of misalignment so that they can cope with the complexities of digital disruption (Khanagha et al., 2018). In their digital migration, organizations face a dilemma, as they have to embrace more flexible and informal innovation processes and at the same time avoid a chaotic situation that will deplete organizational resources to little effect (Volberda, 1996).

To deal with such dilemmas, we need to reconsider the way managers across functions and levels of the organization perform their job, and the 'how and what' of what they do in terms of setting directions, making decisions, coordinating activities, and motivating people (Birkinshaw, 2010; Hamel, 2006; Volberda et al., 2014). Hence, introducing new management practices – i.e., the generation and implementation of processes or techniques that are new to the state of the art (Birkinshaw et al., 2008, p. 829) – becomes central to digital strategies. Organizations need to experiment with and try out new routines and practices, such as lean, agile or scrum practices, to learn how they can deal effectively with digital innovation and strategy. This experimental learning approach to the development of routines implies that other higher-order routines that govern operational routines and that are heavily reliant on experiential learning also need to be reconsidered. Importantly, not all management innovation needs to be internally generated; firms can potentially shortcut the process by looking outside their boundaries for new ways of managing that can be adapted to their particular context or can reach out to external change agents to bring in new perspectives (Volberda et al., 2014). As an unexpected outcome of the COVID-19 crisis, digitally managed routines for

internal and external processes are being rolled out faster than ever. Thus, as digital transformation brings a need for firms to accommodate tensions and potentially incongruous routines, they need to move from their traditional management principles where the emphasis is typically on alignment to new ones with a greater emphasis on speed and complexity.

The structural pillar of digital strategies – new organizational forms

Digital technologies are also prompting changes in the internal structure of firms. More effective sharing of information enables firms to be less hierarchical and more receptive to bottom-up decision making. As a consequence, it becomes easier for people to work remotely and manage their careers more flexibly (Birkinshaw, 2018; Eden et al., 2019). A number of new organizing models have emerged in recent years. Examples include agile management, holacracy and teal organizations, often exemplified by "born digital" firms such as Google, Spotify, Valve, and Zappos (Bernstein et al., 2016; Puranam et al., 2014). While the underlying principles of self-organization exemplified by these firms have been around for many decades, the ability of firms to put these principles into practice has undoubtedly been enhanced by digital innovation.

Digital technologies enable information to be shared widely and instantaneously, making it possible for organizations to operate in a flatter and less hierarchical way. This trend of moving away from traditional hierarchical structures has been underway for several decades (e.g., Eccles and Nohria, 1992; Hedlund 1986) but has gathered pace in recent years, largely because of the emergence of self-organizing practices. Digitally mature firms structure themselves in ways that make them fitter, flatter, and faster, and far better at unlocking value. While this may imply less need for a layer of middle managers in organizations, there are still critical tasks that need to be undertaken by individuals outside the upper echelons. For example, to deal with the increased speed of change and the ambiguity of digital ecosystems, it is important to delegate critical aspects of sensing and even seizing activities to managers who are in in direct contact with customers and other actors in the ecosystem and who have direct knowledge of global markets. It appears that organizations need to redefine, not eliminate, the role of middle managers in line with the demands of digital ecosystems.

There has also been much research on malleable organization designs (Hanelt et al., 2020) and new hyperadaptive organizational forms, which enable firms to incorporate digital technologies rapidly and help to boost new business models (Birkinshaw et al., 2008; Hamel, 2007). These include the ambidextrous organization (Tushman and O'Reilly, 1996; Gilbert, 2005), the disposable organization (March, 1995), the poised organization (Kauffman, 1995), semi-structures (Brown and Eisenhardt, 1997), adhocracy (Birkinshaw and Ridderstrale, 2017), the hypertext form (Nonaka and Takeuchi, 1995), or more generally the flexible organization (Volberda, 1998). A common theme across these different forms of organization is the notion that structure is only partially determined from above; it also emerges through the complex interactions between actors at lower levels (Brown and Eisenhardt, 1998; Kauffman, 1995; Prigogine and Stengers, 1984). Many firms, however, still operate with traditional hierarchical organizational forms that severely limit their capacity to develop new business models. To facilitate the adoption of digital business models, these traditional organizational forms need to be either modified slightly or completely redesigned (Foss, 2002; Foss et al., 2009; Volberda et al., 2018; Yoo et al., 2012). As an illustration, Haier, the Chinese multinational manufacturer of appliances and consumer electronics, moved away from a traditional hierarchical structure and started using self-managed teams. It is now an organization with no layers or traditional bosses. Instead, thousands of independent microenterprises, run by small flexible teams, collaborate over networks of platforms and employees to accomplish the company's goals. Another alternative model, which became popular during the 2010s, is a holacracy, in which the power of top management is embodied in a detailed "written constitution" that sets out how the firm should be structured, governed, and run, with a view to giving individuals as much freedom as possible. This constitution evolves over time through the decisions taken by those within the organization. As such, power is distributed across all levels of the organization, thereby reducing the burden of decision-making for top management. Managers become "lead links" and employees have roles rather than jobs (Robertson, 2015). In the case of the US online clothing retailer Zappos, the holacracy works in such a way that if a particular business problem arises on a regular basis, a different team of employees is brought together each time to try and address it. After piloting holacracy in a small unit, Zappos extended this model across the whole company. Employees gradually became more comfortable with their new levels of authority and responsibility, but there were practical challenges in implementing holacracy in its entirety that led to further

tailoring of the model to Zappos' particular circumstances. Once again, we draw readers' attention to Figure 1, where the connections between cognition and structural changes (see especially Gavetti, 2012) and between routines and structures are indicated by the arrows between boxes.

The interplay between cognition, routines, and structure

It is important to consider that the three pillars of digital transformation we discussed here do not operate independently. Digital transformations are often implemented as a set of stand-alone IT initiatives. As a result, many promising digital technologies stall or underdeliver without it being readily apparent as to why. Digital transformation must be holistic to deliver full business value, which implies that coherent and linked changes to cognition, routines, and structures will be needed. Making changes in just one of these areas at a time may not come close to achieving all the benefits that a fully coordinated move would deliver (Whittington et al., 1999). For instance, manager and employee beliefs about digital technologies ("digital mindsets") are likely to influence their engagement in, or withdrawal from, the firm's broader change agenda, for example the extent to which they see digital transformation initiatives as opportunities for growth (Cennamo et al., 2020; Solberg et al., 2020; Schneider and Sting, 2020). Digital transformation is therefore often about helping managers and employees to develop a different mindset in relation to digital technologies so that appropriate structures and routines can then be developed (Cennamo et al., 2020). At the same time, appropriate routines and flat, horizontal structures are essential to channel attention towards allocating resources to new digital technologies. For example, co-creation is mostly manifested in routines that encourage responsiveness and innovation, but in a highly formalized structure where everything is tightly controlled it is very difficult to achieve the desired level of flexibility required for collaboration. Similarly, as firms with digital new ventures or platforms attempt to scale to address much broader markets, managers need to recognize the need to be able to implement new routines and structures effectively. These examples clearly illustrate how all three elements, cognition, routines, and structure, need to be considered and dealt with simultaneously. Going back to Figure 2, we represent these complementarities with boxes and use arrows to show the interconnections between cognition, routines, and structures.

Mastering digital transformation: A typology of digital transformation journeys

Digital transformation can be set in motion by reframing cognitive models of management (by envisioning new digital business models), building new digital routines (for the seizing of digital opportunities), and bringing in new organizational structures (for the setting up and integration of digital operations). Although it is essential to ensure these three central elements are closely aligned, we do not know very much about how digital transformations unfold in practice (Lanzolla et al., 2020). When considering the process of digital transformation across different industry sectors, it is clear that the pace and rate of change varies enormously. The academic literature tends to focus on industries such as technology, the media, telecoms or retail, where new competitors have been the most successful and traditional, established firms have struggled the most. But there are many other industries – from consumer goods to engineering or energy – where the impact of digital technologies on firm strategies has been less disruptive. For example, the Italian utility Enel Corporation went through an extensive and successful digital transformation during the 2010s, which enabled it to incorporate new technologies into its factories and its energy distribution activities and to fundamentally re-engineer its internal routines (Birkinshaw and Mark, 2019). However, throughout this period its business model remained stable, and to an outside observer the changes would have been mostly invisible. Returning to our earlier examples of business model transformation, we also note that, while disruption by newcomers has been common in B2C industries (for example, Uber's shake-up of the taxi industry), the move by capital-intensive manufacturers from traditional product business models and isolated, unconnected ecosystems to servitized solutions business models and tightly constructed ecosystems has been led almost entirely by a small sub-group of incumbents, often those who dominated those industries in earlier years and who had both the vision and the resources to manage the necessary changes (Visnjic Kastalli and Van Looy, 2013).

It is therefore useful to conceptualize a number of different types of digital transformation journeys that a firm might go on, depending on its circumstances and the choices made by its top executives. One important dimension is the *type of change*, as denoted by its speed and scope. For some firms this might be transformative, because it results in fundamentally different cognitive frames, routines, and structures for the firm. For others it might be evolutionary, resulting in incremental changes in all of these areas. A second dimension is the *strategic orientation* in relation to the ecosystem, that is how does the firm view its

relationships with other actors in the ecosystem. Some digital journeys involve the firm proactively shaping a new ecosystem, others involve it adapting to existing ecosystems. Combining these two types of change (transformative and evolutionary) with different strategic orientations to the ecosystem (shaping versus adapting) gives us four possible types of journey, as shown in Figure 3 below (see also Table 1 for the roles that top, middle, and frontline managers may play in this):

<Insert Figure 3 about here>

- *Type 1 – Holistic digital transformation: Shaping the ecosystem through transformative change*. This type of journey, which we call "*explore and dominate*", is characterized by transformational leadership, a committed top and middle management, an innovative culture, a focus on internal knowledge absorption, a dynamic external environment, and an internal organizational identity that is subject to frequent change (see also Table 1). This proactive digital transformation requires the creation of new cognitive schemes, the development of fundamentally new routines, and the redesigning of the organizational form. It entails an organization-wide transformation that involves all levels of management. The born digital firm Amazon went through such a journey; it shaped and expanded its ecosystem and changed its original online bookselling business model by adopting a wide portfolio of other business models, leveraging synergies between customer groups both within and between business models over time (Aversa et al., this issue). Nike's migration to digital technologies is a typical case of holistic digital transformation. It was able to create a premium and seamless experience for customers, with the result that more than 30% of its sales are now online. With its platform it created its own sports ecosystem. It also moved from a retail-based model to an online direct-to-consumer model, switched to a new organizational structure that was led by consumers and data, and invested heavily in end-to-end technology.
- *Type 2 – Facilitated digital transformation: Adapting to an ecosystem by upgrading to new customers/complementors.* A journey of this type, which we call "*explore and connect*", is characterized by transformational leadership, a committed top and frontline management, an innovative, customer-driven culture, a focus on external knowledge absorption, a dynamic external environment, and an external organizational identity in flux. Digital transformation here centers

around upgrading the organization in response to completely new customers. Microsoft is one company that embarked on such a transformation journey, starting in 2014 when Satya Nadella took over as CEO. In this transformation, Microsoft shifted from providing traditional software (i.e., its Windows operating system and Office productivity suite) to cloud networking systems by developing relationships with new customers and complementors. The Canadian French-language newspaper La Presse also went through a process of facilitated digital migration. To reach a different, younger customer group it needed to introduce a news app and online platform (La Presse+) that would provide more opportunities for customization (e.g., specific articles and advertisements). It discontinued its weekday print edition. This made La Presse the first daily newspaper to become 100% digital and thus the digital leader of Canada's news and media industry.

- *Type 3 – Directed digital transformation: Shaping the ecosystem through evolutionary change*. This type of journey, which we call "*exploit and improve*", is characterized by transactional leadership, a committed top management, a less innovative culture, a focus on internal knowledge absorption, a competitive external environment, and a strong internal organizational identity. In this case, a directive management improves and perfects the existing routines within the dominant cognitive frames and existing organizational form. This type of transformation journey is exemplified by AB Inbev, the largest brewer in the world. AB Inbev is experimenting with digital technology in its innovation lab, Beer Garage, to find ways in which artificial intelligence, the IoT, or machine learning can be used to engage with its ecosystem partners (e.g., breweries, retailers, and customers) and to create new ways of connecting with them. In the same way, the top management of Heineken, a fast-moving consumer goods (FMCG) brand whose marketing and sales have traditionally been done via physical, offline distribution channels, launched a stand-alone ecommerce platform (Beerwulf) in order to interact directly with end-customers and reduce the firm's dependency on powerful retailers. Ikea, which achieved its success as a bricks and mortar retailer, is also representative of this kind of journey. It only started to sell online in 2009. The changes were driven by the top management, and through a series of small, incremental changes the firm has been able to migrate to a multi-channel brand with both offline and online sales.

- *Type 4 – Connected digital transformation: Adapting to the ecosystem by strengthening the ties with existing customers/complementors*. A journey of this type, which we call "*exploit and connect*", is characterized by transactional leadership, a committed top management, a customer-driven culture, a focus on external knowledge absorption, a high level of competitive pressure, and a strong external organizational identity. Here, the cognitive frames, routines, and organizational form are improved significantly by strengthening the firm's links to its existing customers. Combining and exchanging knowledge is particularly important in this type of journey. It is one that is exemplified by companies such as Best Buy, which over a period of seven years engaged in a digital transformation that helped it turn around its performance in response to changes in its ecosystem caused by the rise of digital retailers like Amazon. Best Buy uses digital technologies to deepen its relationship with existing customers. For example, it uses customer data to personalize its sales offers and customer support, helping it to reduce costs and provide more value to consumers.

<Insert Table 1 about here>

Importantly, how change is implemented depends on the type of digital transformation journey a firm embarks on. Specifically, this choice determines who the main change agents will be, what roles they will need to play, and what actions are likely to be effective. The CEO, and the top and middle management will adopt different roles and engage in different activities depending on whether the digital journey is transformative or evolutionary and whether the firm is intent on shaping the ecosystem or is merely responding to changes within it (see also Table 1).

A Type 1 digital transformation journey (holistic) involve the most drastic change in management and roles. Since this is a transformative change and the firm is shaping its ecosystem, there is a need for changes to both top and middle management. The changes occur from the inside out, through the adoption of new digital technologies, the creation of new cognitive schemes, the development of new routines, and a fundamental redesign of the organization. Both top management and middle management are involved intensively in this. This type of digital migration places a heavy burden on senior managers and is thus likely to result in some major changes to the top management team. The substantial involvement required from middle managers generally means that this type of journey may be more difficult to complete satisfactorily

with the firm's existing middle managers still in place. After all, some of those middle managers may have spent a large part of their career focusing on refinements to the business, made within the existing cognitive frame. Thus, undertaking a complete metamorphosis of the organization and its ecosystem entails making significant changes within the organization, and to its routines and structure, as there is a need for people with new skills and to develop new relationship within the organization and with new ecosystem members.

In Type 2 digital journeys (facilitated), firms aim to transform but through a more reactive approach, responding to changes in their ecosystem rather than leading the change. This implies that, as in Type 1 journeys, there are likely to be drastic changes to the top and frontline management in order to accommodate new roles for operating with the changed ecosystem. However, the transformation journey starts later, as the firm adopts a wait and see approach, potentially avoiding the turmoil associated with figuring out who the main players in the ecosystem are, and what new management roles, routines, or ways of structuring the firm will be needed (see Karhu and Ritala's study in this issue about the different strategies firms can employ). To facilitate the transformation, the firm does not focus merely on current customers and allocate all of its resources to finding the best solutions for them, sometimes referred to as the "tyranny of the served market" (Christensen, 1997; Hamel and Prahalad, 1994); a firm's largest customers will often be resistant to new digital technologies. Instead, top managers seek to free themselves from the influence of their most important customers, for example by establishing a separate organizational unit for new customers as they explore and make new connections within the new ecosystem.

With Type 3 transformation journeys (directed), where firms aim to shape the ecosystem but the change is limited in scope and takes place more slowly, we may see less drastic changes in management and in managers' roles. With evolutionary change, top managers strengthen the organizational identity, while middle managers promote internal cooperation. Also, one of the tasks of both top and middle managers is to be very responsive to the firm's most important customers. As change takes place gradually, changes in managers' roles are also made gradually and may initially take the form of recruiting staff rather than replacing existing managers. New roles associated with new cognitive models are necessary to shape the ecosystem but these roles emerge over time. Similarly, new routines and ways of organizing appear as the organization brings in new ecosystem partners and adjusts its relationships with existing ones. This type of

digital transformation journey requires the organization to operate with multiple and conflicting strategic and organizational logics as its relationship with the ecosystem evolves over time.

With Type 4 transformation journeys (connected), organizations adapt to a changing ecosystem by strengthening their ties with existing customers and complementors. That is, the focus is on strengthening the routines, cognitive schemes, and organizational forms by linking them more closely to existing customers. The improvement comes mainly from engaging in co-creation with customers, adjusting management practices, and fine-tuning the organization – activities which are particularly powerful in combination. The level of involvement required from top managers is less than for the others: it is to consider issues such as which types of customer segments to serve or which of the firm's existing customers are the most important to invest in. Also, top managers can support the transformation by encouraging the use of new technologies, making clear how these relate to the core competencies, and reinforcing their use by updating reward systems.

Thus, digital transformation journeys vary in terms of the pacing, speed, reach, and magnitude of the transformation, and take four generic forms . They each require specific leadership styles, management roles, and organizational cultures and identities (see Table 1).

Outline of the Special Issue

For the special issue, we received 57 submissions, of which nine papers were eventually accepted for publication after a three-stage review process. The articles in this special issue span different research methods and empirical contexts and explore various dimensions of strategic management in the digital era. We present these articles according to the original theme of the special issue (process, content, and context) and explain how each relates to our conceptual model and our three core elements of cognition, routines, and organizational structure (see Table 2).

<Insert Table 2 about here>

Strategy Process

The study by Azad and Zablith (this issue) shows how different aspects of digital visualization (i.e., incorporating non-narrative elements, network depiction, and adaptive interface functionalities) can be used to help front-line employees to participate in a major strategic change process. The authors use in-depth primary data from an academic institution and investigate how senior managers can enable and encourage front-line employees to contribute to the strategy-making process. The article identifies the particular elements of visualization tools that are beneficial for effective open strategy-making, and provides a useful example of how an organization may circumvent hierarchical structures in order to facilitate strategic change. Organizations require new routines that are enabled by digital technologies (in this case visualization) and that shape the cognition of front-line employees so that they will contribute to the change process in the way that the organization requires. Their findings indicate that strategy literature should go beyond its current focus on senior and middle managers and take into account the cognition of front-line employees in connection with the strategic change process.

Similarly, the study by Plotnikova et al. (this issue) explains how digital communities can complement and exist in parallel to the formal hierarchy. The study used longitudinal qualitative data from Ericsson and presents an in-depth analysis of the open strategizing processes used to create and coordinate an online community. It provides insights about the digital community routines developed by corporate strategists to facilitate interactions within the community that will generate valuable input to inform corporate strategies. The emphasis is on routines that can be used to encourage community members to participate, and in this way, similar to the Azad and Zabith article described above. This article underscores the importance of considering cognitive factors relating to employees in various parts of the organization.

Strategy content

Five articles in this special issue explore digital business models, particularly platform-based business models, and their implications for strategy. Gawer's conceptual piece (this issue) explores what factors drive digital platform firms to set or modify their boundaries. She examines various dimensions that companies offering digital platforms have to consider when making strategy. These include the scope of the platform, the customer groups that have access to the platform, and the pattern of data exchange between various

actors in a platform ecosystem. The article suggests that the question of how to organize and govern digitized resources of platform ecosystems is one that transcends firm boundaries. Firms therefore need to be aware of decision-making, relationships, and data exchange patterns beyond their traditional boundaries. The interactions between the scope of the firm, the sides of the platform, and the digital interfaces require new routines and processes for building and sustaining a platform.

McIntyre et al. (this issue) provide detailed insights regarding the persistence of dominant platforms. They conceptualize achieving platform dominance as part of a dynamic process, rather than a static outcome as often characterized in previous literature. The authors put forward several propositions to explain the contextual and firm-specific factors that explain why a technology-based platform maintains its dominant position over a significant period in the market, and they provide some interesting insights into how complementors can modify organizational routines "to embrace new platforms while preserving their commitment to extant platforms" and the speed and ease with which they can learn new routines, technologies, and architectures associated with the new platforms.

Aversa et al. (this issue) discuss customer-side complementarities as an important determinant of the effectiveness of digital business models. They argue that previous studies have focused primarily on supply-side complementarities, such as the synergies between a firm's resources and its capabilities, but demand-side (i.e., customer) complementarities have remained largely unexplored. In a longitudinal qualitative analysis (1995–2018) of Amazon's various business models, they identify and map how these customer complementarities (network effects and one-stop-shop effects) can support a firm's growth and give it competitive advantage in the digital space. The article also underscores the importance of the relationship between managerial cognition and the dynamics of demand-side business models.

Although platforms developed by incumbents generate strong network effects and winner-take-all dynamics that protect them from competition, these same features can render these platforms vulnerable to competitive strategic moves from new entrants with rival platforms. According to Karhu and Ritala (this issue), these entrants can capture value and at the same time avoid having to make an upfront investment in value creation. The authors discuss three strategies that can be used by new entrant platforms to take over market share from established platforms: platform exploitation, platform injection, and platform

pacing. Importantly, their study helps to provide a better understanding of the importance of strategic timing in platform competition.

Tavalaei and Cennamo (this issue) use a panel dataset of mobile app developers to provide an empirical analysis of how choices made by firms providing complementary offerings to participate in multiple platforms and with multiple products may affect the success and failure of these firms. They conclude with an important revelation regarding the strategic trade-offs that these complementors must make when devising strategies designed to enhance their scale and scope, specifically with regard to which platforms to use and to what extent to diversify their product offerings. The article provides insights into how complementors may use their resources across various platforms and products. The findings indicate that they are better off either specializing in one product category and exploiting potential economies of scale across multiple platform ecosystems (category specialization) or specializing in one platform ecosystem and exploiting potential economies of scope by expanding their product offerings across multiple product categories (platform ecosystem specialization). This so-called entrepreneurial ambidexterity of complementors requires organizational designs that enable learning in various platform ecosystems and that maximize synergies between them.

Strategy context

The last two articles revisit classic strategy issues, i.e., technology adoption and strategic renewal, and discuss how existing research may need to be revisited in connection with digital technologies. To explain variation in the adoption of digital technologies, Ceipak et al. (this issue) undertake a longitudinal analysis of a panel of 127 US manufacturing firms between 2002 and 2012, using this to examine the dominant coalition's motivation to engage in emergent digital technologies (such as IoT solutions) as well its ability to deploy the resources needed to pursue such a motivation. This study expands on the cognition element of our conceptual model. The authors underscore that it is increasingly important to understand the motivational factors for a firm and for others with whom it collaborates in order to determine the reasons behind the success and failure of ecosystem actors.

The study by Fraser and Ansari (this issue) is based on an in-depth case study of a multinational insurance group that was disrupted by digitally-led innovation, namely the rise of internet-based general

insurance aggregator platforms. The authors take a socio-cognitive perspective, analyzing the different framing processes used by individuals in firms. They come up with the concept of multiplexed cognitive framing, in which conflicting frames can be held by members of the same department; this allows the organization to test out and iterate between different strategic responses to disruptive digital innovation, making adaptations to the strategy as they go. With the increasing ambiguity created by the speed, scope, and scale of change in digital ecosystems, considering complexities of this kind is pertinent for understanding both the process of change and variations in the outcomes.

Taking stock and research agenda

In this introductory article, we have advanced research on strategizing in the digital era in a number of ways. First, we have provided a definition of digital transformation, which stresses that the adoption of digital technologies, company-wide change (either evolutionary or transformative) is required to create and appropriate new value in an existing or newly formed ecosystem. The central contribution of our article is an integrative framework for strategizing in the new digital competitive landscape that underscores the importance of the interplay between the cognitive barriers faced by managers when trying to comprehend the new digital world , a new need to reconfigure and extend digital routines, and new organizational forms that are appropriate for new ways of creating value and securing a competitive advantage. We argue that digital transformation must be holistic to deliver full business value, implying a need for coherent, interrelated changes to cognition, routines, and structures. In addition, we have provided new insights into the managerial dynamics of digital transformation by putting forward a typology of digital transformation journeys. For each journey, we have described the management roles that top, middle, and frontline managers have to take, depending on whether the digital migration is evolutionary or transformative and whether the firm is responding to or seeking to shape the ecosystem.

Alongside this integrative framework and typology of digital transformation journeys, the articles featured in this special issue provide new theoretical insights and indications for managers of how companies can migrate successfully to new digital business models. These articles address key issues such as what type of digital strategies can be used and how these differ from "traditional" strategies, what

advantages are offered by new organizational forms and agile management practices, how digital strategies can be implemented, and how firms can achieve competitive advantage when operating on digital platforms.

Agenda for Future Research on Digital Strategy

Although our understanding of strategizing in the digital age has increased over the past decade with a surge in research, there are still many areas that require more research attention. As rapid technological advances have far-reaching implications for how firms compete and how they develop and implement their strategies, there is still a lot to uncover. We propose several directions for future research.

The cognition, routines, and structure pillars of digital transformation. As we suggest in this introductory article, digital transformation is a cognitive process, because managers need to envision new ways to compete and employees at all levels of the organization need to make sense of digital technologies. How much attention managers are able or prepared to give to new digital business models depends on their digital mindset (Solberg et al., 2020). But what types of cognitive orientation are most likely to make managers more aware of opportunities for digital transformation and able to act upon them? Very little research has been undertaken to examine what organizations need to do to overcome the cognitive hurdles faced by managers (Ceipak et al. and Fraser and Ansari, both this issue). Future studies could look in more detail at how cognitive shifts take place, and could consider particularly how existing routines and structures may enable or inhibit the adoption of new mental models.

Cognitive ability is needed to sense digital opportunities, but routines are also essential to enable the organization to seize those opportunities by reconfiguring the resource base and capturing value from it. Although various scholars (Hanelt et al., 2020; Vail, 2019; Verhoef et al., 2021; Warner and Wäger, 2019) have highlighted several of the dynamic routines needed for digital transformation (rapid prototyping, balancing digital portfolios, digital agility, digital networking, and data analytics routines), we need more research on the specifics of these strategy and innovation routines in dynamic contexts.

Finally, we need more knowledge of malleable intra and inter-organizational designs that might be used to set up and integrate digital operations (Hanelt et al., 2020). New digital technologies raise many questions about the boundaries of the firm, especially when new digital business models are being employed inside and also partly outside the firm. In this issue, Gawer highlights the complexities of setting

the boundaries of platform firms; there are difficult decisions to be made not only regarding what assets should be owned, what labor should be employed, and what activities should be carried out by the firm but also what the composition and configuration of the platform's customers and complementors should be, and what digital interfaces should be employed. Since digital technologies have blurred the line between competition and cooperation, boundary decisions are increasingly complex. Importantly, future research needs to go beyond the boundaries of the firm and consider boundaries also at the ecosystem level. More work is also needed to explore and uncover new intra and inter-organizational forms. Such fine-grained research could investigate what impact digital technology has on the fluidity of firms' boundaries and when it creates rigidities versus flexibility. In other words, how and when do the boundaries of the firm and the ecosystem shift?

Coping with the paradoxes of digital transformation. Digital transformation is complex as it involves a major change of existing cognitive mindsets, routines, and structures. Many incumbents struggle with exploring new digital opportunities while also exploiting proven digital technologies; they experience many challenges and tensions as they try to move away from their pre-digital cognitive mindsets, routines, and structures. A key area for future research is to study how organizations manage these strategic tensions associated with digital transformation (Lauritzen and Karafyllia, 2019; Khanagha et al., 2014; Smith and Beretta, 2021; Smith and Lewis, 2011). Tensions, frictions, and dilemmas can surface in all three of the areas that are central to our framework. For instance, how can firms compete using a traditional product business model while at the same time challenging their managers to adopt a different mindset and experiment with a platform business model? How can managers achieve a fit with the requirements of existing actors in a traditional value chain while at the same time creating a misfit by fundamentally reshaping the ecosystem by bringing in new complementors? Similar tensions apply to the improving and stretching of routines. There is an ongoing friction between leveraging existing assets to ensure efficiency gains for current key clients and developing digital assets that can be used to provide new offerings for new clients with unique needs. Of course, the tensions in cognition and in routines for sensing and seizing digital opportunities also lead firms to adopt dual and often conflicting structures in order to realize digital transformation (Khanagha et al., 2014). This duality involves the creation of a separate digital unit in charge of exploring digital opportunities and leading the transformation while the rest of the organization is just following the

transformation and implementing the digital changes (Sebastian et al., 2017; Svahn et al., 2017). It requires the firm to simultaneously explore new digital opportunities and exploit these in different portions of the corporation, openness to grow the ecosystem and encourage protection of intellectual property, or decentralize the strategy processes while at the same time providing direction for the future in a volatile and uncertain world. To gain a better understanding of how to support digital transformation, it is important for future researchers to acknowledge the multitude of challenges and tensions surrounding digital transformation and to identify ways of coping with these paradoxical tensions. Smith and Beretta's study (2021) of the digital transformation of a traditional, product-focused manufacturer shows how coping with and embracing several of these tensions simultaneously (e.g., autonomy versus control, narrow versus holistic focus, and informal versus formal knowledge sharing) ended up fueling digital transformation in a productive way. Also, Sebastian et al. (2017) found that mature companies were able to navigate digital transformation because of their ambidextrous ability, which enabled them to maintain both an operational backbone and a digital services platform. Future research should probe further into these coping mechanisms for managing the paradoxical tensions of digital transformation.

Managerial and organizational contingencies of digital transformation. Digital transformations do not follow a clear-cut sequential process, and addressing the three pillars, the tensions that can surface in all three and the interdependencies between them is important. However, there is only limited empirical evidence of how firms manage these tensions and interdependencies over time. Most studies assume linear paths of digital transformation, based mainly on anecdotal evidence. Due to the multidimensional nature of digital transformation, as illustrated in our integrative framework, digital transformation journeys are idiosyncratic and non-linear. We therefore need more research into the dynamics of digital transformation. In this article we have provided a typology of four ideal types of digital transformation journeys. However, we need more studies that analyze the various managerial and organizational contingencies that may enable or inhibit firms in their digital migration process, such as leadership (Singh and Hess, 2017), organizational culture (Vail, 2019), corporate identity, or CEO characteristics. For instance, who should take the leadership role: the CEO, CFO, CTO, or a special chief digital officer (CDO)? Should this person be an insider with a proven track record but not much digital knowledge, a young digital guru, or an outsider with extensive digital experience? According to Furr, Gaarlandt, and Shipilov (2019) insiders with little digital experience

who were placed at the head of digital initiatives were the most successful. While technological advances started the digital revolution, research shows that the success or failure of digital transformation rests on the people involved, rather than on the technological hardware itself (Kane et al., 2019). There is still a need for further exploration of the managerial and organizational levers that allow new digital technologies to be integrated into strategizing. In particular, we need to find out how people can be stimulated to engage with new ways of doing things, how political resistance can be overcome, and how managers should act in new roles (Lee and Berente, 2012) created by a digital transformation. Research in these areas could explore leadership behaviors and reward systems, but should also consider what career development will be needed to help employees develop and apply new digital skills and competencies (see, for instance, Cennamo et al., 2020; Lanzolla et al., 2020).

Digital routines. A fourth important direction for future research is to develop a deeper and broader understanding of digital routines. We still know very little about how firms reconfigure resources during digital transformation (Lavie, 2006). Understanding digital routines better is central to unlocking digital transformation. Arguably, the two dominant research streams (Karali, 2018) examining the relationship between routines and digital transformation are the dynamic capabilities stream (Teece, 2007; Eisenhardt and Martin, 2000) and the routine dynamics stream (Feldman and Pentland, 2003). The first stream emphasizes that because routines become inert over time, they need updating and changing as the firm acquires new dynamic capabilities to enable it to adopt new digital technologies. Most scholars in the digital transformation literature seem to take a dynamic capability perspective, arguing that firms should build new dynamic capabilities for sensing and seizing of digital opportunities and for transforming the organization to realize the full potential of these opportunities (Teece, 2007; Vail, 2019; Verhoef et al., 2021; Warner and Wäger, 2019). The routine dynamics stream, however, emphasizes the capacity of routines to change endogenously, thereby allowing flexibility and change within digital routines. As firms are incorporating more and more digital technologies into their routines (e.g., data-based automation or artificial intelligence), the classic distinction between routines and capabilities might disappear (Hanelt et al., 2020). Because routines based on these digital technologies are very flexible and adaptive, they can enable digitally mature firms to adapt faster than ever. According to the systematic review of the digital transformation literature provided by Hanelt et al. (2020, p. 25), in the future "the need for dynamic

capabilities in the traditional sense" will reduce. We therefore need more investigation of how individuals in firms develop and change routines for reconfiguring digital assets and of the factors that enable this to happen.

Platform strategies. While the research on platforms (and more broadly, ecosystems) is burgeoning, there are relatively few studies offering a socio-cognitive perspective on platform and ecosystems (see Rietveld and Schilling, 2020). Future research would benefit from going beyond purely economic or technological considerations and exploring the various biases and social dynamics that may boost or inhibit the success of platforms or may cause them to fail (Aversa et al., this issue; Karhu and Ritala, this issue). Also, the implications of the transition from traditional to platform business models have not been considered sufficiently in existing research. It would be valuable to investigate what characteristics of routines and organizational forms enable such transitions (McIntyre et al., this issue). Another crucial area for strategic management scholars to look at more closely is the question of governance in an ecosystem setting and how firms may influence the structure of the ecosystem (Tavalei and Cennamo, this issue).

*Digital strategy as practice***.** The adoption of digital technologies not only enables new digital product and service offerings (Yoo et al., 2012) but increasingly also impacts the processes and practices of strategy-making (Malhotra et al., 2017; Whittington, 2014). The use of digital platforms (such as crowdsourcing and online communities) may democratize the strategy process (Haefliger et al., 2011) by involving multiple actors from multiple levels of the organization in developing and implementing strategy. Including people from various layers of the organization in the strategy-making process is of course appealing, yet such efforts are fraught with dilemmas and tensions (Plotnikova et al., this issue). Managing collaboration between actors with varied expertise and different functional foci may be challenging in terms of achieving an alignment of interests and agendas in strategy development. Future research could look at the variation in firms' success or failure in leveraging the power of crowds in their strategy-making process (Azad and Zablith, this issue). Moreover, process studies could use longitudinal approaches to understand the ways in which strategists deal with the dilemmas associated with new strategy practices over time.

Business models. Value creation and value capture are essential aspects of a firm business model, but in digital ecosystems the scope of value exchange mechanisms goes beyond the firm's boundaries. The process of developing and implementing a business model then becomes more complex. Future studies

could uncover what multilevel mechanisms determine the success or failure of new business models (Aversa et al., this issue), and should incorporate the cognitive dimensions of business models, within and across organizational boundaries (Fraser and Ansari, this issue). This is partly because how various actors perceive and evaluate value, especially in the early stages of new business model creation, becomes central to the success or failure of firms (Ceipak et al., this issue).

Managerial Implications

Managers can benefit from the insights provided by our introductory article in several ways. First, it allows managers to move beyond the jargon, giving them a clearer understanding of what digital transformation is about and what various dimensions are involved. By focusing on the three core elements of cognition, routines, and hierarchy, managers can develop a more holistic view of digital transformation and create synergistic complementarities between these three elements when they embark on a change initiative. Importantly, the section on transformation journeys emphasizes that the path to digital transformation is neither linear, nor the same for firms in different ecosystems. While digital transformations in practice are indeed specific to the firm, we have set out four ideal types of digital migration: holistic, emergent, directed, and connected. Each of these is distinctive from the others in terms of the type of organizational change involved and the firm's strategic orientation to the ecosystem. In addition, each implies differences in terms of the leadership style, specific roles of top management, organizational culture, knowledge absorption process, type of environment, and organizational identity. This typology thus offers some important indicators for managers and those providing management education, and we hope it will help managers to succeed with digital transformation. Although digital transformation starts with digital technologies, the more important issue is how companies make their way through this strange new digital world in which they find themselves. Ultimately digital transformation is as much about strategizing as it is about technology (Fitzgerald et al., 2014; Kane et al., 2015; Hess et al., 2016; Rogers, 2016; Singh and Hess, 2017; Tabrici et al., 2019; Warner and Wäger, 2019). Managers need to identify the idiosyncrasies of the context in which they are embedded and must also to be prepared to alter their strategies during the transformation journey in order to cope with the complexities and uncertainties of digital ecosystems.

References

Adner, R., 2017. Ecosystem as structure: An actionable construct for strategy. *Journal of Management*. 43 (1), 39-58.

Adner, R., Kapoor, R., 2010. Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal*. 31 (3), 306-333.

Autio, E., Mudambi, R., Yoo, Y., 2021. Digitalization and globalization in a turbulent world: Centrifugal and centripetal forces. *Global Strategy Journal*, in press.

Aversa, P., Haefliger, S., Hueller, F., Reza, D.G., 2021. Customer complementarity in the digital space: Exploring Amazon's business model diversification. *Long Range Planning*, this issue.

Azad, B., Zablith, F., 2021. How digital visualizations shape strategy work on the frontlines, *Long Range Planning*, this issue.

Baden-Fuller, C., Haefliger, S., 2013. Business models and technological innovation. *Long Range Planning*. 46 (6), 419-426.

Baden-Fuller, C., Morgan, M.S., 2010. Business models as models. *Long Range Planning*. 43(2-3), 156-171.

Benner. M., Tushman, M.L., 2015. Reflections on the 2013 decade award – "Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisted" ten years later. *Academy of Management Review*. 40 (4), 497-514.

Bernstein, E., Bunch, J., Canner, N., Lee, M., 2016. Beyond the holacracy hype. *Harvard Business Review*. 94 (7-8), 38-49.

Bharadwaj, A., El Sawy, O.A., Pavlou, P.A., Venkatraman, N., 2013. Digital business strategy: Toward a next generation of insights. *Mis Quarterly*. 37, 471-482.

Birkinshaw, J., 2018. What to expect from agile. *MIT Sloan Management Review*. 59 (2), 39-42.

Birkinshaw, J., 2010. *Reinventing Management*. John Wiley & Sons, Chichester.

Birkinshaw, J., Hamel, G., Mol, M.J., 2008. Management innovation. *Academy of Management Review*, 33 (4), 825-845.

Birkinshaw, J, Mark, K., 2019. *25 Need-To-Know MBA Models*, Pearson. Harlow.

Birkinshaw, J., Ridderstråle, J. (2017). *Fast/forward: make your company fit for the future*. Stanford University Press, Stanford.

Boudreau, K., 2010. Open platform strategies and innovation: Granting access vs. devolving control. *Management Science*. 56 (10), 1849-1872.

Brown, S.L., Eisenhardt, K.M., 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*. 42 (1), 1-34.

Brown, S.L., Eisenhardt, K.M., 1998. *Competing on the edge: Strategy as structured chaos*. Harvard Business Press, Boston.

Ceipak, R., Hautz, J., Messeni Petruzzelli, A., De Massis, A., Matzler, K., 2021. A motivation and ability perspective on engagement in emerging digital technologies: The case of Internet of Things solutions. *Long Range Planning*, this issue.

Cennamo, C., Dagnino, G.B., Di Minin, A., Lanzolla, G., 2020, Managing Digital Transformation: Scope of Transformation and Modalities of Value Co-Generation and Delivery, *California Management Review*, 62 (4). 5-16.

Chesbrough, H. (2003). The Era of Open Innovation. *Sloan Management Review*. 44 (3), 35-41.

Chesbrough, H. (2010). Business model innovation: opportunities and barriers. *Long Range Planning*, *43*(2-3), 354-363.

Chesbrough, H., Rosenbloom, R.S., 2002. The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*. 11 (3), 529-555.

Chesbrough, H., Di Minin, A., Piccaluga, A., 2013. Business model innovation paths. In: Cinquini, L., Di Minin, A., Varaldo, R. (Eds.). *New business models and value creation: A service science perspective*. Springer-Verlag, Milan, pp. 45-66.

Christensen, C.M., 1997. *The Innovator's dilemma: When new technologies cause great firms to fail*. Harvard University Press, Boston, MA.

Constantinides, P., Henfridsson, O., Parker, G.G., 2018. Introduction-Platforms and Infrastructures in the Digital Age. *Information Systems Research*. 29 (2), 381-400.

Dattée, B., Alexy, O., Autio, E., 2018. Maneuvering in poor visibility: How firms play the ecosystem game when uncertainty is high. *Academy of Management Journal*. 61 (2), 466-498.

De Smet, A., Gagnon, C., Mygatt, E., 2021. Organizing for the future: Nine keys to becoming a future-ready company. *McKinsey & Company*. January, 1-14.

Eccles, R.G., Nohria, N., 1992. *Beyond the Hype: Rediscovering the Essence of Management*. Harvard Business School Press, Cambridge. MA.

Eisenhardt, K.M. , Martin, J., 2000. Dynamic Capabilities: What Are They? *Strategic Management Journal*. 21 (10-11), 1105-1121.

Eden, R., Jones, A.B., Casey, V., & Draheim, M. (2019). Digital transformation requires workforce transformation. *MIS Quarterly Executive*, 18(1): 1-17.

Feldman, M.S., Pentland, B.T., 2003. Reconceptualizing organizational routines as a source of flexibility and change. *Administrative Science Quarterly*. 48 (1), 94-118.

Fitzgerald, M., Kruschwitz, N., Bonnet, D., Welch, M., 2014. Embracing digital technology: A new strategic imperative. *MIT Sloan Management Review*. 55 (2), 1.

Foss, N.J., 2002. New organizational forms-critical perspectives. *International Journal of the Economics of Business*,. 9 (1), 1-8.

Foss, N.J., Husted, K., Michailova, S., 2009. Governing knowledge sharing in organizations: Levels of analysis, governance mechanisms, and research directions. *Journal of Management Studies*. 47 (3), 455-482.

Foss, N.J., Saebi, T., 2017. Fifteen years of research on business model innovation: How far have we come, and where should we go? *Journal of Management*. 43 (1), 200-227.

Foss, N.J., Saebi, T., 2018. Business models and business model innovation: Between wicked and paradigmatic problems. *Long Range Planning*. 51 (1), 9-21.

Foss, N.J., Lyngsie, J., Zahra, S.A., 2013. The role of external knowledge sources and organizational design in the process of opportunity exploitation. *Strategic Management Journal.* 34 (12), 1453-1471.

Frankenberger, K., Weiblen, T., Csik, M., Gassmann, O., 2013. The 4I-framework of business model innovation: A structured view on process phases and challenges. *International Journal of Product Development*, 18 (3-4), 249-273.

Fraser, J., Ansari, S., 2021. Pluralist perspectives and diverse responses: Exploring multiplexed framing in incumbent responses to digital disruption. *Long Range Planning.* this issue.

Furr, N., Shipilov, A., 2019. Digital doesn't have to be disruptive: the best results can come from adaptation rather than reinvention. *Harvard Business Review.* 97 (4), 94-104.

Furr, N., Gaarlandt, J., Shipilov, A., 2019. Don't Put a Digital Expert in Charge of Your Digital Transformation, *Harvard Business Review*, Digital article, August 5.

Gavetti, G., 2005. Cognition and hierarchy: Rethinking the microfoundations of capabilities' development. *Organization Science.* 16 (6), 599-617.

Gavetti, G., 2012. PERSPECTIVE—Toward a behavioral theory of strategy. *Organization Science.* 23 (1), 267-285.

Gavetti, G., Levinthal, D.A., Rivkin, J.W., 2005. Strategy making in novel and complex worlds: The power of analogy. *Strategic Management Journal.* 26 (8), 691-712.

Gawer, A., 2021. Digital platforms' boundaries: The interplay of firm scope, platform sides, and digital interfaces, *Long Range Planning.* this issue.

George, G., Osinga, E.C., Lavie, D., Scott, B.A., 2016. Big data and data science methods for management research. *Academy of Management Journal.* 59 (5), 1439-1507.

Gilbert, C.G., 2005. Unbundling the structure of inertia: Resources versus routine rigidity. *Academy of Management Journal.* 48 (5), 741-763.

Gurbaxani, V., Dunkle, D., 2019. Gearing Up For Successful Digital Transformation. *MIS Quarterly Executive.* 18 (3). 208-220.

Hamel, G., 2007. *The Future of Management*, Harvard Business School Press, Boston, Massachusetts.

Hamel, G., 2006. The why, what, and how of management innovation. *Harvard Business Review. 84* (2), 72.

Hamel, G., Prahalad, C.K., 1994. Competing for the future. *Harvard Business Review.* 72 (4), 122-128.

Hanelt, A., Bohnsack, R., Marz, D., Antunes Marante, C., 2020. A Systematic Review of the Literature on Digital Transformation: Insights and Implications for Strategy and Organizational Change. *Journal of Management Studies.* in press.

Hannah, D.P., Eisenhardt, K.M., 2018. How firms navigate cooperation and competition in nascent ecosystems. *Strategic Management Journal.* 39 (12), 3163-3192.

Hautz, J., Seidl, D., Whittington, R., 2017. Open strategy: Dimensions, dilemmas, dynamics. *Long Range Planning.* 50 (3), 298-309.

Haefliger, D., Monteiro, E., Foray, D., Van Krogh, G., 2011. Social Software and Strategy. *Long Range Planning.* 44 (5-6), 297-316.

Hedlund, G., 1986. The Hypermodern MNC - A Heterarchy? *Human Resource Management.* 25 (1), 9-35.

Hess, T., Matt, C., Benlian, A., Wiesböck, F., 2016. Options for formulating a digital transformation strategy. *MIS Quarterly Executive*. 15 (2), 123-139.

Holmqvist, M., 2003. A dynamic model of intra-and interorganizational learning. *Organization Studies*. 24(1), 95-123.

Jacobides, M.G., Cennamo, C., Gawer, A., 2018. Towards a theory of ecosystems. *Strategic Management Journal*. 39 (8), 2255-2276.

Johnson, M.W., Christensen, C.M., Kagermann, H., 2008. Reinventing your business model. *Harvard Business Review*. 86 (12), 50-59.

Kane, G.C., Phillips, N., Copulsky, J.R., Andrus, G.R., 2019. *The Technology Fallacy: How people are the real thing to digital transformation*. MIT Press, Cambridge MA.

Kane, G.C. Palmer, D. Phillips, A.N. Kiron, D., Buckley, N., 2017. *Achieving Digital Maturity*. MIT Sloan Management Review and Deloitte University Press.

Kane, G.C. Palmer, D. Phillips, A.N. Kiron, D., Buckley, N., 2015. *Strategy, not technology, drives digital transformation*. MIT Sloan Management Review and Deloitte University Press, 14, 1-25.

Karali, M., 2018. *Investigating Routines and Dynamic Capabilities for Change and Innovation*. ERIM PhD Series in Research in Management.

Karhu, K., Ritala, P., 2021. Slicing the cake without baking it: Opportunistic platform entry strategies in digital markets. *Long Range Planning*, this issue.

Kauffman, S.A., 1995. Technology and Evolution: Escaping the Red Queen effect. *The McKinsey Quarterly*, (1), 118-130.

Khanagha, S., Ramezan Zadeh, M.T., Mihalache, O.R., Volberda, H.W., 2018. Embracing Bewilderment: Responding to technological disruption in heterogeneous market environments. *Journal of Management Studies*. 55 (7), 1079-1121.

Khanagha, S., Volberda, H., Oshri, I., 2014. Business model renewal and ambidexterity: structural alteration and strategy formation process during transition to a Cloud business model. *R&D Management*. 44 (3), 322-340.

Kretschmer, T., Leiponen, A., Schilling, M., Vasudeva, G., 2020. Platform Ecosystems as Metaorganizations: Implications for Platform Strategies. *Strategic Management Journal*. in press.

Lanzolla, G., Lorenz, A., Miron-Spektor, E., Schilling, M., Solinas, G., Tucci, C.L., 2020. Digital Transformation: What is new if anything? Emerging patterns and management research. *Academy of Management Discoveries*. 6 (3), 341-350.

Lavie, D. (2006). Capability reconfiguration: An analysis of incumbent responses to technological change. *Academy of management review*, *31*(1), 153-174.

Lauritzen, G.D., Karafyllia, M., 2019. Perspective: leveraging open innovation through paradox. *Journal of Product Innovation Management*. 36 (1), 107-121.

Lee, J., Berente, N., 2012. Digital innovation and the division of innovative labor: Digital controls in the automotive industry. *Organization Science*. 23 (5), 1428-1447.

Malhotra, A., Majchrzak, A., Niemiec, R.M., 2017. Using public crowds for open strategy formulation: Mitigating the risks of knowledge gaps. *Long Range Planning*. 50 (3), 397–410.

March, J.G., 1995. The Future, Disposable Organizations and the Rigidities of Imagination. *Organization*. 2 (3-4), 427-440.

Martins, L.L., Rindova, V.P., Greenbaum, B.E., 2015. Unlocking the hidden value of concepts: A cognitive approach to business model innovation. *Strategic Entrepreneurship Journal*. 9, 99–117.

Matt, C., Hess, T., Benlian, A., 2015. Digital transformation strategies. *Business & Information Systems Engineering*. 57 (5), 339-343.

McGrath, R.G., 2010. Business models: A discovery driven approach. *Long Range Planning*. 43 (2 3), 247-261.

McGrath, R.G., 2013. The end of competitive advantage: How to keep your strategy moving as fast as your business, *Harvard Business Review Press*.

McIntyre, D.P., Srinivasan, A., Chintakananda, A., 2021. The persistence of platforms: The role of network, platform, and complementor attributes, *Long Range Planning*, this issue.

Nambisan, S., Lyytinen, K., Majchrzak, A., Song, M., 2017. Digital Innovation Management: Reinventing innovation management research in a digital world. *Mis Quarterly*, 41 (1), 223-238.

Narayan, S., Sidhu, J.S., Volberda, H.W., 2020. From Attention to Action: The Influence of Cognitive and Ideological Diversity in Top Management Teams on Business Model Innovation. *Journal of Management Studies*. in press.

Nonaka, I., Takeuchi, H., 1995. *The Knowledge-Creating Company*. Oxford University Press, New York.

Plotnikova, A., Pandza, K., Sales-Cavalcante, H., 2021. How Strategy Professionals Develop and Sustain an Online Strategy Community: The Lessons from Ericsson. *Long Range Planning*, this issue.

Priem, R. L., Wenzel, M., Koch, J., 2018. Demand-side strategy and business models: Putting value creation for consumers center stage. *Long Range Planning*. 51 (1), 22-31.

Prigogine, I., Stengers, I., 1984. *Order Out of Chaos: Man's New Dialogue with Nature*. Heinemann, London.

Puranam, P., Alexy, O., Reitzig, M., 2014. What's "new" about new forms of organizing? *Academy of Management Review*. 39 (2), 162-180.

Rietveld, R. , Schilling, M., 2020. Platform Competition: A Systematic and Interdisciplinary Review of the Literature. *Journal of Management*. in press.

Robertson, B.J., 2015. *Holacracy: The revolutionary management system that abolishes hierarchy*. Penguin Books, London.

Rogers, D. L., 2016. *The Digital Transformation Playbook: Rethink Your Business for the Digital Age*. Columbia University Press, New York.

Rossi, M., Nandhakumar, J., Mattila, M., 2020. Balancing fluid and cemented routines in a digital workplace. *The Journal of Strategic Information Systems*. 29 (2), 101616.

Sambamurthy, V., Bharadwaj, A., Grover, V., 2003. Shaping agility through digital options: Reconceptualizing the role of information technology in contemporary firms. *MIS Quarterly*. 27 (2), 237-263.

Schallmo, D., Williams, C.A., & Boardman, L. (2017). Digital transformation of business models-best practice, enablers and roadmap. *Journal of Innovation Management*, 21(8): 1740014-1 – 1740014-17.

Schneider, P., Sting, F.J., 2020. Employees' perspectives on digitalization-induced change: Exploring frames of industry 4.0. *Academy of Management Discoveries*. 6 (3), 406-435.

Sebastian, I.M., Ross, J.W., Beath, C., Mocker, M., Moloney, K.G., Fonstad, N.O., 2017. How big old companies navigate digital transformation. *MIS Quarterly Executive*. 16 (3), 197-213.

Singh, A., Hess, T., 2017. How Chief Digital Officers promote the digital transformation of their companies. *MIS Quarterly Executive*. 16 (1), 1-17.

Schwab, K., 2017. *The Fourth Industrial Revolution*. Crown Business, New York.

Smith, P., Beretta, M. (2021). The Gordian Knot of Practicing Digital Transformation: Coping with Emergent Paradoxes in Ambidextrous Organizing Structures. *Journal of Product Innovation Management*. 38 (1), 166-191.

Smith, W.K., Lewis, M.W., 2011. Toward a theory of paradox: A dynamic equilibrium model of organizing. *Academy of Management Review. 36* (2), 381-403.

Solberg, E., Traavik, L.E., Wong, S.I., 2020. Digital Mindsets: Recognizing and Leveraging Individual Beliefs for Digital Transformation. *California Management Review*. 62 (4), 105-124.

Sosna, M., Trevinyo-Rodríguez, R.N., Velamuri, S.R., 2010. Business model innovation through trial-and-error learning: The Naturhouse case. *Long Range Planning*. 43 (2-3), 383-407.

Svahn, F., Mathiassen, L., Lindgren, R., 2017. Embracing Digital Innovation in Incumbent Firms: How Volvo Cars Managed Competing Concerns. *MIS Q.*, 41 (1), 239-253.

Tabrizi, B., Gerard, K., Irvin, V., 2019. Digital Transformation is Not About Technology. *Harvard Business Review*. 1-6.

Tavalaei, M.M., Cennamo, C., 2021. In search of complementarities within and across platform ecosystems: Complementors' relative standing and performance in mobile apps ecosystems. *Long Range Planning*, this issue.

Teece, D.J., 2010. Business models, business strategy and innovation. *Long Range Planning. 43* (2-3), 172-194.

Teece, D.J., 2007. Explicating Dynamic capabilities: The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*. 28 (13), 1319-1350.

Teece, D., Peteraf, M., Leih, S., 2016. Dynamic capabilities and organizational agility: risk, uncertainty, and strategy in the innovation economy. *California Management Review*. 58 (4), 13-35.

Tripsas, M., Gavetti, G., 2000. Capabilities, cognition, and inertia: Evidence from digital imaging. *Strategic Management Journal*. 21 (10-11), 1147-1161.

Tushman, M.L., O'Reilly III, C.A., 1996. Ambidextrous organizations: Managing evolutionary and revolutionary change. *California Management Review*. 38 (4), 8-29.

Van Alstyne, M.W., Parker, G.G., Choudary, S.P., 2016. Pipelines, platforms, and the new rules of strategy. *Harvard Business Review*. 94 (4), 54-62.

Van Haverbeke, W., Van de Vrande, V., Chesbrough, H., 2008. Understanding the advantages of open innovation practices in corporate venturing in terms of real options. *Creativity and Innovation Management*. 17 (4), 251-258.

Van Knippenberg, D.L., Dahlander, L., Haas, M., George, G., 2015. Information, Attention, and Decision Making. *Academy of Management Annals*. 58 (3), 649-657.

Venkatraman, N., Henderson, J.C., 2008. Four vectors of business model innovation: Value capture in a network era. In: Pantaleo, D, Pal, N. (Eds.), *From strategy to execution: Turning accelerated global change into opportunity*. Springer-Verlag, Berlin-Heidelberg, pp. 259-280.

Verhoef, P.C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J.Q., Fabian, N., & Haenlein, M., 2021. Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*. 122, 889-901.

Vial, G., 2019. Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*. 28 (2), 118-144.

Visnjic Kastalli, I., Van Looy, B., 2013. Servitization: Disentangling the Impact of Service Business Model Innovation on Manufacturing Firm Performance. *Journal of Operations Management*. 31 (4), 169-180.

Voelpel, S., Leibold, M., Tekie, E., & Von Krogh, G., 2005. Escaping the red queen effect in competitive strategy: Sense-testing business models. *European Management Journal*. 23 (1), 37-49.

Volberda, H.W., 1996. Toward the flexible form: How to remain vital in hypercompetitive environments. *Organization Science*. 7 (4), 359-374.

Volberda, H.W., 1998. *Building The Flexible Firm: How To Remain Competitive*. Oxford University, Oxford

Volberda, H.W., Van Den Bosch, F.A., Mihalache, O.R., 2014. Advancing management innovation: Synthesizing processes, levels of analysis, and change agents. *Organization Studies*. 35 (9), 1245-1264.

Volberda, H., Van Den Bosch, F., Heij, K., 2018. *Reinventing Business Models: How Firms Cope with Disruption*. Oxford University Press, Oxford.

Warner, K.S., Wäger, M., 2019. Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*. 52 (3), 326-349.

Whittington, R., 2014. Information Systems Strategy and Strategy-as-Practice: A joint agenda. *Journal of Strategic Information Systems*. 23, 87-91.

Whittington, R., Pettigrew, A., Peck, S., Fenton, E., Conyon, M., 1999. Change and complementarities in the new competitive landscape: A European panel study, 1992-1996. *Organization Science*. 10 (5), 583-600.

Wu, J., Shanley, M.T., 2009. Knowledge stock, exploration, and innovation: Research on the United States electromedical device industry. *Journal of Business Research*. 62 (4), 474-483.

Yoo, Y., Boland Jr, R.J., Lyytinen, K., Majchrzak, A., 2012. Organizing for innovation in the digitized world. *Organization Science*. 23 (5), 1398-1408.

Figure 1: A framework for strategizing in the digital competitive landscape: The interplay between cognition, routines, and hierarchy

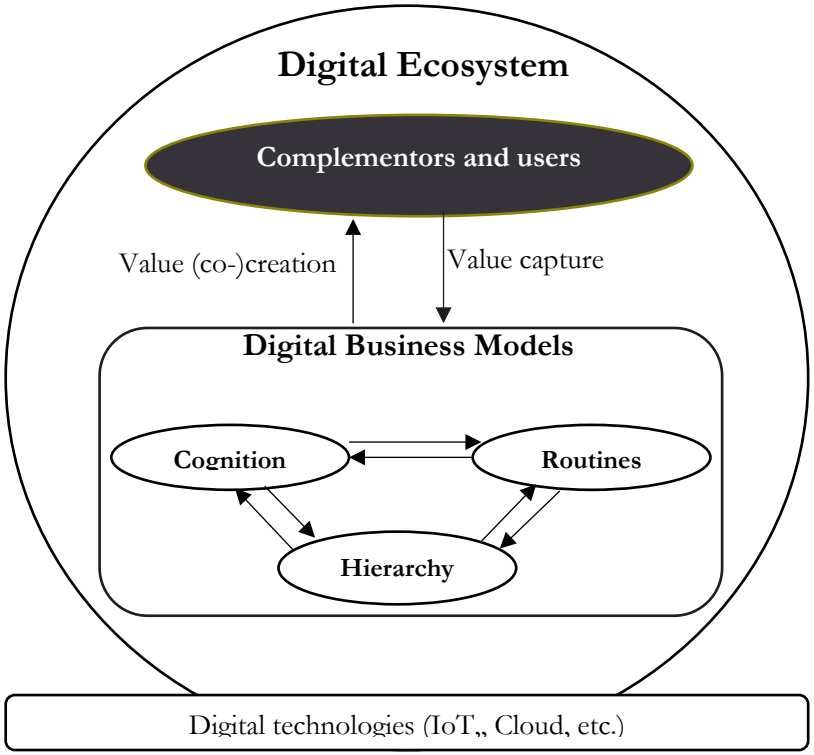

Figure 2: An integrative model of digital transformation: reframing cognitive models, building digital routines, and implementing new organizational forms

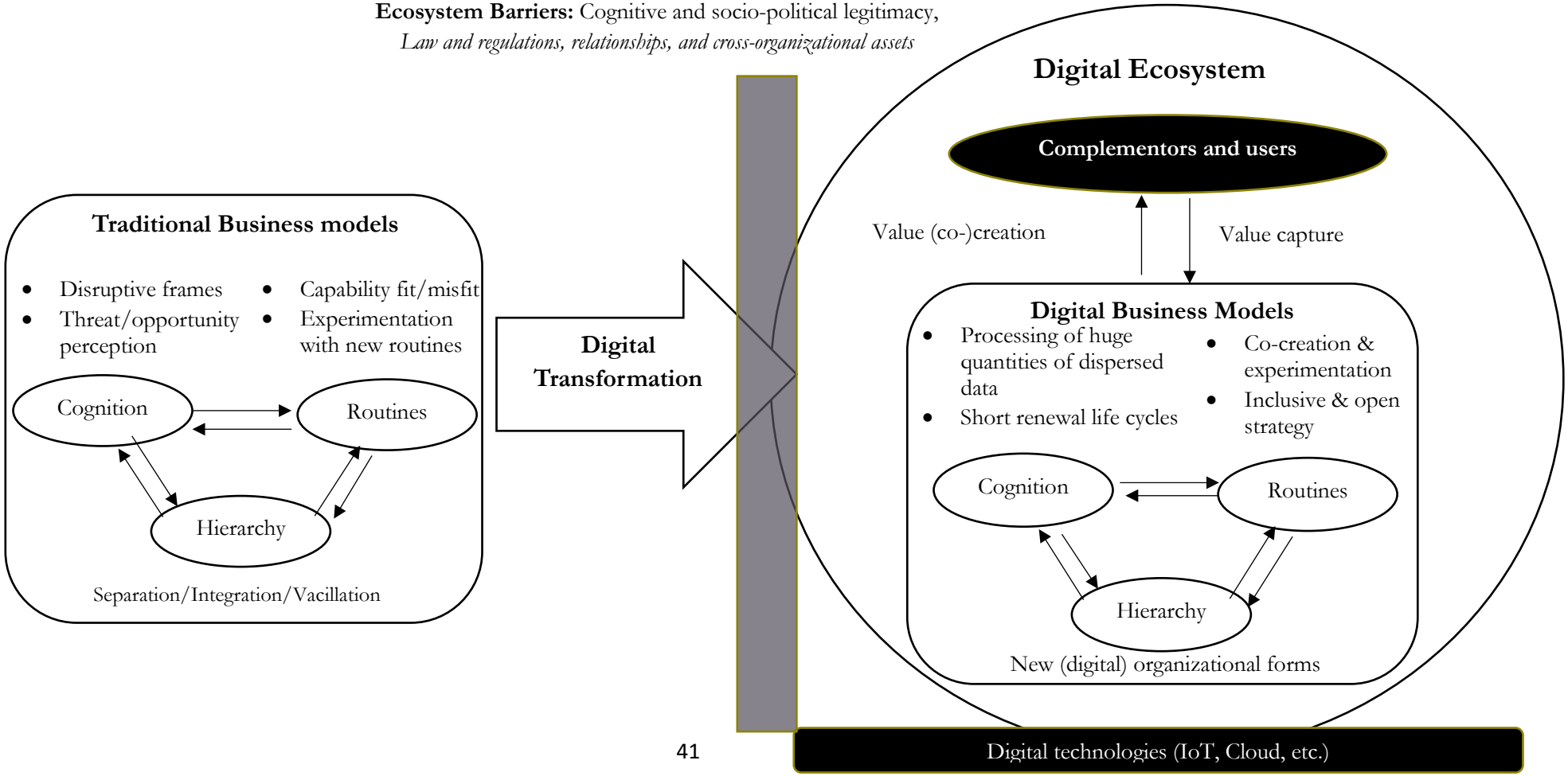

Figure 3: Firms' digital transformation journeys

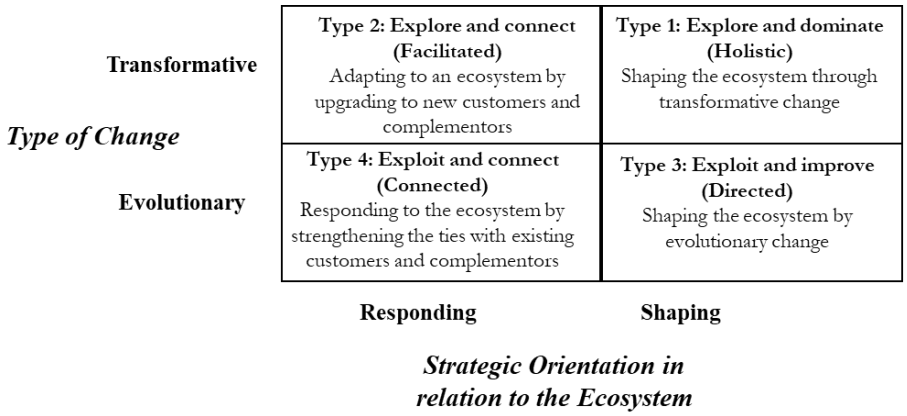

Table 1: A managerial typology of digital transformations

	Adapting to the ecosystem	***Shaping the ecosystem***
Transformative *(Creating new cognitive schemes, routines, and organizational forms)*	**2. Explore and connect:** ***Facilitated digital journey*** 1. Transformational leadership 2. Involvement of top and frontline managers 3. Innovative, customer-driven culture 4. External knowledge absorption 5. Dynamic environment 6. New external identity	**1. Explore and dominate:** ***Holistic digital journey*** 1. Transformational leadership 2. Involvement of top and middle line managers 3. Innovative culture 4. Internal knowledge absorption 5. Dynamic environment 6. New internal identity
Evolutionary *(Refinement of cognitive schemes, routines, and organizational forms)*	**4. Exploit and connect:** ***Connected digital journey*** 1. Transactional leadership 2. Involvement of top managers 3. Customer-driven culture 4. External knowledge absorption 5. Strong competitive pressures 6. Strong external identity	**3. Exploit and improve:** ***Directed digital journey*** 1. Transactional leadership 2. Involvement of top managers 3. Less innovative culture 4. Internal knowledge absorption 5. Competitive pressures 6. Strong internal identity

Table 2: Overview of the studies in the special issue

Study	Topic	Type of study	Focus	Key ideas
Azad and Zablith	Strategy process	Empirical: qualitative	Cognition	Digital technologies make it possible for front-line employees to participate in a major strategic change process. The study showcases the role of digital visualizations to implement an organizational turnaround strategy.
Plotnikova et al.	Strategy process	Empirical: qualitative	Routines	The study proposes that the strategy process in the digital era requires new ways of strategizing and new roles. It highlights the use of online communities that connect internal and external actors and bring together people with diverse expertise and from different hierarchical levels. Such online communities for strategizing complement and exist in parallel to the formal hierarchy, as professional strategists increasingly adopt new roles as managers with central responsibility for decisions on how these communities should be organized.
Gawer	Strategy content	Conceptual	Routines and structure	The study addresses the important question of how platform firms make strategic decisions on the scope (assets, labor, and activities), which customer groups have access to the platform, and the digital interfaces for exchange of data.
McIntyre et al.	Strategy context and content	Conceptual	Routines	Conceptualizing platform dominance as a dynamic process rather than an outcome, this study considers the factors that contribute to a platform's viability. It homes in particularly on the network effects between the different members of the ecosystem, showing their importance for understanding continued platform performance.
Aversa et al.	Strategy content	Empirical: qualitative	Cognition	The study explores how customer-side complementarities affect the effectiveness of digital business models. It thereby highlights the cognitive schemas of managers in relation to digital business models.
Karhu and Ritala	Strategy content	Empirical: qualitative	Routines and structure	The study puts forward three strategies by which entrant platforms can take over market share from incumbent platforms by allowing entrants platforms to capture value without having to make upfront investments in value creation. The strategies proposed include: platform exploitation, where the entrant uses some of the incumbent's ecosystem resources; pacing, where the entrant platform benefits from the exact and codified nature of digital resources of the incumbent platform; and injection, where the entrant places itself inside the platform.

Tavalaei and Cennamo	Strategy content	Empirical: quantitative	Structure	The study advances our understanding of how strategy affects the performance of platform ecosystem members. Specifically, it explores which combinations of specialization or participation in multiple platform ecosystems, or of specialization in a particular or multiple product categories, affect the performance of platform complementors.
Ceipek et al.	Strategy context	Empirical: quantitative	Cognition	The study helps to build understanding of the factors that affect the adoption of emergent digital technologies. It finds that technology adoption depends on the motivation of the dominant coalition and the ability to deploy the required resources.
Fraser and Ansari	Strategy context	empirical - qualitative	Cognition	The study puts forward a socio-cognitive perspective to understand firms' responses to disruptive digital innovation. It finds that the use of multiplex framing (non-binary and conflicting frames) by individuals in a group or department allows them to use trials and adaptive iteration to navigate the uncertainty and ambiguity associated with disruption.

[i] Financial support for this paper and the wider project Building Better Business Models came from RCUK - EPSRC (EP/K039695/1) and the Mack Institute, Wharton, U. Penn.