

# Digital Business Transformation and Strategy: What Do We Know So Far?

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**November 2017**

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## INTRODUCTION

Digital transformation (DT) is becoming a prime topic for firms across the globe (Von Leipzig et al. 2017; Kane et al. 2015; Kaufman & Horton 2015; Fitzgerald et al. 2013). It is anticipated that companies that are unable to adapt to the digital world will undoubtedly fall victims to "*digital Darwinism*", where incumbents may disappear and only the most adaptable enterprises, responsive to technological trends, will survive to remain on the competitive landscape (Schwartz 2001). Yet, the history of companies' technological advances has been plagued with failed attempts that focus solely on technologies without taking broader strategic decision areas into account (Kane et al. 2015). Currently, there are many examples of organizations unable to keep pace with the new digital era and managers still lack clarity about the strategic considerations in their digital transformation endeavors (Hess et al. 2016; Matt et al. 2014).

From an academic viewpoint, digital transformation per se is a rather fragmented field as a result of the existence of multiple and diverse areas of investigation, such as the digital transformation of societies, industries, economies and individuals. Recent work related to digital business transformation has predominantly focused on investigating its challenges, drivers and the failures of previous attempts. Although the pivotal role of a dedicated strategy has been recognized in the literature stream, it is still in its infancy, requiring more in-depth work to fully comprehend how the transformation can be achieved (Kulatilaka & Venkatraman 2001; Yoo et al. 2010; Matt et al. 2014; Hess et al. 2016). Exploring digital business transformation from a strategic point of view should therefore enhance the academic literature with valuable insights and also aid leaders in

grasping the recent developments and underlying strategic building-blocks of the transformation that they are attempting.

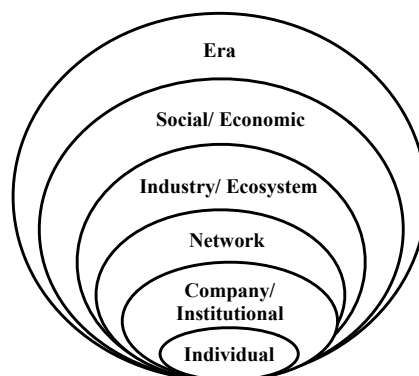
Thus, our goal in this paper is to consolidate the research that focuses on the company perspective. Through this process, we aim to: 1) review and consolidate the current body of knowledge regarding business-level digital transformation to understand its origins and roots; 2) further hinge the examination of business-level transformation on a strategy perspective and examine it from a strategic management point of view by exploring the content, as well as the process, of a digital transformation strategy; 3) position digital transformation in the context of previous technology-enabled transformations; and 4) identify its key distinctive features. Although this narrowed approach (company perspective) is partially restrictive, it allows better comprehension of one perspective of the phenomenon, possibly assisting in establishing connections and linkages with the wider scope of the field.

To do so, we organize the paper as follows: first, we start by introducing the different DT perspectives encountered in the literature. Continuing with the company perspective, we present varying definitions found in the literature and introduce our working definition regarding digital business transformation. Next, we continue by describing our methodology and illustrate the framework designed to guide this research. Finally, we summarize our synthesis into diagrams and discuss our findings.

## DIGITAL TRANSFORMATION PERSPECTIVES

The digital transformation phenomenon has been explored widely in different academic domains, resulting in a crude overview of the field. In this section, we present the different digital transformation perspectives encountered in the literature before positioning this review within the field.

An unrefined search for academic publications using the keyword “*digital transformation*” yields thousands of articles, which examine the phenomenon from various perspectives, as grouped in **Figure 1**. While they are represented as distinct perspectives, they also sometimes overlap. They will be briefly touched upon next.



**Figure 1: Digital Transformation Perspectives in the Literature**



From a digital *era* perspective, DT stresses the fundamental change in our world due to the pervasive nature and proliferation of digital technologies (Anderson & Lanzolla 2010). Arguably, we have reached the *fourth industrial revolution*, which builds on the preceding three but uses new digital technologies with “full force”, whereby both the development and diffusion of innovations are much faster than before (Schwab 2016). A new global world *economy*, characterized by dynamism, customization and intense competition, is developing and the cornerstones for succeeding in it involve embedding knowledge, technology and innovation into products and services (Atkinson 2005). Additionally, the novel concept of a circular or sharing economy is shifting the linear take–make–dispose model of resources to a model where flows of materials, energy, labor and new information interact and promote a restorative, regenerative and more productive economic system (Schwab 2016). The *industry* perspective highlights how the disruptive nature of digital technologies has revolutionized the way that industries operate and how the traditional boundaries between them have dissolved. In recent years, manufacturing has gained popularity with the introduced concepts of “Industry 4.0”, “smart factories” and “advanced manufacturing”, which seek to enable industry to navigate its way through digitalization through the use of cyber-physical systems in the production network and service-orientation in traditional industries (Lasi et al. 2014; Blau & Gobble 2014). New technologies have also accentuated the changing *network* dynamics from the center of organizations to accommodate digitally engaged customers at the edge, where consumers and communities co-create value in a digital ecosystem (Gray et al. 2013). Value network competition is another research area for academics, who seek to explore how IT affects overlapping, as well as non-overlapping, networks (Evangelos Katsamakos 2014). The need for transformation is also a clear business reality, which occurs in all industries and impacts *companies* of all sizes and shapes (Basole 2016). It is no surprise that “90% of business leaders in the U.S. and U.K. are expecting IT and digital technologies to make an increasing strategic contribution to their overall business in the coming decade” (Hess et al. 2016). DT is also exhibited in the “*extended self*”, where technological changes dramatically affect the way in which *individuals* present themselves and communicate. Five crucial changes resulting from the digital age have been conceptualized in the literature (Belk 2013): *de-materialization* of possessions in the form of photos and videos; *re-embodiment* of our physical bodies into pictures and videos; *sharing* more with the help of digital devices; *co-constructing* the sense of self through digital enablers such as social media and blogs; and a *distributed memory*, where human memories are outsourced to engines and hard drives. This individual level of digital transformation allows an exponential increase in digital data volume, revealing a huge amount of information floods that often bypass intentionally constructed barriers. Thus, researchers have recommended ways of managing the super-transparency of people in our world today (Austin & Upton 2016). We have shown the different perspectives explored in the literature and will continue to focus on the company perspective based on its importance in our new market reality, as evidenced in the introduction.

## GUIDING DEFINITIONS

A key question is whether digital transformation, as a topic, is really new. Early work on business transformation seeks to integrate multiple long-lasting concepts within the

strategy and information systems (IS) literature. We trace the roots of digital transformation back to the 1990s when initial work on business transformation was developed, and continue to illustrate its development across these two domains.

### ***Business Transformation***

“Transformation” became a catchphrase for a variety of practices and organizational outcomes in the 1990s (Muzyka et al. 1995). An early attempt to define business transformation at a conference organized by the Corporate Renewing Center at INSEAD resulted in a two-dimensional concept: “A fundamental change in organizational logic, which resulted in or was caused by a fundamental shift in behaviors” (Muzyka et al. 1995; McKeown & Philip 2003). Building on this broad definition, Muzyka et al. (1995) cluster transformation concepts into four constructs:

- ***Re-engineering***: improving overall organizational efficiency while only partially addressing the better engagement of the workforce;
- ***Restructuring***: improving efficiency without necessarily improving the organizational ability to achieve its long-term goals and opportunity capturing;
- ***Renewing***: gaining improved efficiency, effectiveness and innovativeness through employee empowerment without a clear focus on the desired results;
- ***Regeneration***: improving existing processes and fundamentally revisiting the direction and portfolio of available opportunities.

All of the above-mentioned types of transformation create tensions in norms and behaviors between old competencies and present and future challenges. The 1990s additionally linked business transformations to the strategy field, with Prahalad and Oosterveld (1999) describing it as the invention of strategies and management processes that must be driven by new ideas, a new concept of opportunities. Based on their experience they share a number of lessons that they have learned about business transformation. First, it must involve the entire organization, with top managers changing the worldview of the organization. It must also deal with deeply embedded values and beliefs and requires a new set of skills to be built at all levels. Finally, it must be coupled with new management processes, including performance evaluations, rewards, career management, product development and logistics. The strategy link has also been established in recent years: McKeown and Philip (2003) consider a business transformation to be “an overarching concept encompassing a range of competitive strategies which organizations adopt in order to bring about significant improvements in business performance”. These strategies include business process re-engineering, organizational development, total quality management and the use of information technology. More importantly, technology has been identified as a key internal dimension aiding organizations in transforming. In fact, the role of new information and communication technologies has been widely recognized because of their rapid development and diffusion, resulting in triggering business transformation considerations within organizations (Morgan & Page 2008). The so-called technology-enabled transformation will be explored next.

### ***IT-Enabled Transformation***

The IS domain has extended the concept of business transformations with its vigorous investigation of the competitive potential of information technologies and their role in IT-enabled transformations (Venkatraman 1994). These transformations are often perceived as a change caused by a transformational information technology, where the transformational power of IT must be exhibited in at least three of the following dimensions: processes, new organizations, relationships, user experience, markets, customers and disruption (Lucas et al. 2013). Many authors have established transformation rules and criteria that fit with an IT-enabled one. For example, Dehning et al. (2003) suggest that information technologies are transformational if they fundamentally alter traditional ways of doing business by redefining capabilities, processes and relationships. They should also involve strategic acquisitions in order to acquire new capabilities or to enter a new market. Finally, the use of IT should dramatically change how tasks are carried out and enable firms to operate in different markets, serve different customers and ultimately gain considerable competitive advantage. Similar to business transformations, Gouillart and Kelly (1995) further categorized IT-enabled transformations into four transformation constructs:

- ***Reframing*** the company's view of itself and the perception of the business;
- ***Restructuring*** the internal configuration of the organization to allow for more flexibility;
- ***Revitalizing*** the organization along its value-chain alignment with marketplace opportunities; and
- ***Renewal*** of people-based issues in regards to skill improvement.

In an attempt to integrate the work of several authors on IT-enabled transformations, Morgan and Page (2008) propose four phases through which organizations progress. They build on one another and increase in risk and gains, as companies advance through them. These phases consist of ***adapting***, where selected activities are automated, ***evolving***, where ICT alignment is created, ***envisioning***, where the business network process is redesigned and, finally, ***renewing***, where the business scope is reframed.

### ***Digital Transformation***

Multiple perceptions of digital transformation emerge in the literature. The idea of a digital transformation arises from the blending of personal and corporate IT environments and encapsulates the transformational effect of new digital technologies such as social, mobile, analytics, cloud and the Internet of Things (SMACIT) (White 2012; Kane et al. 2015; Sebastian et al. 2017). A broad definition describes it as the integration of digital technologies and business processes in a digital economy (Liu et al. 2011). A similar wide-ranging view regards it as the use of technology to radially improve the performance or reach of enterprises (Westerman et al. 2014). A more detailed perception views digital transformation as the use of these technologies to impact three organizational dimensions: ***externally***, with a focus on digitally enhancing the customer experience and altering its entire life cycle; ***internally***, affecting business operations, decision-making and organizational structures; and ***holistically***, where all business segments and functions are affected, often leading to entirely new business models

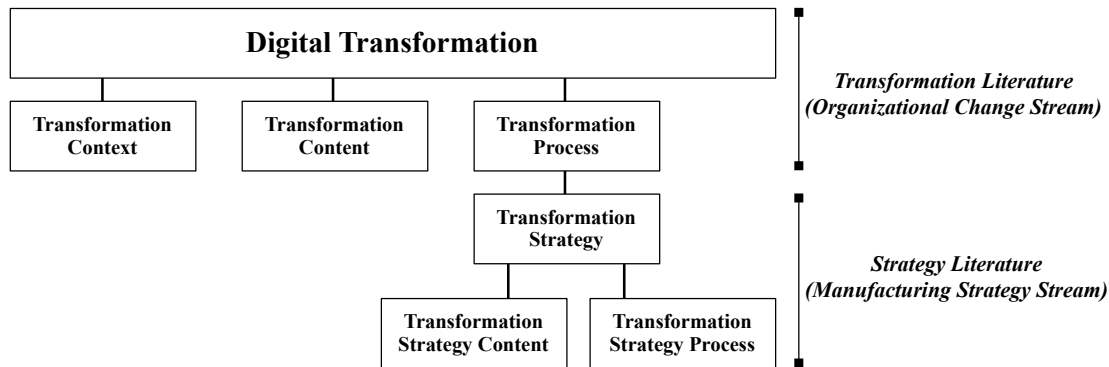
(Kaufman & Horton 2015; Schuchmann & Seufert 2015; Hess et al. 2016). In general, scholars have come to agree that digital transformation is linked to a fundamental shift in reaching a superior performance and that it considers internal, external and holistic firm dimensions.

The described nature of digital transformation found in the literature further suggests that its degree of complexity exceeds that of previous IT-enabled transformations. This is supported by the fact that DT is considered to be one of the major challenges in all industries in recent years, without exception (Schuchmann & Seufert 2015), and even though companies recognize its paramount importance, they still face multiple obstacles that inhibit them from initiating, let alone benefiting from, digital transformation (Von Leipzig et al. 2017). They struggle to get business benefits from new digital technologies, as competing priorities lead the list of common speed bumps (Kane et al. 2015; Fitzgerald et al. 2013). This might be due to a lack of clarity about the different available options and elements that managers need to consider in their transformation approach (Hess et al. 2016). Fitzgerald et al. (2013) suggest that a significant minority of companies have succeeded in developing the right managerial and technological skills to gain transformational effects from new digital technologies. They further propose that additional leadership and institutional challenges are also faced by businesses today. Leadership challenges include a lack of urgency, vision and direction, whereas institutional ones are related to the attitudes of older workers, legacy technology, innovation fatigue and politics. Institutional challenges can best be explained by the fact that most technology-enabled transformations involve a certain degree of resistance to change manifested in the behavior of certain members, who refuse to accept the new state of affairs (Lawton 2015). This cultural barrier is often underestimated and usually not recognized by companies (Von Leipzig et al. 2017).

Overall, we conclude that digital transformation is a more complex type of technology-enabled business transformation, which needs to address the strategic roles of new digital technologies and capabilities for successful digital innovation in the digital world (Yoo et al. 2010). We define it as the process through which companies converge multiple new digital technologies, enhanced with ubiquitous connectivity, with the intention of reaching superior performance and sustained competitive advantage, by transforming multiple business dimensions, including the *business model*, the *customer experience* (comprising digitally enabled products and services) and *operations* (comprising processes and decision-making), and simultaneously impacting *people* (including skills talent and culture) and *networks* (including the entire value system).

## METHODOLOGY

This study systematically reviews the current body of knowledge in an attempt to consolidate a firm foundation and therefore advance our knowledge in the digital transformation domain. Digital transformation is explored using the guiding framework in **Figure 2**, which shows the building blocks for this study.



**Figure 2: Guiding Framework**

Coherent with the previously discussed framework, the questions in **Table 1** (below) were specified.

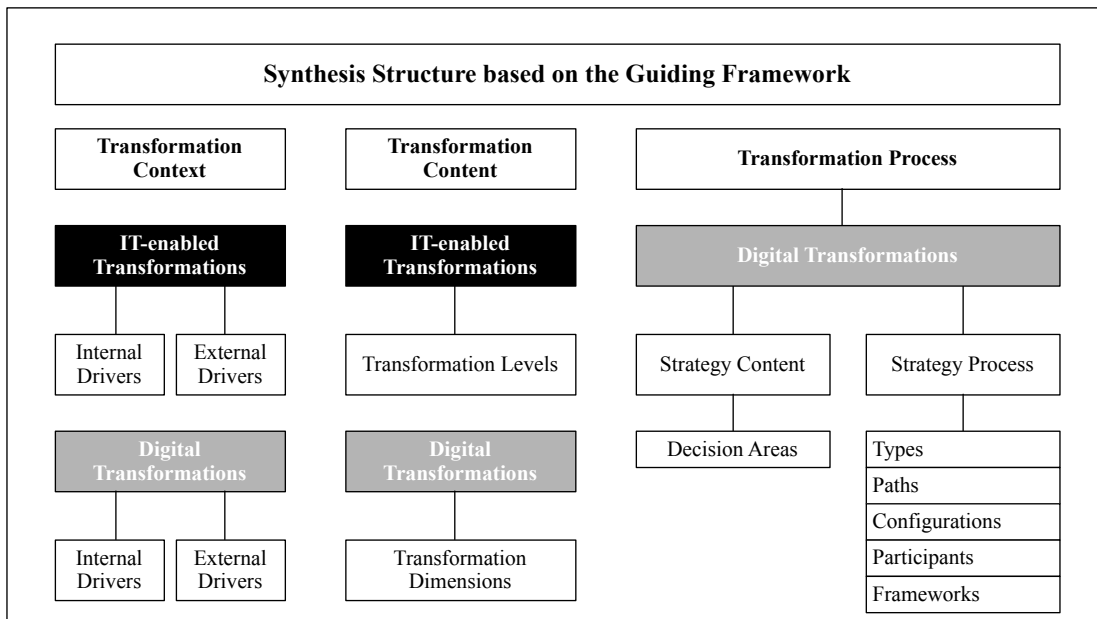
**Table 1: Questions to be Addressed**

Questions	Rationale
<i>Q1: Why do companies digitally transform?</i>	Seeks to understand the <b>context</b> of digital transformation
<i>Q2: What do we know about the dimensions of digital business transformation?</i>	Seeks to understand the <b>content</b> of digital transformation
<i>Q3: How do businesses formulate and implement their digital business transformation strategies?</i>	Seeks to understand digital transformation from a <b>strategy lens</b> and explores its <b>content</b> and <b>process</b>

## SYNTHESIS

This section synthesizes the data obtained in this review based on the guiding framework and explores the DT context, DT content and DT process. When exploring the first two, we contrast digital transformation with earlier IT-enabled transformations in an attempt to fully explore the DT concept first. In doing so, we look at the internal and external transformation drivers and also consolidate the transformation levels/dimensions. We further investigate DT from a process point of view to comprehend its strategic implications. This is accomplished by identifying the various key decision areas and by discussing the strategy lenses and frameworks encountered in the literature. A summary of this section is illustrated in **Figure 3**.





**Figure 3: Literature Synthesis Framework**

### 1. Digital Transformation Context: *Why Do Companies Digitally Transform?*

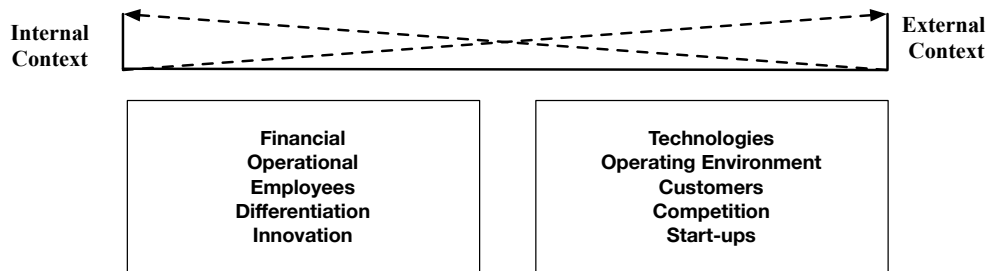
This section examines the context in which companies transform by looking at previous IT-enabled transformations in the 1980s and 1990s, and contrasting them with digital ones. The information revolution has recognized the strategic importance of integrating information systems to enable companies to gain and maintain a competitive advantage (Ward 1987; Jelassi & Dutta 1993; Yetton et al. 1994; Galliers 1994; Raghunathan & Madey 1999). **Internally**, the business environment focus has been on cost savings (Venkatraman 1994; Noble 1995). There has also been an increased emphasis on achieving improved operational efficiency, effectiveness through the proper management of information needs and a strategic differentiation from competitors (Ward 1987; Noble 1995; Clark et al. 1997; Ward et al. 1990). **Externally**, companies have reaped the benefits of improvements in technology cost and performance (Eisley & Ttang 1996; Raghunathan & Madey 1999), which has led to the emergence of new IT/IS-based products and services (Ward 1987; Ward et al. 1990). We identify an agile response to changing industries and market volatility (Eisley & Ttang 1996; Clark et al. 1997), to client expectations (Sheppard 1989; Venkatraman 1994; Noble 1995) and to competitive rivalries (Clark et al. 1997; Sarker & Lee 1999). Similar to the notion of start-ups today, Ward (1987) stresses the emergence of new IT/IS-based competition to compete with already existing companies. Ward et al. (1990) also suggest examining other industries and the business relationships with the outside business world to potentially share the benefits from new technologies.

Many drivers unfold when trying to contextualize why companies digitally transform, and these can also be divided into internal motivations and external triggers. **Internally**, companies are motivated to transform themselves as a result of decreasing sales and financial pressure on the current core business (Hess et al. 2016; Andriole 2017). They also strive to drive social and economic benefits for their stakeholders, with special emphasis

on their employees, who actively seek to interact and collaborate more effectively with the customers they serve. Employees now want to work for digitally enabled organizations and require improvements in the company's IT and greater flexibility in their working environment (Kaufman & Horton 2015; Kane et al. 2015; Webb 2013). Operational drivers are also linked to why companies endeavor to digitally transform, in order to gain efficiency growth (Kane et al. 2015; Andriole 2017) or the closely related productivity improvements (Von Leipzig et al. 2017). Furthermore, many companies aspire to the innovations (Andriole 2017; Hess et al. 2016) and the competitive differentiation (Berman 2012) that digital transformations deliver. Although these internal motivations are mostly proactive approaches, digitally integrated organizations sometimes passively transform to formally comply with corporate social responsibility initiatives as a minimum requirement imposed upon them (Kaufman & Horton 2015).

**Externally**, emerging technologies play a pivotal role as a trigger for transformations. In particular, their speed of development (Chahal 2016), their market-changing (Hess et al. 2016; Kohli & Johnson 2011) and industry-disrupting potential (Westerman et al. 2014; Fitzgerald et al. 2013) demand that firms quickly respond and assemble their digital resources. Because of the resulting connectivity, mobility and social networks that digital technologies are equipped with or enable, tech-savvy connected customers across all facets of society have completely changed their behaviors and expectations from the companies they interact with, which is a common theme identified in numerous papers (Hess et al. 2016; Kane et al. 2015; Earley 2014; Berman 2012; Fitzgerald et al. 2013; Chahal 2016). More importantly, they expect firms not only to react to their demands but also to anticipate their future needs before identifying them themselves, putting immense pressure on companies to respond accordingly (Von Leipzig et al. 2017). Customers aside, common pressure is also exerted from increased digitally focused competition in a highly globalized world, which is another reason for companies to speed up their transformation (Westerman et al. 2011; Kohli & Johnson 2011; Von Leipzig et al. 2017). Innovative start-ups are additional triggers; they are seen to disrupt the business model of many incumbent firms as they take advantage of low barriers (Loebbecke & Picot 2015). These drivers for transformation, depicted in **Figure 4**, converge together making DT an inevitable business endeavor. The representation shows that they cannot be strictly categorized as internal versus external drivers, as there is no concrete distinction between these two interconnected concepts. Yet, the drivers can incline more towards one of the contexts. For example, although innovation mostly stems from internal aspirations it can also be a response to external triggers in the competitive environment in some cases.

Observing the drivers found in the literature, we find that there is an emergent need to respond to people's expectations, namely, tech-savvy employees, who want to work for digitally transformed organizations, and tech-savvy customers, who expect companies to keep pace with new technological trends in order to remain on the competitive landscape. Moreover, the emergence of small start-ups disrupting incumbents is also gaining more attention in the literature. These start-ups, known for their speed in acquiring and even developing emerging technologies for competitive advantage, are a critical factor adding to the importance of embarking on digital transformation initiatives.



**Figure 4: Digital Transformation Context**

## 2. Digital Transformation Content: *What Do We Know About the Dimensions of Digital Business Transformation?*

We examine the content by looking at areas of transformation tackled in previous IT-enabled transformations and by contrasting them with digital ones. The seminal work on strategic alignment (Venkatraman et al. 1993) and on IT-enabled transformation (Venkatraman 1994) has initiated an excessive investigation of the potential of information systems in enabling organizational transformation (Morgan & Page 2008; Besson & Rowe 2012; Bharadwaj et al. 2013; Valdez-de-leon et al. 2016). Venkatraman’s (1994) highly cited paper (1,643 citations) on IT-enabled transformations sheds light on five different transformation levels with varying degrees of change and potential benefits. The schematic representation of his proposed framework has proven to be useful in comprehending the content of previous IT transformations. While the revolutionary levels reap greater benefits, they also involve a higher degree of organizational changes such as new structuring activities, reporting mechanisms, performance measurement criteria and informational flow. Evolutionary levels, on the other hand, indicate marginal benefits but also entail lower degrees of complexity in terms of change requirements. The five levels of IT-enabled transformations are summarized in **Table 2**.

**Table 2: Five Levels of IT-Enabled Transformation**

IT-Enabled Transformations	Characteristics	Levels
<i>Localized exploitation</i>	Decentralized leveraging of IT systems within organizational functions	Evolutionary level
<i>Internal integration</i>	Systematic leveraging of IT capabilities throughout the entire business process	Evolutionary level
<i>Business process redesign</i>	Redesigning the current business process and organizational design	Revolutionary level
<i>Business network redesign</i>	Redesigning the nature of exchange between multiple stakeholders in a business network	Revolutionary level
<i>Business scope redefinition</i>	Expanding the business scope and fundamentally restructuring activities within the value chain	Revolutionary level

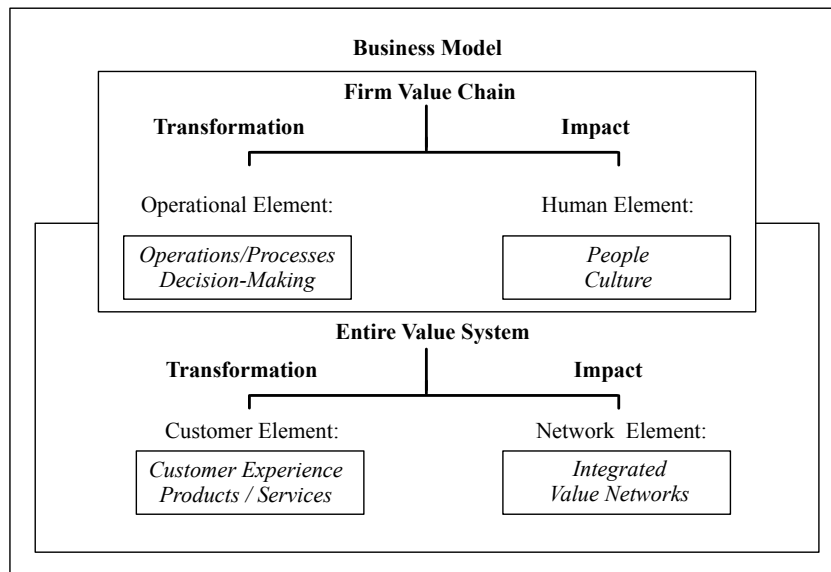
Adapted from Venkatraman (1994)

In a **localized exploitation** the role of information technology is limited to supporting functional requirements (Venkatraman 1994; Ward 1987), where the IT value can be restricted to informational and transactional benefits such as faster and easier access to information, reduced operating costs or enhanced employee productivity (Gregor et al. 2006). **Internal integration** shifts IT's back-office role and brings it more to the fore by integrating existing systems and linking different functions into organization-wide networks, thus removing departmental barriers and aligning more closely with the rest of the business for improved performance (Noble 1995; Roepke et al. 2000; Boddy & Paton 2005; Goh et al. 2007). Yet, these mere evolutionary levels, where IT processes are left intact, explain the concerns that IS managers have regarding the measurable impact of IT investments on organizational competitiveness (Galliers 1994; Burn 1993; Sheppard 1989; Porter 1985). **Business process re-engineering** has gained popularity with Hammer and Champy's (1993) pioneering work, which describes it as a "fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical contemporary measures of performance such as cost, quality, service and speed". At the heart of this radical approach is the notion of discontinuous thinking, breaking away from the outdated assumptions of the old operational design (Galliers 1994). Consequently, a number of companies have resorted to this approach while migrating to an e-business (Krell & Gale 2005), data warehousing platforms (Cooper et al. 2000), enterprise resource planning (ERP) systems (Voordijk et al. 2003; Grabski & Leech 2007) or customer relationship management (CRM) systems (Beldi et al. 2010). **Business network redesign** goes beyond the organizational boundaries by leveraging information technology to transform the value activities with external stakeholders such as customers, suppliers and other business partners with the objective of improving firm performance; radically different organizational forms take shape such as downsizing, corporate venturing and building strategic networks (Ebrahimipur & Jacob 2001; Zhao et al. 2008). As integration between firms takes place more complexity arises for technological, as well as political, reasons (Noble 1995). The role that IT plays in **business scope redefinition** directly influences the logic of business relationships within the extended business network, allowing firms to offer entirely new services and to enter new markets (Venkatraman 1994; Sheppard 1989; Clark et al. 1997). As a consequence of this role companies transcend from the secure confines of their stable business and invent business models that take full advantage of the growing centrality of IT (Dhar & Sundararajan 2007; Rau 2007; Cagle 2008).

Looking at more recent papers, which specifically address digital transformation, we use a similar approach to identify the transformational dimensions in the digital age, as shown in **Figure 5**. It is important to note that we differentiate between areas that companies intentionally transform and areas that are subsequently impacted by the transformation process. The proliferation of digital technologies has opened the door to potential business opportunities, enabling organizations to create new **business models** (Singh & Hess 2017; Hess et al. 2016; Kane et al. 2015; Matt et al. 2014; Kaufman & Horton 2015). This transformation varies in scale, as it can be in the form of a digital modification to the existing business or the creation of an entirely new digitalized business model (Westerman et al. 2014; Daimler 2017). We use Porter's (1991) firm's value chain and value

system framework to classify the rest of the dimensions. A firm's value chain includes the various activities within the firm's own boundaries, from inbound logistics to services, and also consists of supporting activities to facilitate the end-to-end production process. A firm's value system, on the other hand, extends to suppliers upstream and also to channels and end-customers downstream.

We identify two areas within the firm's value chain that are being transformed or impacted: an **operational** and a **human element**. Transforming the operational element targets key business operations and processes (Matt et al. 2014) as companies seek to streamline their operations (Singh & Hess 2017; Fitzgerald et al. 2013) and to integrate their processes with digital performance management (Westerman, Tannou et al. 2012; Westerman et al. 2014). When transforming operations, companies further disseminate new digital technologies for improved decision-making (Kane et al. 2015; Kaufman & Horton 2015; Kohli & Johnson 2011). As a consequence, the human element is impacted by the newly shaped company culture, especially when companies create a more flexible and employee-friendly work environment and enhance knowledge sharing as a result of virtualized offices, for instance (Westerman et al. 2014; Webb 2013). We also identify two areas within the firm's value system that are being transformed or impacted: a **customer element** and a **network element**. The customer element focuses on transforming the customer experience, which ranges from a better customer understanding through designed analytics to seamless and enhanced customer engagement across all touch-points and digitally enhanced communication tools (Singh & Hess 2017; Westerman et al. 2014; Earley 2014; Fitzgerald et al. 2013; Westerman, Tannou et al. 2012). In line with attempts to reshape customer value propositions are initiatives to digitally enhance the products and services offered to customers (Hess et al. 2016; Matt et al. 2014; Berman 2012; Daimler 2017). Companies exploit digital technologies beyond their borders, which ultimately impacts their supply chains, allowing for novel ways of interactions with their industry network (Matt et al. 2014). Although deploying these technologies enables strategic alliances, partnerships and complex relationships to be built with the wider network, this can also lead firms to cut away unnecessary layers in the value system (Andal-Ancion et al. 2003). It is important to highlight the strong interplay between the transformed and impacted dimensions. For example, if companies transform their customer experience, they might have to transform their operations, which might also affect their interactions with their value networks. Thus, there is a blurred boundary between the transformations and the consequently impacted areas as they cross firm's value chains and their entire value system. We also propose that the business model transformation is the most difficult area to transform, as it is likely that it touches upon all elements within a firm's value chain and value system.

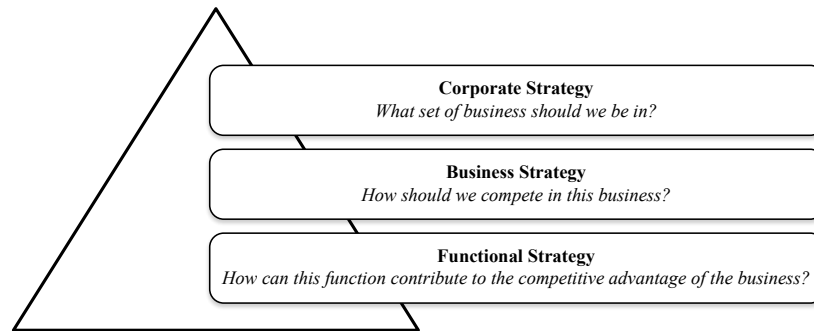


**Figure 5: Digital Transformation Content**

### **3. Digital Transformation Process: How Do Businesses Formulate and Implement Their Digital Business Transformation Strategies?**

Faced with multiple digital transformation challenges, companies have recognized the need to govern this complex endeavor by formulating and executing a clear strategy to keep pace with the new digital reality (Matt et al. 2014). This is supported by various stakeholders within organizations: executives see the potential of emerging digital technologies, and yet they are unclear about how to achieve their transformation goals. Experts in the business world are all in agreement that the ability to digitally reinvent the business is not just about the technologies being adopted, but rather about a radical strategic and cultural change within the organization (Von Leipzig et al. 2017), and corporate employees equally believe in the central role that strategy plays for successfully adopting new technologies (Fitzgerald et al. 2013). Both levels, individual and organizational, are therefore advised to comprehend this strategic imperative behind any digital integration and transformation attempts (Kaufman & Horton 2015). Despite the paramount importance of formulating a dedicated strategy that integrates all the prioritization, coordination mechanisms and implementation steps of digital transformation, academia still fails to provide a coherent guideline that addresses a company-wide transformation strategy (Matt et al. 2014; Hess et al. 2016). “We need strategic frameworks that are aimed at deliberately harnessing the unique capabilities of digital technology that are embedded into products to gain competitive advantage” (Yoo et al. 2010). This “growing sense of urgency about the need to craft successful strategies for the digital marketplace” (Kulatilaka & Venkatraman 2001) makes it apparent that the concept of a company-level digital transformation seems to hinge on a strategy perspective, which is needed in the literature, as well as in practice. Therefore, this review continues to focus on the strategic perspective of a DT and the following sections explore this in more detail.

Before introducing the digital transformation strategy and positioning it within the hierarchy of companies' strategies, we briefly touch upon the relevant strategy levels recognized in the literature, as shown in **Figure 6**. These levels are the most commonly met in the world of business. It is useful to identify the strategy hierarchy for each situation, since strategic choices can be tempered or restricted depending on the members involved at each level (Mills et al. 1995).



Adapted from Mills et al. (1995)

**Figure 6: Three Major Strategy Levels**

### Digital Transformation Strategy Definition

A digital transformation strategy is considered to be an overarching and company-wide strategy guiding an organization in its entire digital transformation journey. It therefore surpasses functional thinking and holistically tackles the opportunities and risks associated with the enabling digital technologies (Singh & Hess 2017). Its distinctive nature of being inclusive of all business segments and company-spanning characteristics necessitates several alignment mechanisms: **first**, alignment with the business strategy; and, **second**, alignment with other operational or functional strategies to act as a unifying link between different strategy levels within companies (Matt et al. 2014; Kaufman & Horton 2015; Hess et al. 2016). Digital transformation dimensions also include digital activities and changes to products, services and business models, thus going beyond the firms' operational boundaries. Consequently, the scope of a digital transformation strategy should be more broadly designed, and because of the uncharted waters of many transformation initiatives, the strategy should be subject to a continuous reassessment regarding its underlying assumptions, as well as its progress (Matt et al. 2014).

The literature accentuates the difference between a digital transformation strategy, IT strategy and digital business strategy. Venkatraman et al. (1993) articulate three dimensions as inherent in an IT strategy, namely the IT scope, systemic competencies and IT governance, meaning that it typically concentrates on the efficient management of IT infrastructure and application systems, with limited impact on driving innovations. The resulting system-centric focus regarding the future use of technologies is considered to be hindering the product-centric and customer-centric transformational opportunities crossing firms' boundaries in a digital economy (Matt et al. 2014). A digital transformation strategy, on the other hand, impacts companies more broadly and allows for transformational opportunities within business models, products, processes and

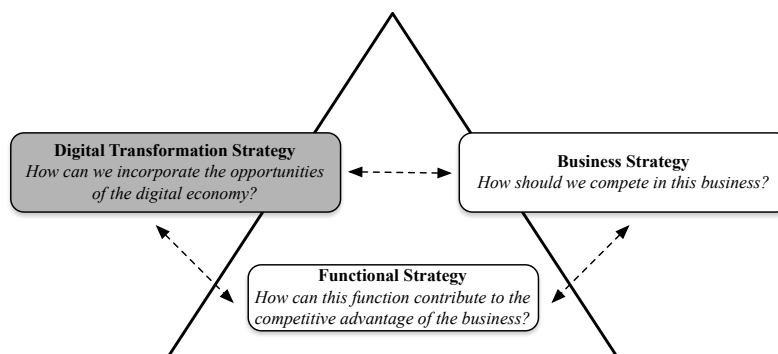
customers. It is further argued that the previous IT strategy knowledge cannot simply be transferred to a digital transformation context (Hess et al. 2016).

With the rise of digital products, processes and services, Bharadwaj et al. (2013) define digital business strategy as an “organizational strategy formulated and executed by leveraging digital resources to create differential value”, which revamps the role of IT strategy from a functional strategy to one that is fused with the business strategy. Although this strategy determines the desired future business opportunities based on the integration and use of new digital technologies, it does not provide guidelines regarding the transformational steps needed to reach the desired future state (Matt et al. 2014; Hess et al. 2016).

As a result of the lack of a coherent and rigorous definition of a digital transformation strategy found in the literature, we propose the following working definition and criteria for a digital transformation strategy. A digital transformation strategy is a company-spanning strategy that is formulated to enable a company to incorporate the opportunities of the digital economy by leveraging digital resources and capabilities, and digitally transforming along multiple business dimensions: operational, customer-focused and business models. It further:

- a) Recognizes the fusion between the business strategy and IT strategy;
- b) Translates the digital layer of a business strategy to the various functional strategies and acts as a missing link;
- c) Provides specific transformational guidelines to reach the future state; and
- d) Considers broader organizational restructuring requirements and acquisitions.

Thus, the discussed characteristics, as well as the necessary alignment mechanisms of a digital transformation strategy, position it at the level of a business strategy in a company’s strategy hierarchy. This allows it to incorporate the vast opportunities that the digital environment and the readily accessible digital technologies present (Sebastian et al. 2017), as depicted in **Figure 7**. It also illustrates the necessary functional alignments that the digital transformation strategy fulfills.

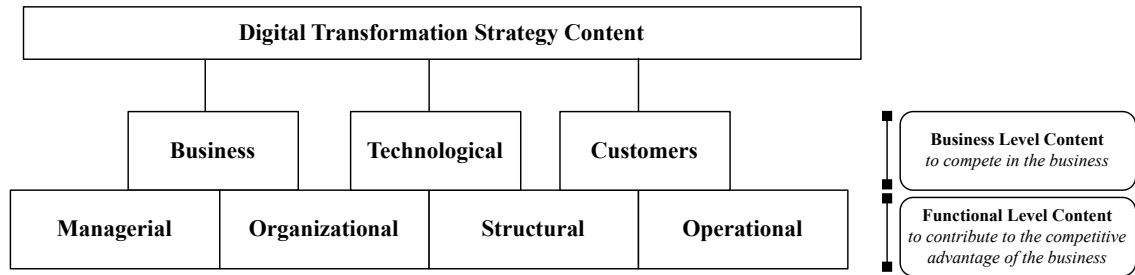


**Figure 7: Positioning Digital Transformation Strategy**



### 3.1 Digital Transformation Strategy Content: What Decision Areas are Relevant?

The design of a digital transformation strategy requires companies to make appropriate strategic decisions in several key areas and this section synthesizes the relevant ones encountered in the literature, as summarized in **Figure 8**. We categorize the content according to the strategy level being addressed. We further propose that these strategic decision areas have to be incorporated into the strategy formulation process by making a set of deliberate choices to meet the long-term goals of the transformation endeavor.



**Figure 8: Digital Transformation Strategy Content**

From a *business* point of view, an initial business case has to be made, in which the long-term objectives need to be clear and also overweighing the mere pursuit of quick gains. Closely related to this are decisions about the potential need for an overall change-readiness assessment in order to comprehend the current state of a company's performance, and to identify potential problems, vulnerabilities, opportunities and the associated risks (Lawton 2015; Kaufman & Horton 2015). Furthermore, digital transformation implies changes in value creation, derived from the way in which adopted digital technologies alter the current business model. Companies are required to rethink the scope of their business and also identify potential new revenue streams from digitally enhanced products, services and customer interactions (Hess et al. 2016; Matt et al. 2014). They should also consider the integration of digital technologies with their core values and business goals to ensure a sustainable outcome (Kaufman & Horton 2015). Most importantly, academics emphasize the importance of establishing a common and clear vision across the entire organization to inform all the stakeholders where they are heading and to ensure the transformation's future success (Chahal 2016; Fitzgerald et al. 2013; Westerman, Tannou et al. 2012; Webb 2013). Decisions will also involve how the vision will be set and who is going to communicate it to the rest of the organization.

**Technological** decisions are crucial when introducing new emerging technologies into companies. Among areas being explored here is the role that technologies play in the firm to achieve strategic goals. This can be divided into an enabling role for new business opportunities or a merely supportive one to fulfill current business requirements. Closely related to that is a company's attitude towards new technologies and its ability to exploit them for future business goals. Firms usually fall into two broad categories: they either adopt established and widely used technology solutions and act as market followers or become the market leaders by innovating and introducing new technology solutions to the markets (Hess et al. 2016; Matt et al. 2014). This stems from investments in their capabilities to conceptualize how digital technologies can impact their business (Kane et

al. 2015) and also requires dedicated change programs to ensure that the organization is concurrently evolving with the technologies (Webb 2013).

Numerous strategic decisions have to be taken in relation to changes in the interaction with **customers**. Companies are encouraged to investigate potentially new benefits created in their customer experience through digitally enhanced changes to the customer journey (Valdez-de-leon et al. 2016). This can be achieved by exploring all the customer touch-points and integrating the companies' interactions across various digital, as well as physical, platforms (Berman 2012). Transforming the customer experience can also be accomplished through the introduction of digitally enhanced products and services (Hess et al. 2016; Matt et al. 2014; Valdez-de-leon et al. 2016). Additionally, investments in R&D can further help organizations develop digitized solutions to anticipate customer needs rather than merely responding to existing ones (Sebastian et al. 2017).

**Managerial** decision areas have a financial element, which evolves around choosing how to finance the digital transformation endeavor, after assessing the financial pressure on the current business (Hess et al. 2016; Matt et al. 2014). The focus on fostering innovation is also a critical element to be discussed (Kane et al. 2015; Lawton 2015), in which managers are encouraged to view digital innovation as an integral part of their strategy (Kaufman & Horton 2015). Agile and new flexible working, along with a consideration of a bottom-up innovation processes, should drive an ongoing digital transformation (Westerman, Tannou et al. 2012; Valdez-de-leon et al. 2016). Managers need to further be aware of the paramount importance that various capabilities play, namely, organizational, technology-based, product-related and digital capabilities (Kane et al. 2015; Matt et al. 2014; Westerman, Bonnet et al. 2012). Examining their firms' strategic assets and capabilities through a digital lens may help managers pinpoint which existing assets can be leveraged, which capabilities can be used in new ways and whether or not new competencies are needed to be brought into the company (Westerman & Bonnet 2015; Hess et al. 2016; Ross et al. 2017). In their empirical work with large, old companies, Sebastian et al. (2017) reveal the importance of two technology-enabled assets that are necessary for a successful digital transformation: an operational backbone to ensure efficiency and reliability of core operations; and a digital service platform to support business agility and rapid innovations.

Various **organizational** decisions are also identified in the literature, in which companies are advised to take a closer look at the employees, culture, talent and skillset, and leadership. Companies should review the need for developing a collaborative work environment and ensure that the transformation project is staffed correctly (Kane et al. 2015; Matt et al. 2014). Employees are often assessed from a maturity point of view, in which their roles, expertise and capabilities are scrutinized (Von Leipzig et al. 2017). This enables companies to classify themselves into a category of digital maturity and also helps them to navigate their transformation in a structured manner. Further considerations are required regarding the necessary changes in the company's culture, which are aimed at adapting it to work with new technologies rather than imposing these technologies on employees (Chahal 2016). Additional decisions are made around

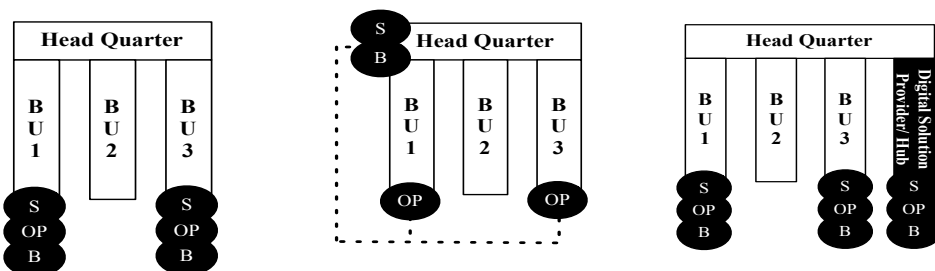
techniques for encouraging risk, creating the right digital mindset and helping employees to adapt quickly to change (Kane et al. 2015; Kaufman & Horton 2015). This cultural shift is considered to be the biggest challenge encountered in transformation-related change programs (Webb 2013) and is also viewed as a critical success factor in technology-induced business transformations (Lawton 2015).

A digital transformation strategy formulation needs to further include decisions regarding securing people with the necessary skills and talent to be able to capitalize on the digital trends (Kane et al. 2015; Westerman, Tannou et al. 2012; Berman 2012). Action plans are taken upon assessing which organizational skills are affected (Matt et al. 2014), what skills changes are required (Hess et al. 2016) and whether internal training or new talent acquisition is necessary (Kaufman & Horton 2015). Kane et al. (2017) further recommend recognizing on-demand talent markets as strategic resources, balancing full-time and part-time talent and creating an environment where the best people want to work.

Within the organizational decision areas is the criticality of the buy-in from senior leaders and the board (Chahal 2016), who are expected to articulate their vision to the staff and prepare the roadmap for future commitments (Fitzgerald et al. 2013). This top-down approach is preferable (Westerman, Tannou et al. 2012; Kane et al. 2015), and yet there is no clear answer as to which c-suite position should be in charge of the digital transformation strategy (Matt et al. 2014). Together with CIOs or even CEOs, new positions such as CDOs are also emerging as potential candidates for driving the transformation.

A pattern of other **structural** decisions is also articulated in the literature and involves the right internal governance, as well as external collaborations through partnerships or acquisitions. Internally, companies face multiple structural choices to support the execution of their digital transformation strategy and to make decisions regarding whether new operations will be incorporated into their existing structures or through new separate units (Valdez-de-leon et al. 2016; Hess et al. 2016). Establishing a strong company-wide coordination mechanism through communication and collaboration rules, along with the desired KPIs, are also of paramount importance to ensuring the firm is on the right path to transformation (Westerman et al. 2011; Von Leipzig et al. 2017). We identify multiple models that can be adopted depending on the company's current state, as shown below:

**Internal Models** (Westerman et al. 2011; Guest 2014)<sup>1</sup>

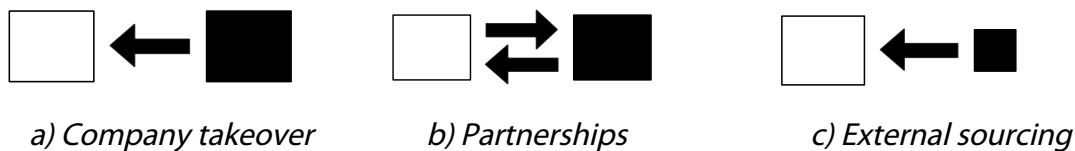


<sup>1</sup> S = strategy; OP = operations; B = budget; models are adapted from Westerman et al. (2011).

a) *Tactical models*      b) *Centralization models*      c) *Champion models*

*Tactical models*, also referred to as silos, have no enterprise coordination; strategies, operational teams and budgets for digital initiatives reside in each business unit. Here digital technologies are used in an efficient and effective way to achieve business units' targets. *Centralization models* exhibit more coordination since digital strategies and funds are managed at an enterprise/corporate level. This structure enables organizations to scan the market for opportunities and provide a central team to work with business units for implementation. *Champion model* business units have their own strategies, operational teams and budgets but must use the resources and solutions offered by the dedicated digital business units. Here, emphasis is placed on education, knowledge-sharing and enabling others in the business.

**External Models** (Hess et al. 2016)



Adopting the right *external models* allows companies to seek help from external sources. Companies accumulate the necessary know-how during *takeovers* in the form of merger and acquisition activities. Companies can also develop their workforce in digital technologies through fostered *partnerships*. Another alternative is to obtain the necessary resources from outside through *external sourcing*.

The **operational** dimension of strategic decisions cannot be overlooked in digital transformation projects and mainly incorporates choices regarding necessary operational changes and adaptations to the current business processes (Hess et al. 2016; Webb 2013). Here companies have to make decisions based on mapping exercises to determine the processes that will be affected by the new technology integration (Matt et al. 2014). Organizations must also be primed to tightly infuse the use of new data into their processes and decision-making (Kane et al. 2015). They should be further equipped with the predictive capability to obtain certain insights from analytics and to leverage the data to optimize its digitally enabled supply chain and interaction with customers (Berman 2012). Ways to drive operational agility and efficiency can be achieved by determining points of vulnerabilities and addressing them (Kaufman & Horton 2015). Maturity models also exist to help companies assess the state and agility of their current processes, and to increase their digitalized operation (Valdez-de-leon et al. 2016; Von Leipzig et al. 2017).

A comprehensive digital transformation strategy needs to address the above-mentioned decision areas, and, depending on the company context, the right choices from various alternatives should be selected.

### 3.2 Digital Transformation Strategy Processes: How Do Companies Transform?

We aim to scrutinize the different strategy perspectives in this section to help us find an answer regarding *how* companies transform. This is achieved by exploring the different *strategy types, strategy paths, strategy configurations* and *strategy frameworks*.

#### 3.2.1 Strategy Types

The strategy types encountered in the literature either define the focus of the strategies being deployed or describe them from a managerial perspective. Sebastian et al. (2017) articulate two types of strategy identified in their empirical work, with incumbents embarking on a digital transformation journey: **a customer engagement strategy (CSS)**; and **a digital solutions strategy (DSS)**. While a CSS focuses on offering a superior, innovative, personalized and integrated customer experience, a DSS aims to reformulate a company's value proposition through the integration of products, services and data (Ross et al. 2017). They have been identified as two types of strategy that companies can commit to when operating in a digital age.

Kaltenecker et al. (2015) also conducted empirical work with well-established companies in the software industry shifting their focus from an on-premises market to an on-demand market as a result of the emergence of cloud computing technology. The resulting applications on a cloud infrastructure help them to extend their generic management strategies when transforming and dealing with disruptive innovations. This is based on Christensen's theory of disruptive innovations, in which he describes the innovator's dilemma: incumbents operate on a sustaining trajectory by focusing on improving their current products and services for their most profitable and demanding customers and consciously ignore the needs of other segments. New entrants, on the other hand, choose the disruptive trajectory by targeting the overlooked segments and providing more suitable functionality at a lower price before slowly finding their ways to incumbents' mainstream customers, where they then expand their offering in volume (Christensen 1997; Clayton et al. 2015). Well-established companies are expected to face this dilemma as they hold on to their technologies, even though they see the potentially disruptive new technologies emerging (Kaltenecker et al. 2015). **Table 3** (below) shows a set of different management strategies adopted by incumbents in the software industry to manage potentially disruptive innovations using cloud computing as an example. This construct of strategy typologies is useful in understanding the transformation strategy process; yet the literature still lacks a full exploration of other relevant strategy types that may only be understood through further empirical work related to additional digital technologies, and not just cloud computing.

**Table 3: Digital Transformation Management Strategies**

Strategy Type	Explanation
<i>Spin-Off</i>	Independent spin-off or a separate organizational unit to ensure adequate staffing and help follow potentially disruptive innovations.
<i>Leader</i>	Early preparation and market entry to gain a first-mover advantage.
<i>Expert Opinion</i>	Gathering information from a wide range of sources: technological staff, cooperation partners, customers and external experts to support the

	transformation process despite internal resistance from stakeholders.
<b><i>Trial and Error</i></b>	Testing products and markets to achieve fully developed software, especially for high-quality products.
<b><i>Recruitment</i></b>	Recruiting innovative and experienced staff to help with the transformation process or cooperating with universities and lead customers.
<b><i>Direct Sales</i></b>	Distributing on-demand software directly or by financially incentivizing resellers to promote on-demand sales.
<b><i>Step-by-Step</i></b>	A ramping-up approach by focusing on smaller solutions in the beginning and expanding the customer base with time.
<b><i>Partnership and Ecosystem</i></b>	Gaining access to technology expertise through a strong technological partner to adapt to a disruptive technology faster.
<b><i>Visionary Top Management</i></b>	Top management vision communication can accelerate the transformation process and motivate employees.

Adapted from Kaltenecker et al. (2015)

### **3.2.2 Strategy Paths**

Several paths are suggested in the literature to guide companies when choosing their transformation journey's starting point. Berman (2012) proposes three strategic paths as different starting points when choosing the company's digital transformation dimension. The underpinning activities evolve around reshaping the operating model by creating, leveraging or integrating digital operations, or reshaping the customer value proposition by enhancing, extending or redefining it with digital engagement. The first path's starting point evolves around reshaping the operating model by leveraging information and digital capabilities within the organization before reshaping the customer value proposition and experience through digitally enhanced products and services. The second path starts with transforming the value proposition before reshaping the operating model and the third alternative route transforms both simultaneously from the start. The suggested paths seem to be industry-specific; companies with mostly physical products and fewer customer requirements for information may begin their digital endeavor by transforming the operations, whereas asset-light companies such as financial services are most likely to have an initial focus on transforming the customer value propositions.

Similarly, Sebastian et al. (2017) build on their two aforementioned strategy types (customer engagement and digitized solutions strategies) and propose committing to only one type of strategy as a starting point before being able to benefit from the outcomes associated with the other strategy. This study reveals that committing to only one starting point aids in making strategic decisions regarding resource allocation.

The appropriate starting point has proven to be a characteristic of a robust and successful strategy formulation methodology, since there must be clearly defined expectations of what the strategy process involves and what type of results need to be obtained (Platts 1994). Nevertheless, the different industry-specific starting points still need to be further tested with a larger industry sample to provide deeper insights regarding when and why certain business dimensions are chosen to be transformed before others. The literature is

also lacking in-depth analysis of how these suggested starting points are interlinked, and whether or not, and to what extent, they influence one another.

### **3.2.3 Strategy Configurations**

We demonstrate the different strategy configurations followed when companies adopt new technologies to help them transform. We identify different techniques to be used with a direct impact on the external environment, the internal environment, or both.

Andal-Ancion et al. (2003) explore the investments in new information technologies (NIT), which enable several business transformations, and introduce three types of mediation strategy that change the industry's value chain. These strategies include techniques that are characterized by ***classic disintermediation***, where companies' distributors are cut out of the value chain, ***remediation***, where companies' distributors are embraced, and ***network-based mediation***, where new alliances and partnerships shape complex relationships in an industry.

Internal procedures focus on multiple strategic configurations that should be followed when companies transform. The notion of recognizing the importance of information systems, and the need for their integration into business strategies, has already been a point of discussion since the 1880s. Ward (1987) has shown how the business objective of information systems extended from enabling efficient operations in the 1960s, to providing better management information in the 1970s and to increasing business competitiveness in the 1980s. Consequently the term ***strategic alignment*** was coined and this lens refers to how different strategy levels must be configured, with a special focus on the alignment between business strategy and functional IS/IT strategies to realize strategic value from IS investments (Venkatraman et al. 1993). The central argument is that a firm's ability to achieve differential advantage requires continuous alignment between four domains: business strategy, organizational infrastructure and processes, IT strategy and IS infrastructure. The strategic alignment model and its underlying components are now a well-established theme in IS research (Coltman et al. 2015; Lawton 2015) and are also adopted in the context of digital transformation. The four domains also offer a tool to align business and digital strategies and to conceptualize the necessary e-leadership qualities and capabilities that drive this alignment (Li et al. 2016). Similarly, drawing on the experience of the digital transformation in the oil and gas industry, the alignment approach is chosen to close the gap between the business and IS strategy (Kohli & Johnson 2011). It further leads to establishing guiding principles within the organization for acquiring IT, information availability and creating value from IT investments. Similarly, in the context of cloud computing as an innovative and disruptive technology Peter Ross and Blumenstein (2013) accentuate the fact that a firm's competitive advantage will be realized when it better integrates its information and communication technologies (ICT) with the core business. This calls for a more strategic role, as opposed to IT's past isolated role in the back office.

Moreover, ***strategic fit*** as a strategy configuration refers to the technique of aligning a firm's internal resources and capabilities with the environmental environment. It extends the resource-based view, which recognizes internal resources and capabilities as a main

source of competitive advantage, by extending the analysis to external factors. Arguably, the strategic fit lens allows us to explore the digital transformation phenomenon fully, and is developed into a framework to aid in understanding digital initiatives in the banking industry (Liu et al. 2011).

There seems to be a common agreement that digital transformation strategies need to be exhibiting certain configurations to allow companies to successfully transform. Although DT research is still in its infancy, we expect academics to continue experimenting with different strategy configuration models and to provide us with their performance implications.

### **3.2.4 Strategy Participants**

We explore the key participants in a digital transformation that need to be known during the strategy formulation, as well as the implementation process. The wide-spanning nature of a digital transformation (Matt et al. 2014) and its alignment with different strategy levels highlights its cross-functional integration within the business and the need for cross-functional teams to be on board (Kane et al. 2015; Harrington & Tjan 2008). Sebastian et al. (2017) indicate that the old “divide-and-conquer” approach, where functions are working in silos to optimize their individual performances, are not suited to digital transformation; people should collaboratively experiment with technologies and embrace collaborations across functional and organizational boundaries. From a leadership point of view, we have already discussed their roles and level of involvement in the strategy content; yet we notice the importance of distinguishing between additional participants who formulate the strategy, participants who are affected by it and participants who implement it, the project owners. Little is known about these roles, which can still be developed and incorporated into strategy frameworks.

### **3.2.5 Strategy Frameworks**

We examine six digital transformation strategy frameworks encountered in the literature and shed light on their nature (Westerman, Tannou et al. 2012; Kaufman & Horton 2015; Hess et al. 2016; Parviainen et al. 2017; Von Leipzig et al. 2017; Sebastian et al. 2017). They entail much of the previously discussed strategy content and are all designed in stages, which build on one another. This echoes the idea that a transformation is a process that advances through stages, building on one another as opposed to occurring as single events (Kotter 1997). We identified six distinctive phases that can be applied to all of the frameworks, and also equip managers with a structured approach while progressing from one stage to the next.

**Table 4: Phases identified in Digital Transformation Frameworks**

<b>Phase</b>	<b>Description</b>
<i><b>Initiation</b></i>	Understanding digitalization opportunities, threats and impact
<i><b>Ideation</b></i>	Imagining transformation dimensions as options for the business
<i><b>Assessment</b></i>	Evaluating digital readiness levels and identifying gaps
<i><b>Engagement</b></i>	Communicating the vision and integrating the necessary people
<i><b>Implementation</b></i>	Proceeding with the action plan in various domains



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**Sustainability** | Validating and optimizing the action plan continuously

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We further contrast the frameworks with Kotter's (1997) guide, in which he thoroughly explains why transformation efforts fail in businesses. He outlines eight critical success factors, including establishing a sense of extraordinary urgency to communicate the vision and change the company culture. We find that several of the steps in the digital transformation frameworks touch upon the human-related factors mentioned in Kotter's guide and thereby denote the paramount importance of the people's perspective: the right leaders have to be chosen, the vision needs to be communicated throughout, employees are empowered to take initiatives and the right skills have to be acquired.

Although it might seem that there is a plethora of strategy frameworks in the literature, it is important to note that their empirical work is rather limited to certain criteria. For example, Westerman, Tannou et al. (2012) and Sebastian et al. (2017) focus solely on examining large companies, where most of them are also incumbents in their field. Other studies also pay closer attention to specific industries such as the media industry (Hess et al. 2016) or the service sector in Germany (Von Leipzig et al. 2017). Parviainen et al. (2017) synthesize their findings from diverse industrial case studies as a unit of analysis, while Kaufman and Horton (2015) propose their DT blueprint without validation from industry engagements. These findings uncover the need to develop additional frameworks in different contexts to allow us to comprehend the DT phenomenon in more depth, to explore more industry-specific insights and to allow for wider reach.

The importance of building a new portfolio of core capabilities that suit the digital age and allow for efficiency and responsiveness is recognized in the literature. In fact, Berman (2012) highlights the importance of a digital capability and proposes that they encompass business model innovation, customer collaboration, cross-channel integration, insights from analytics, digitally enabled supply chains and a networked workforce. Likewise, Sebastian et al. (2017) underline the need to develop the necessary technology and business capabilities to ensure efficiency, scalability, reliability and rapid implementation of digital innovations. Foremost, companies are urged to assess their current resources and capabilities, and identify the relevant competencies that will be needed in the future (Hess et al. 2016). Despite the paramount importance of assessing and developing digital and other organizational capabilities, the frameworks lack comprehensive and pragmatic approaches to how to do so.

## **DISCUSSION**

This section aims to reflect on the findings. It contributes by positioning digital transformation within the context of technology-enabled transformations and also sheds light on the distinctive features that emerged from the review.

### **Positioning Digital Transformation**

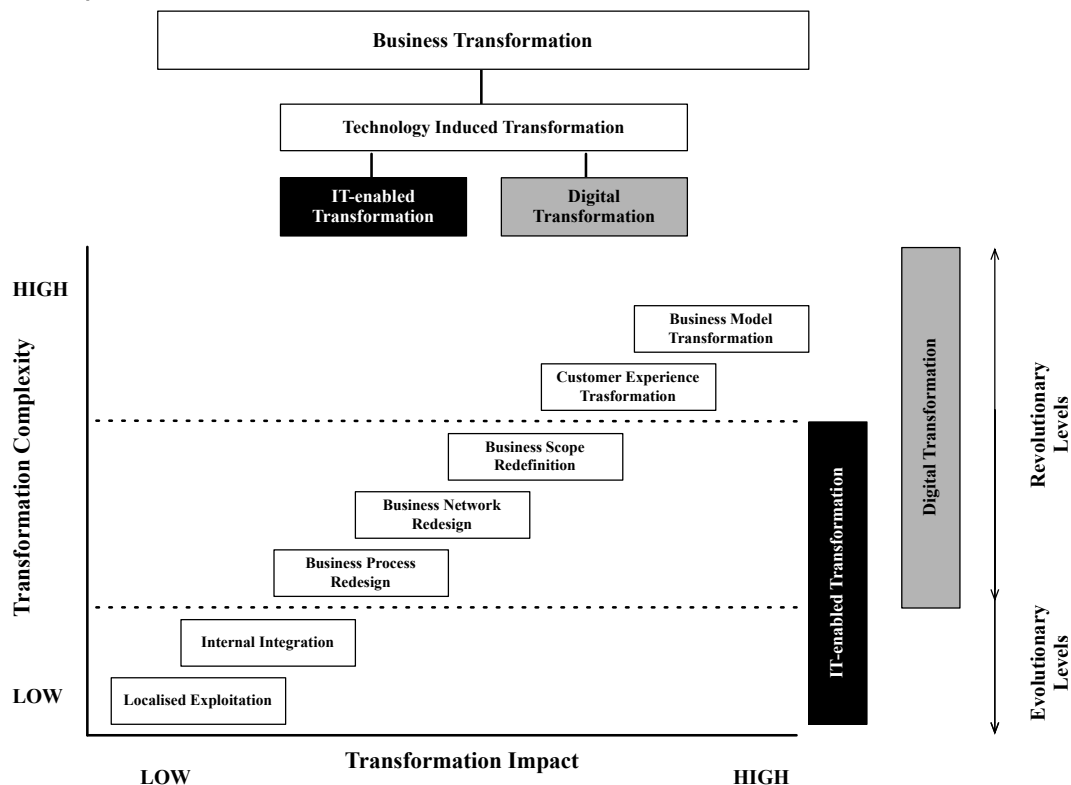
Analyzing the content of digital transformation allows us to position the digital transformation phenomenon and distinguish it from previous technology-enabled transformations.

We propose that:

- the degree of complexity in digital transformations exceeds that of previous IT-enabled transformation, as it takes a revolutionary approach to fundamentally change any of the above-mentioned dimensions;
- the range of potential impact and benefits arising from digital transformation are also higher and have a clear external impact crossing traditional organizational boundaries.

This differentiation is illustrated using the schematic representation of Venkatraman's (1994) diagram for IT-enabled transformations in Figure 9. We argue that digital transformation only entails revolutionary levels of transformation as a result of its increased complexity and impact. This is apparent in the nature of the business dimensions that are being transformed and their interlinks:

- The operations: with multiple impacts requiring a fundamental redesign;
- The customer experience: with a wider impact crossing firm's boundaries;
- The business model: adding additional layers of complexity and wide-spanning impacts.



**Figure 9: Positioning Digital Transformation**

### **Distinctive Features of Digital Transformation: How is Digital Transformation Different to Previous IT-Enabled Transformations?**

Following the positioning of digital transformation within IT-enabled transformations, this section attempts to demystify some novelties and the distinctive characteristics of digital transformation. We mainly argue the differences from a technological point of

view and show its implications on products, firm's value chains and the external environment before concluding with the necessary organizational restructuring.

### Technological Perspective

Arguably, the nature of digital technologies is a fundamental key difference causing the dramatic shift within organizations and in the competitive landscape. Today, we are reaching an inflection point, where the effect of these digital technologies manifests with "full force" and enables "unprecedented things" (Brynjolfsson & McAfee 2014). They have computer hardware, software and networks at their core, and have benefited from the exponential improvements in IT capacity, which can best be explained using Moore's Law. Moore and Fellow (1998) write: "The complexity for minimum components costs has increased at a rate of roughly a factor of two per year. Certainly over the short term this rate can be expected to continue, if not to increase." They have revised this doubling of computing power from one year to two, and nowadays it is common to use a doubling period for general computing power of 18 months. Progress in the digital world depends on "how many electrons per second can be put through a channel etched in an integrated circuit, or how fast beams of light can travel through fiber-optic cable" (Brynjolfsson & McAfee 2014). This digital progress may slow down with time, as many people have already predicted, and yet there are two reasons why it will not: **first**, we underestimate the engineers and scientists working in the computer industry; and, **second**, only if we use the same technology will we run into limitations. In fact, Moore's Law is different to the laws of physics, as it is a predication related to the work of people in the industry, who have shown consistent success in the past. Furthermore, we are not limited to one technology. A convergence of multiple technologies is happening today as the innovations build on and amplify one another in a fusion of multiple technologies across the physical, digital and biological realm (Schwab 2016). Our central argument in identifying the key differences of digital transformation is further grounded on multiple characteristics of digital technologies. Yoo et al. (2010) note that they differ from earlier technologies in three characteristics:

- a) **Re-programmability**: allowing separation of the functional logic from the physical embodiment that executes in addition to a wide array of functions;
- b) **Homogenization of data**: storing, transmitting, processing and displaying digital content such as audio, video, text or image using the same digital device;
- c) **Self-referential nature**: the requirement of using digital technology, leading to a faster diffusion and positive network externalities.

In addition, digital technologies have **mobility** and **ubiquitous connectivity** features, which provide immediate interaction and access to a wide range of data and computing power; these features are also reflected in today's products and enable a wider reach (of people), regardless of geographical location (Schwab 2016; Lanzolla & Anderson 2008; Lanzolla & Giudici 2017). The exponential availability of data as a result of the discussed features enables companies to analyze the insights and derive the right decisions in real time.

In summary, these technologies do not merely automate basic processes, satisfy information needs or affect the business strategy, as was the role of IT in previous eras

(Ward et al. 1990); they also have the capacity to reformulate the entire business strategy as a result of their unprecedented capabilities: ensuring efficiency, scalability, reliability and predictability of core operations, while simultaneously facilitating rapid development and the implementation of rapid innovations in response to, or even anticipation of, customers' needs (Sebastian et al. 2017).

### **Product Perspective**

The third wave of technology-enabled transformations encountered nowadays is allowing technologies to be an integral part of the products themselves, which is regarded as a fundamental difference from what we have seen before (Porter & Heppelmann 2014; Hansen et al. 2011). New smart connected products are emerging as a result of the immense improvements in processing power, device miniaturization and the network benefits of ubiquitous wireless connectivity mentioned above. They share **physical components** (mechanical and electrical items), **smart components** (sensors, microprocessors, data storage, controls, software, operating systems and digital user interfaces) and **connectivity components** (ports, antennae, protocols and networks enabling communication with the product cloud) (Porter & Heppelmann 2015). Having these core components, they offer greater opportunities for new functionality, more reliability, higher utilization and further capabilities that transcend the traditional product boundaries (Porter & Heppelmann 2014). Thus, the new features of products in the digital world allow firms to reformulate their value propositions by combining products and utilizing their embedded data.

### **Value Chain Perspective**

The software-intensive nature of the above-mentioned smart, connected products support the co-creation of value together with stakeholders and customers (Zimmermann et al. 2016), and additionally restructure the entire value chain activities. In terms of the design and development activities, Porter and Heppelmann's (2015) recent work demonstrates how these products now rely more on software engineers than mechanical engineers. Their designs need to accommodate remote servicing in addition to fine-tuning flexibility to meet new customer requirements or performance hiccups. The new emphasis on the software's functionality further diminishes the complexity previously associated with products' physical layers. Due to this increased software functionality, manufacturing activities can even shift their assembly at the customer end, where software is uploaded and configured. We are now witnessing the emergence of smart factories and national initiatives such as Industrie 4.0, possibly the largest worldwide trend in manufacturing (Von Leipzig et al. 2017), requiring cloud-based systems and networked machines to optimize production. Today's term "Internet of Things" takes tracking activities in logistics to a completely new level, as it eliminates the RFID scanning process and relies on interaction between objects. Moving on to the marketing and sales activities, Porter and Heppelmann (2015) further delineate how data retrieved from smart, connected products enables companies to conduct finer customer segmentation, to tailor their offerings and to develop more sophisticated pricing strategies that are in line with the data they extract and analyze. Moreover, even the after-sale service activities are reshaped as companies shift from reactive to preventive and proactive servicing activities.

### **External Environment: Customer and Network Perspective**

Digital transformation is fundamentally different to previous IT-enabled transformation because of the specific trends observed when companies engage with customers. Looking at transformations in media, telecommunications and technology companies, Lanzolla and Anderson (2008) distill three specific trends:

- a) ***Digital interactions***: the features of digital technologies allow people to have more active interactions with content since they are capable of creating, eliminating or consuming it when and how they want.
- b) ***Digital distribution***: the diffusion of digital technologies allows content to be widely distributed to customers as a result of the increased number of available channels and devices.
- c) ***Ubiquitous digital reach***: digital interconnectivity overcomes physical barriers and allows companies to reach more people and build a customer network based on interests rather than geographical location.

These trends in our digital era embody a change in customer behavior, as they are now “more informed, communicate more with other customers and are forming ever higher expectations regarding digital service provision that spans across all channels and industries” (Von Leipzig et al. 2017). Customers nowadays expect companies to anticipate their expressed demands, as well as their still unknown future needs. Companies that embrace these new demands will succeed, while others will no longer be able to compete. Gray et al. (2013) further emphasize how the focus of IT activity is shifting from the center of an enterprise to its edge to be able to engage with consumers who are digitally connected and activated. In particular, consumer-centric service industries need to realize new strategic value at the edge, where consumers are considered to be co-creators of value, knowledge organizers and important factors of production.

Katsamakos (2014) identifies another defining feature of digital transformation: the emergence of network competition. Here value networks, regarded as “interdependent firms coordinating closely to deliver value to consumers in the form of products of services”, shift the locus of industry competition from the individual companies competing against one another to a value network competing together in the marketplace. Their key attributes are:

- a) ***Increased cooperation, information sharing and intensity of collaboration;***
- b) ***Co-specialized investments;***
- c) ***Long-term, repeated interaction based on trust and strong relationships formed among partners.***

### **Internal Organizational Structures**

Digital transformation is often described as a continuous, complex and revolutionary undertaking that even goes beyond company borders (Matt et al. 2014; Hess et al. 2016; Liu et al. 2011). Kane et al. (2015) argue that the uniqueness of digital transformation lies

in risk-taking being a cultural norm as companies seek new levels of competitive advantage. It will not have a completion date because of the accelerated developments in digital technology and fast-changing customer behavior requiring businesses to be quick to continuously change and adapt themselves (Chahal 2016). Accordingly, digital transformation substantially shapes a company in its entirety and demands major changes in its organizational structures, as well as a reassessment of its norms and values (Liu et al. 2011).

The ability to digitally transform a complete restructuring, as well as the introduction of new roles, are necessary. This is supported by the fact that the classical functional model of separate functional units (i.e. logistics, production, logistics, sales, finance, IT) is breaking down. The transformation permeates every part of the business and involves the entire business, from the board to the front-line staff, rendering preceding silo operations a failed approach (Chahal 2016). Some functional roles often overlap and blur (Porter & Heppelmann 2015), and thus the creation of cross-functional teams is encouraged to better link and coordinate internal firm activities (Ross & Blumenstein 2013). A potential solution is to introduce interdisciplinary teams representing the business, as well as the IT side, with an operational lead (Horlach & Drews 2016). The newly introduced data-intensive environment leads to the formation of new units such as customer success management units or unified data-organization units to ensure enterprise-wide data integration (Porter & Heppelmann 2015). Horlach and Drews (2016) also reveal the necessity of having a bimodal IT operation, where digital IT and traditional IT, sometimes referred to as “two-speed IT”, coexist. Furthermore, new digital technologies require different skills and mindsets to previous waves of transformative technologies, arguably a reason why CIOs are often not in the best place to take charge of digital transformation (Singh & Hess 2017). In response, some firms appoint new positions at the top management level, for example, a chief digital officer (CDO), to work alongside the CIO and to take care of the digital products and services at the customer interface (Hess et al. 2016).

## CONCLUSION

The objective of this review has been to show the current state of academic research in digital business transformation strategies. It reveals the reasons why companies digitally transform and illustrates companies’ internal motivations, as well as their external triggers. The content of digital transformation is also framed and we distinguish between the business dimensions that are being transformed and the areas that are being impacted by the transformation. Finally, we identify multiple dimensions regarding the content of strategy formulation in the digital era, and also comment on the strategy process. The review additionally adds novel insights regarding the positioning of digital transformation and the key characteristics that distinguish it from previous technology-enabled ones.

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