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Digital Agility: Conceptualizing Agility for the Digital Era

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Abstract

It goes without saying that digital technologies have been forming an increasingly crucial component of companies' value offerings in recent times. In many industries, this trend has led to converging markets, where traditional firms compete and collaborate with software firms and digital startups. One central competitive factor in these markets is the ability to capitalize on digital options faster than the competition. Prior research on agility in this context has advanced our knowledge on managerial and employee behaviors, as well as structures supporting such behaviors, to enable agility both in traditional and software firms. The challenge for firms in digitally converging markets is that agility now requires a combination of organizational and IS development agility—perceiving these concepts as separate entities is no longer appropriate or instructive. Building on prior work on agile behaviors and structures, and published cases on digital firms, we develop an integrative conception of digital agility in line with the realities of the digital era.

Keywords: Agility, Digital Agility, Digital Era, Theory Building, Literature Review

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1 Introduction

Many organizations have been and are being impacted by digital transformation, with deep structural changes arising as a result (Baiyere et al. 2020; Wessel et al. 2021). These changes are due to a combination of factors heralded by the digital era such as the *generativity of digital technologies*, *digital market convergence*, and *fluid organizational boundaries*. Prior research in the field of information systems has chronicled each of these factors, as summarized below. A review of this research forms the basis for our theorization.

The *generativity of digital technologies* implies that they can be widely applied in a number of ways to create value (Henfridsson & Bygstad, 2013; Kallinikos et al., 2013; Yoo, 2010; Yoo, et al. 2020). When these technologies are incorporated into the value offerings

of traditional products and services, the markets formed by these technologies may start to gradually *converge*, often melding together (Seo, 2017; Crowston & Myers, 2004; Wessel et al., 2020). Examples of this phenomenon have been recorded in several industries—media and the press (Utesheva et al., 2016), music (Lucas et al., 2013), finance (Seo, 2017), telecommunications (Crowston & Myers, 2004), and manufacturing (Baiyere et al., 2020), among others. Such market changes can remove entry barriers and reduce existing competitive advantages (Kahre et al., 2017). In the face of such changes, companies may regard their internal resources as being insufficient, leading to external resources being sought after. Indeed, there is evidence that competition in converging markets is accompanied by new types of collaborative arrangements between firms (Baskerville

et al., 2020; Bygstad et al., 2018; Montealegre et al., 2019), resulting in the boundaries of these companies becoming more *fluid*.

With the advent of the digital era, increased competition resulting from the above influences has challenged companies to become more agile in order to survive. Indeed, early conceptions of agility can be found in strategic management studies published in the 1990s (e.g., Goldman & Nagel, 1993; Goldman et al., 1995). Since this early work, the concept has become bifurcated in the information systems literature, diverging into research streams concerned with “IT-enabled *organizational* agility” (Breu et al., 2001; Sambamurthy et al., 2003; Overby et al., 2006; Tallon et al., 2019) and “IS *development* agility” (Diegmann et al. 2018; Lyytinen & Rose, 2006; McAvoy et al. 2013). These streams explicate agility from two different perspectives: the former from an organizational context rooted in the application of IT, and the latter from a team-based IS project context, focusing for the most part on development methodologies (Baskerville & Pries-Heje, 2004; Sarker et al., 2009, Butler and Grey, 2006; McAvoy et al. 2013).

Despite the clear progress made on organizational and ISD agility, as already noted, the digital era calls for the inseparability of organizational and ISD project agility (Baiyere et al., 2020), and thus a rethinking of some of the basic assumptions that may have served us well in the past (see, for example, literature reviews by Diegmann et al., 2018; Tallon et al., 2019). Hence, our objective in this paper is to propose a theory of digital agility amenable to the dictates of the digital era.

We use the term *digital firm* to indicate a firm whose value offering comprises a significant digital or data-enabled component. In converging markets, digital firms comprise incumbent firms, whose value offerings have traditionally been nondigital but are now increasingly being complemented with digital components (e.g., Volvo, see Svahn et al., 2017). They also comprise born-digital companies (e.g., Spotify, see Baiyere et al., 2017) and digital startups, including firms offering two-sided digital platforms (e.g., Airbnb and Uber, see Mäntymäki et al., 2019) to promote digitally mediated merchandise for traditional markets.

We embark on the task of conceptualizing digital agility by building on prior research to establish an ontological starting point to question: *What is agility?* Our abstracted definition of agility from this effort highlights (1) emerging opportunities and threats in the external environment, creating a constrained or unfolding time frame, and (2) behaviors and structures that enable timely responses within such time frames. Based on this initial endeavor, we define digital agility as *the capability of a unit to capitalize on opportunities/threats induced by generative digital technologies under constrained or unfolding time frames*.

2 A Reflective Review of Prior Agility Research

2.1 What is Agility?

The concept of agility was first used in the general management and manufacturing literatures in the early 1990s (e.g., Goldman & Nagel, 1993; Goldman et al., 1995) and introduced with the argument that success in volatile industries requires companies to be agile—they need to be able to capitalize on or respond to the opportunities created by new market situations faster than their competitors. The idea of agility as an ongoing adaptation in fast-changing markets has been retained in subsequent definitions. Given the broad interest in the concept of organizational agility in IS research, it is not surprising that agility is defined in several ways. To promote comparison and theoretical conceptualization, we divide definitions into agility constructs in Table 1. For the actual definitions, please see Appendix A.

By reviewing Table 1 and the definitions in Table A1 in the Appendix, a synthesized definition of agility emerges and typically comprises four components: (1) *the unit that needs to be agile*, (2) *the external trigger that causes the constrained time frame and need to be agile*, (3) *the focal behaviors and structures that enable agility*, and (4) *an adverb that conveys the implications of the constrained time frame*. A characteristic feature of agility is that there is external pressure for a unit to be able to sense and respond within constrained time frames or even on a continuous basis. Agility then refers to the ability to make decisions or carry out tasks, such as IS development, supply chain management, or product development, in a manner that is somehow different from the “ordinary” way in order to meet the exigencies of a constrained or unfolding time frame. An externally constrained time frame appears to be the most important distinguishing factor, providing a distinctive meaning to agility that distinguishes it from other similar concepts.

Table 2 lists some examples of definitions for such similar variables as flexible, organic, and dynamic that IS research has deployed to characterize the ability to change. When comparing Tables 1 and 2, it appears that researchers who use the concept of agility (as opposed to flexibility, for example) emphasize the volatile environment, which implies the fast pace of unprecedented change. Words like “rapidly,” “swiftly,” and “quickly” are frequently used in defining agility, while definitions of other similar concepts (see Table 2) do not have a similar emphasis: i.e., time may be mentioned but only as one important goal among others and often without reference to external pressure.

Table 1. Definitions for Agility in IS and General Management Research

Source	Concept (to be defined)	Unit	Trigger (creating constrained time frame)	Behavior and structure (responding to time frame)	Qualifier (Adverb, action qualifier)
Goldman & Nagel (1993, p. 27)	Agile manufacturing enterprise	Manufacturing enterprise	Competitive advantage in an open market	Ability to develop and offer new products, modify product offerings	Quickly, continually
Breu et al. (2001, p. 21)	Agility	Organizations (multiple industries)	Unexpected change, unprecedented threats from the business environment, market changes	Organization-wide capability to respond rapidly to changes	Rapidly, flexibly, in order to survive
Sambamurthy et al. (2003, p. 237)	Agility	Contemporary firms	Intense rivalry, globalization, time-to-market pressures	Ability to detect and seize market opportunities	With speed and surprise, imperative to success
Lyytinen & Rose (2006, p. 183).	Agile ISD organization	ISD organization	Unexpected environmental changes, technical changes, and new business opportunities	IS development: ability to sense and respond; deliver IS	Swiftly, quickly
Holmqvist & Pessi (2006, abstract)	Agility	Manufacturing organization	Changing customer demands, unpredictable events	Ability to sense and respond	Rapidly
Overby et al. (2006, p. 121)	Enterprise agility	Enterprise	Environmental change	Ability to sense and respond	Readily
Doz & Kosonen (2008, p. 8)	Strategic agility	Technology firms	New technologies, business opportunities	Strategic sensitivity, collective commitments, resource redeployment	Real-time, ongoing, quick, fast and strong
Conboy (2009, p. 340)	Agile ISD method	Software firm	Perceived customer value (economy, quality, and simplicity)	ISD method to incorporate the ability to create, embrace and learn from change through collective components and relationships with the environment	Continual readiness, rapidly, inherently, proactively, reactively
Tiwana & Konsynski (2010, p. 290)	IT agility	IT function	Changing line function demands	Ability to adapt	Rapidly
Lu & Ramamurthy (2011, p. 933)	Market capitalizing agility	Firm	Changes in customers' needs.	Ability to respond to and capitalize on changes through monitoring and improving product/service	Quickly, continuously
Lu & Ramamurthy (2011, p. 933)	Operational adjustment agility	Firm	Market or demand changes.	Ability to adjust internal business processes	Physically and rapidly
Ngai et al. (2011, p. 232)	Supply chain agility	Organization	unexpected market changes	Ability to respond to and convert changes to business opportunities	[none]

Table 2. Examples of Concepts that Are Defined in a Similar Manner as Agility

Source	Closely related concepts in IS research	Difference to agility
Clark et al. (1997, p. 425)	Change readiness is the ability of an information systems organization to deliver strategic IT applications within short development cycle times by utilizing a highly skilled internal IS workforce.	No external pressure for constrained time frame (short cycle time)
Byrd & Turner (2001, p. 43)	Flexibility is defined as the degree to which an organization possesses a variety of actual and potential procedures, and the rapidity by which it can implement these procedures to increase the control capability of the management and improve the controllability of the organization over its environment.	No external pressure for constrained time frame (rapidity)
Goh et al. (2013)	Capability reconfiguration is defined as the capability of an organization to reconfigure its existing capabilities through substitution, evolution, and transformation in response to changes in the environment.	No constrained time frame for capability reconfiguration
Kim et al. (2011, p. 488)	Process-oriented dynamic capabilities (PDC) are defined as a firm's ability to change (e.g., improve, adapt, adjust, reconfigure, refresh, renew, etc.) a business process better than the competition.	No constrained time frame for business process change
Lee & Xia (2005, p. 77)	The capability-based perspective defines organizational flexibility as an organizational capability to respond to environmental changes.	No constrained time frame for responding to environmental change
Lee & Xia (2005, p. 77)	ISDP team flexibility is defined as the ISDP team's ability to effectively and efficiently respond to business and technology changes.	No constrained time frame for responding to business and technology changes
Butler & Grey (2006, p. 216)	A commitment to resilience refers to a tendency to cope with dangers and problems as they arise—through error detection and error containment—and exists in contrast to a commitment to anticipation, which focuses on planning.	Merely coping with dangers and problems, excluding the possibility to capitalize on external opportunities
Sia et al. (2008, p. 408)	Modifiability is the ability of an outsourcing relationship to allow alteration of attributes of its existing services in addressing changing business requirements, for example, new configuration setup, alteration of processing workflow or business rules, new reporting requirements, and reference data updates.	No constrained time frame for alteration of outsourced services
Gebauer & Lee (2008, p. 73)	Flexibility-to-change is conceptually related to information technology infrastructure and is measured by the effort that is required to change a given enterprise system after its initial implementation.	No constrained time frame for change in infrastructure and enterprise system
Ramesh et al. (2012, p. 325)	Contextual ambidexterity is the behavioral capacity to simultaneously pursue conflicting demands, such as the ability to demonstrate alignment and adaptability across a business unit.	No constrained time frame for adaptability across a business unit
Scherrer-Rathje & Boyle (2012, p. 87)	In the context of information systems, flexibility is understood as “the ability to adapt to both incremental and revolutionary changes in the business or business process with minimal penalty to current time, effort, cost, or performance” (Nelson & Ghods, 1998, p. 233).	No external pressure for constrained time frame (time being only one of the objectives)

In light of the above, we provide a generic conceptualization of agility as the capability [of a unit] to capitalize on emergent opportunities or avoid emergent threats under constrained or unfolding time frames. We choose the proactive term “capitalize on” rather than more reactive terminology such as “sense and respond.” The definition is intentionally left generic so that it can be applied to different units in different contexts and at different levels of analysis.

Two conditions should be identified at this stage: agility provides a potential conceptual lens for analysis when the purpose is to describe or prescribe actions in (1) an uncertain and emergent situation, and (2) situations in which the time frame for finding a response is limited. Our focus is primarily on organizational agility but the definition is not limited to an organizational context.

3 Conceptualization of Agility in Prior Research

3.1 General Conceptualization of Agility Behaviors and Structures

A key question arising from the use of agility as a concept concerns how can organizations or ISD teams become agile. How can they build the required capabilities for timely capitalization on opportunities and swift responses to threats? A synthesis of prior IS literature concerning agility over three decades highlights behaviors through which scholars have conceptualized how organizations seek to achieve agility. In our theoretical frame, we distinguish between managerial behaviors and employee behaviors that are triggered by external conditions that create a constrained time frame for capitalizing on opportunities and responding to threats. Managerial behavior refers to organization-level decisions and actions. Employee behavior refers to operative-level work that takes place, for example, in operational or development teams. As a third component, we identify structures that promote (or inhibit) the behavior of managers and employees who also possess the ability to change those structures. Structures generally refer to more permanent attributes of the organization, such as organization and technology structures, product structures, formal methods, process prescriptions, or even culture and identity (Figure 1).

The framework presented in Figure 1 assumes that agility may, on occasion, appear to be a result of swift or nimble actions by managers and employees who are able to sense and capitalize on opportunities and threats within a constrained time frame. However, such actions are taken in the structural context of the organization, which can either support or impede such “agile” behavior. This connection emphasizes the organizational capability nature of agility: somewhat permanent structural attributes of the organization partly explain agile behavior. In line with this, structures do not just exist—managers and employees have the potential to design and enact structures and thus provide a means for building a more long-lasting capability for the organization to deal with constrained time frames. In this sense, structures do not sense and respond, or capitalize on—human agency (on the part of managers and employees) is required.

In the following, we briefly review the evolution of theoretical thinking by distinguishing agile behaviors and structures in two industry contexts. We first look at evolution within traditional industries (offering traditional products and services), such as the high-tech industry, which has experienced volatile markets and has thus required organizational agility. We then look at the software industry (offering software products and services), with a particular focus on ISD agility, which enables capitalizing on continuous technological

advances and changing customer needs within constrained time frames.

Before proceeding, we should note that our purpose here is not to claim exhaustiveness in reviewing the literature; recent literature reviews are readily available (e.g., Diegmann et al., 2018; Hoda et al., 2017; Tallon et al., 2019). Rather, we undertake a reflective and interpretive review to identify how the conceptualization of the three generic agility enablers (management; structures; employees) has evolved, both at the organizational and ISD project levels. The purpose is to engage with related literature and reference disciplines that can sharpen our understanding of the agility concept beyond the inclusion criteria of a systematic literature review. For example, recent debates in the IS discipline have shed light on the importance of narrative reviews that emphasize dialogical interaction between the literature and the researcher, iterative reflection and questioning, critical assessment and imagination, as well as argument development and interpretation—which are all activities that prioritize intellectual development over the replicability focus of systematic reviews (Boell & Cecez-Kecmanovic, 2014; Boell & Cecez-Kecmanovic, 2015; Schultze, 2015).

3.2 Synthesis of Organizational Agility

During the early 1990s, researchers began to pay attention to the exceptionally short competitive time frames and volatile markets in high-tech industries (Brown & Eisenhardt, 1997; Christensen, 1997; Goldman & Nagel, 1993; Goldman et al., 1995; Sanchez & Mahoney, 1996; Schilling, 2000; Teece et al., 1997; Tushman and O’Reilly, 1998; Volberda, 1996). Labeled as volatile, high-velocity, hypercompetitive, sometimes even hostile, the market environments for many technology firms (e.g., in the US, Japan, and Europe) appeared to require different kinds of strategies and maneuvering (Brown & Eisenhardt, 1997; Goldman & Nagel, 1993; Goldman et al., 1995; Teece et al., 1997; Volberda, 1996), given that these market conditions were viewed as being significantly different from those of the industrial era.

The rapid increase in internet use expanded hypercompetitive markets and the time-to-market requirements from high-tech firms began to apply to many industries whose value offerings and competition were moving to the internet. So-called e-business provided an extensive array of digital options, creating challenges and market pressures for managers to deploy such options faster than the competition. This was a period during which the concept of agility permeated the information systems discipline, with regard to both the IT and organizational agility contexts (Breu et al., 2001; Overby et al., 2006; Sambamurthy et al., 2003). The concept of agility was adopted to examine the new role that IT could (and should) play in organizations—as a source of rapid deployment of digital options but also as a platform to more broadly promote organizational agility (Breu et al., 2001; Overby et al., 2006; Sambamurthy et al., 2003).

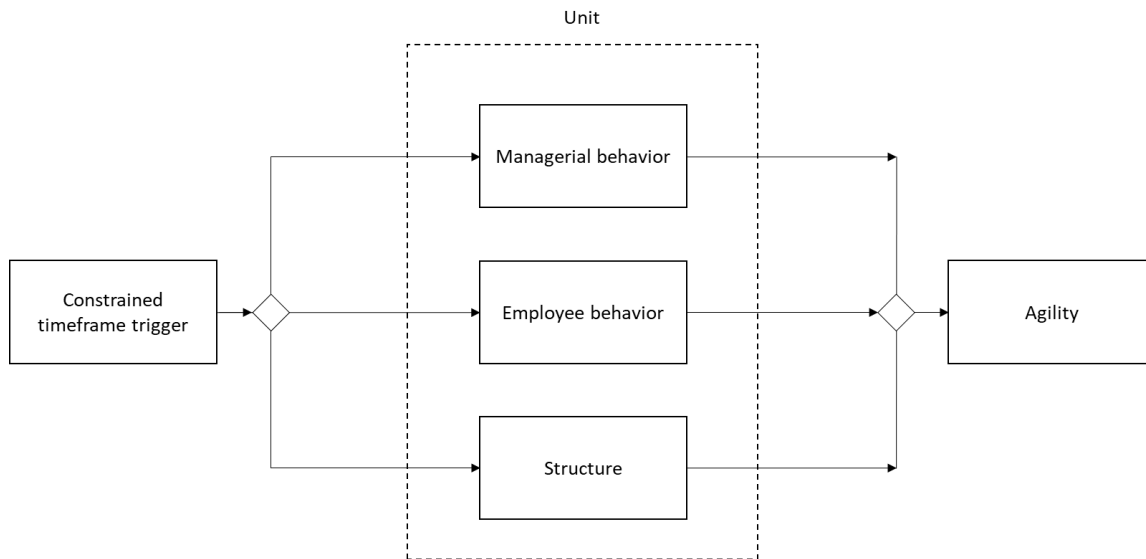


Figure 1. A Theoretical Framework for Agility

Figure 2 summarizes a number of the key conceptual developments to emerge, first in the organizational studies and strategic management literatures, which were then further elaborated on in the IT-enabled organizational agility stream. In strategic management, the concept of agility was first introduced in the context of high-technology manufacturing industries with the argument that success in these volatile industries requires a different set of capabilities than does success in stable manufacturing industries (Goldman & Nagel, 1993; Goldman et al., 1995; Vokurka & Flidner 1998). According to Goldman and Nagel (1993, p. 28), “agile manufacturing is accomplished by integrating three resources—technology, management, workforce—into a coordinated, independent system.”

Arguably the most significant concept emerging from studies addressing *managerial behavior* in volatile markets is dynamic capability (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2015; Teece et al. 1997). In volatile markets, the ability to cope with new situations concerns managers’ capability to integrate build, and reconfigure internal and external competencies to address rapidly changing environments (Helfat & Peteraf, 2015; Teece et al., 1997). Research on IT-enabled organizational agility adopted management as a central agility enabler: the core logic is that managers possess the strategic foresight for setting up an organization to be agile in the face of emergent changes (Galliers, 2007; Sambamurthy et al., 2003). In addition, recent developments in the (IS) management literature, such as in studies concerning “strategy-as-practice,” provide a means to engage employees and the knowledge they gain in routine activities (Galliers, 2007; Peppard et al. 2014).

The early work of Goldman et al. (1993) identified *employees* and their independence and creativity as a key asset of agile firms. Studies by Brown and Eisenhardt (1997) and Eisenhardt and Martin (2001), which focused on product innovation in high-velocity industries such as the computer industry at that time, observed a combination of limited structure (e.g., priorities, responsibilities) with extensive interaction and the freedom to facilitate the improvisation of current products. Subsequent IS research raised the capability of the IT workforce as an antecedent for workforce agility (Breu et al., 2001). Furthermore, the technical and behavioral capabilities of IT personnel were noted as one important antecedent in building flexible IT infrastructures (Fink & Neumann, 2007; Ngai et al., 2011). More recently, a literature review on IT-enabled organizational agility (Tallon et al., 2019) acknowledged the role of the capabilities of the workforce as a significant antecedent for organizational agility.

For designing *structures*, attention was directed to identifying design principles for organizational and technological structures that enable rather than prohibit managerial options for the speedy recombination of resources. For example, in product design, arguments were elaborated regarding a theory of modularity (Sanchez & Mahoney, 1996; Schilling, 2000). In general terms, modularity describes “the degree to which a system’s components can be separated and recombined, and it refers both to the tightness of coupling between components and the degree to which the ‘rules’ of the system architecture enable (or prohibit) the mixing and matching of components” (Schilling, 2000, p. 312).

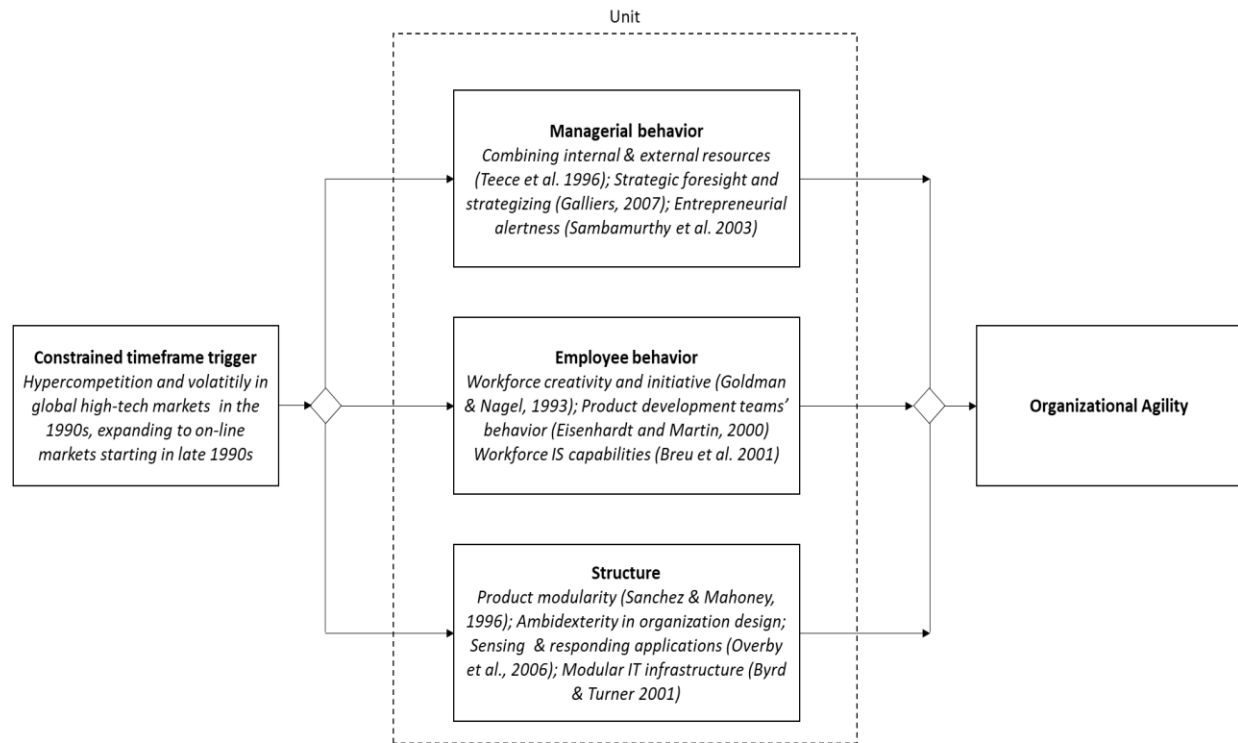


Figure 2. Key Agility Concepts Related to Organizational Agility in Traditional Firms

These principles were later adopted in designing flexible IT infrastructures that enable the capitalizing on opportunities and reacting to threats as they emerge (Byrd & Turner, 2001; Lu & Ramamurthy, 2011; Tiwana & Konsynski, 2010, Weill et al., 2002). Hypercompetitive markets were also seen as requiring new kinds of organizational structures (Volberda, 1996). Tushman and O'Reilly's (1998) concept of ambidexterity (cf. Duncan, 1976; Gupta et al., 2006) was then further conceptualized as "the synchronous pursuit of both exploration and exploitation via loosely coupled and differentiated subunits or individuals, each of which specializes in either exploration or exploitation" (Gupta et al., 2006, p. 693). In this sense, agility thus *emerges* from the astute exploitation of available resources (human and technological) alongside the informed exploration of potentially strategic opportunities. Thus, applications that support searching for and sharing new knowledge when sensing a new situation and responding appropriately can play a crucial role in improving agility (Overby et al., 2006; Rialti et al., 2018).

3.3 Synthesis of ISD Agility

For software firms, the expansion of internet use challenged the planning-oriented ISD paradigm that had been representative of mainstream ISD development practice in the late 1990s. Methods following the

traditional systems development life cycle appeared to be ill suited to deal with the large variety of design options made available by the internet (Baskerville & Pries-Heje, 2004; Cao et al., 2009; Conboy, 2009; Lyytinen & Rose, 2006; MacCormack et al., 2001; Sarker et al., 2009). More flexible methods characterized by the ability to respond to information for a longer segment of the development cycle appeared to be associated with better performance in internet-era software projects (MacCormack et al., 2001).

Many principles and foundations for agile ISD methods were already present in change-oriented ISD methods (as opposed to planning-oriented methods), such as iterative and incremental development (IID), prototyping, and the prototyping spiral model (Boehm, 1975; Boehm, 1988, Larman & Basili, 2003). The adoption of *agility*, used as an umbrella term, was largely driven by practitioners and consultants, first in the Agile Manifesto (Beck et al. 2001), and then as a broad concept for a number of change-oriented ISD methods, such as extreme programming, agile software development, and Scrum. Such methods appeared to provide readiness "to rapidly or inherently create change, proactively or reactively embrace change, and learn from change" (Conboy, 2009).

In light of this, research related to ISD agility has focused on agile methods as *structures* guiding the work of IS development teams (See Figure 3).

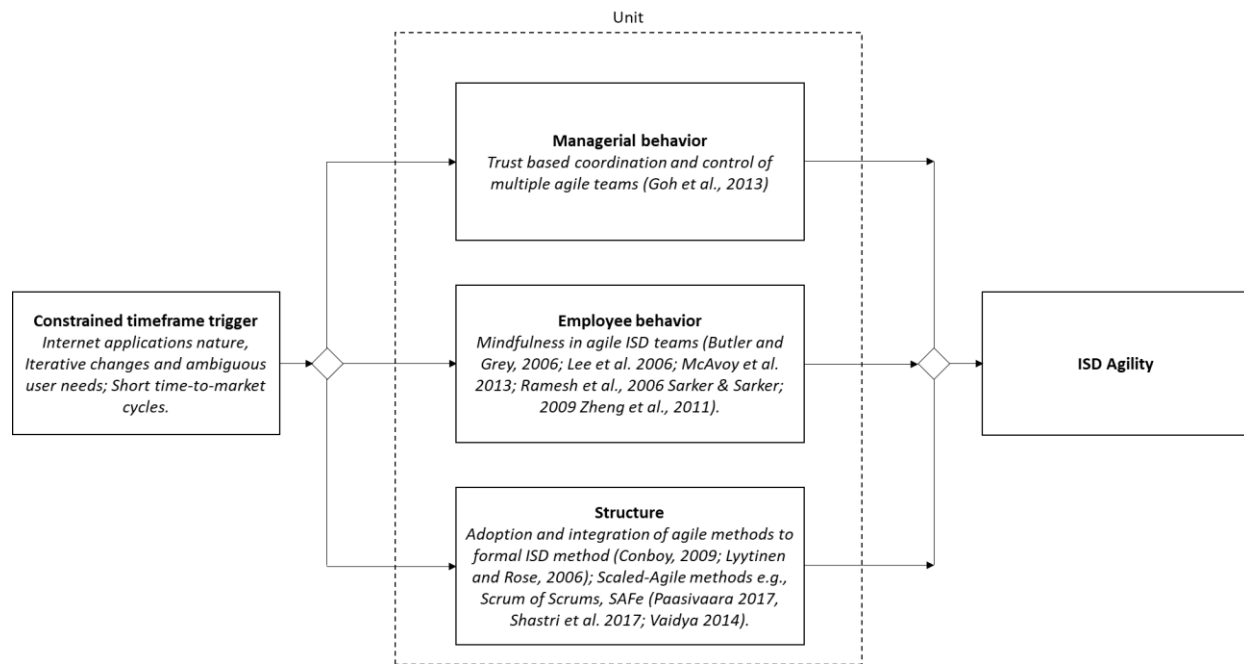


Figure 3. Key Agility Concepts Related to ISD Agility in Software Firms

Research has examined the advantages of agile methods and ways by which agile methods have been adopted in ISD practice (Baskerville & Pries-Heje, 2004; Cao et al., 2009; Sarker et al., 2009; MacCormack et al., 2001; Lyytinen & Rose, 2006; Wang et al., 2012), with a special emphasis on distributed ISD contexts (Lee et al., 2006; Ramesh et al., 2006). Conboy (2009), for example, would argue that having the right method is a necessary but insufficient condition for agility. This is so because the method rarely prescribes all actions but should rather be seen as an ideal that teams enact in specific development situations. Nevertheless, there is a strong assumption that the choice of a formal IS development method influences ISD agility.

Due to the nature of agile methods, *employee behavior* in ISD teams is seen as an equally important enabler of ISD agility. Given the earlier comment on the adoption of particular methods, *doing* agile is not the same as *being* agile—the actual agility of the ISD team to respond to changes (Conboy, 2009; McAvoy et al. 2013). Being agile is highly contingent upon the competencies and mindfulness of individuals and the quality of interaction within ISD teams (Butler and Grey, 2006; McAvoy et al., 2014). According to McAvoy et al. (2013), agility in IS development can build upon routinized action (only partly prescribed by the ISD method), in particular, if such routines “aim at providing opportunities to question expectations and behavioral routines and to evoke awareness context in interaction” (McAvoy et al., 2013, p. 498, quoting Jordan et al., 2009, p. 468). The collective nature of exploration in agile ISD teams is evident in many of the concepts that have surfaced in the literature, such as

organizational mindfulness (Swanson & Ramiller, 2004), collective mindfulness (Butler & Gray, 2006), and collective agility (Zheng et al., 2011).

Overall, the role of *managers* in ISD agility is somewhat different than in organizational agility because the origins of agile methods have been associated with “lean” methods, which are largely based on the idea of independent teams (Conboy, 2009). Managers do, however, play a critical role in agile adoption and transformation, thus creating structures that enable the software development team to act mindfully. Additionally, as the size of projects grows or the number of parallel projects increases, the need for managerial coordination and control becomes evident. Managers are also needed for scaling agility, i.e., to build an organizational environment and coordination and control mechanisms that support the use of agile methods and promote their adoption and use (Desouza, 2007; Goh, et al., 2013). Practices such as SCRUM of SCRUMS and SAFe also link project-level decisions to higher organizational levels, providing managers at higher organizational levels with the possibility of being directly involved in project-level decisions and thus promoting agility in projects (Kniberg & Ivarsson, 2012; Paasivaara, 2017; Vaidya, 2014).

4 Reconceptualizing Agility for Digital Firms

Digital firms combine features of traditional and software firms. In this section, we reexamine the conceptualization of agility with the aim of making it

more relevant to the realities of digital firms. We proceed with our conceptual development in four ways. First, we explicate the need for agility in converging markets, drawing on the concepts of generative technologies and the fluidity of organizational boundaries to illustrate external pressures for agility. Second, we abstract a definition of digital agility from the generic definition of agility synthesized from prior literature. Third, we draw from the literature on digital firms to synthesize managerial behaviors, employee behaviors, and structures that influence digital agility. Fourth, closely building on findings from the literature, we present an integrative theoretical framework and four propositions regarding the interplay of managerial and employee behaviors and enabling structures. In all four points, we draw on illustrative empirical studies from prior research describing digital firms to provide a vivid unpacking of our theorizing.

4.1 The Need for Agility in Digital Firms

We present a brief analysis of the emerging literature on converging markets to highlight some of their most salient characteristics that call for the rethinking of prior perspectives concerning agility. We explain three key trends that give salience to the digital era as an emerging agility context: *competition in converging markets*, the strategic significance of *generative digital technologies*, and *fluid organizational boundaries*. While none of these trends is individually new, the combined and mutually reinforcing effect of these three trends—the nature of competition in converging markets, continuous exploration related to offerings of generative technologies, and increasing collaboration in developing digital offerings—creates a unique context with constrained time frames.

Competition in converging markets refers to situations where the adoption of digital innovations leads to the convergence of previously discrete markets, leading incumbent firms to confront a new market environment with new competitors (Seo, 2017, Vial, 2019). A characteristic feature of converging markets is that organizations from different industries compete against each other with different resources and operate under different regulations and rules (Seo, 2017). To provide an example: for Volvo (Svahn et al., 2017), the converging digital market is related to the need to rethink its core value offering—cars—based on the observation that digital technologies and software are becoming more important than the mechanical parts and perhaps even the car design. This has led all car manufacturers, not just Volvo, into a competitive situation not only with other car manufacturers such as Tesla but potentially also with firms in a strong position to offer digital consumer services, such as Apple, Google, and Amazon. Because of such competition, the time frame to capitalize on emerging digital opportunities and threats is being perceived as constrained.

Additional external pressure for agility in converging digital markets lies in the disruptive consequence that the *generative nature of digital era technologies* can pose, as well as the value-creating opportunities that it can create (Baiyere & Hukal, 2020, Baiyere & Salmela, 2015, Utesheva et al., 2018, Sebastian et al., 2017). In particular, as organizations begin to embrace digital offerings in their value propositions and product portfolios, there is an increasing realization that the prior logic of traditional product development does not necessarily transfer to the development of digital offerings (Baiyere et al., 2020). This creates a challenge for incumbent firms, in particular (Zimmer et al., 2020), whose traditional product development methods and culture (methods, team competencies) may be ill suited toward dealing with generative technologies requiring constant and rapid exploration and experimentation (Kniberg & Iverson, 2016).

As an illustrative example of the inclusion of generative technologies in product development, we turn to the case of LeadTech, a manufacturing technology supplier. LeadTech was operating in an industry dominated by machinery manufacturers in which it was clear that software companies would soon be entering with their digital services, representing the threat of converging markets. A key event in this respect was a competitive bidding process in which LeadTech lost a major contract to a software company. LeadTech's initial perception of a threat posed by new market entrants was turned into an opportunity that would trigger a digital transformation project. The company reorganized itself to enhance the digital components of its existing devices and launched a new digital platform connecting data from customer devices and data from its internal ERP systems. Capitalizing on the generativity of the platform and the associated new digital technologies would require exploration of customers' needs and experiments with new technology. This was, however, at odds with the old product development culture and practices, leading to problems in obtaining the necessary in-house resources to support the data-driven service development projects.

Fluid organizational boundaries refer to the collaborative efforts of companies to capitalize on emerging opportunities from new digital technologies. Increasing reliance on external resources is evident in the emergence and high significance of digital platforms and platform ecosystems (Vial, 2019; Baskerville et al., 2020). As an illustrative example, in digital platform ecosystems, the platform provider assumes a central role in providing a complex digital information infrastructure, while partner organizations or consumers create content or value-adding services. Some platform ecosystems—such as Facebook, YouTube, and Spotify—produce services primarily based on digital objects, while others, such as Uber and

AirBnB, orchestrate the mobilization of physical objects (Baskerville et al., 2020). This approach appears to be highly effective in converging digital markets but it also leads to a platform ecosystem with complex interrelations between the platform provider, complementary organizations, and consumers (Karimi and Walters 2017; Vial 2019; Baskerville et al. 2020). These concepts depart from the assumption that a firm's external resources are merely a "good" that is procured to fulfill a temporary or nonessential need more cheaply than could be provided internally. Instead, they underline the point that in the digital era, external resources may indeed be part and parcel of the firm's strategic capability. If properly nourished and managed, they can grow into resources aligned with the firm despite being located outside its boundaries. Such a mindset has greatly expanded managerial horizons and collapsed previously held beliefs about the rigidity of organizational boundaries.

4.2 Defining Digital Agility

Abstracting from our generic definition of agility, we define digital agility as the capability of a unit to capitalize on opportunities/threats induced by generative digital technologies under constrained or unfolding time frames. First, it is important to note that (1) digital agility, as defined, can be repurposed at the organizational, individual, society, or even industry level, depending on the unit in focus. It is also important to note that (2) our definition considers digital technology to be the basis of either the threat or the opportunity. For example, if the unit is society and we take the case of the COVID-19 pandemic as the threat, then digital technology was not the source of the threat but digital technology was an important aspect of the opportunity leveraged to respond rapidly. In this case, digital agility refers to the capability of society to capitalize on digital technology as an opportunity. Finally, we note that (3) digital agility is not binary—a have or have not—but a gradient along a spectrum of low to high.

What we develop in this paper can be considered to be a theory of *organizational digital agility* since the boundary of our subsequent theorizing takes the organization as the unit in focus. When compared to the generic definition, the unit in our theorizing is replaced with "organization," the highest unit that is agile in digital agility in terms of the prior views of ISD and organizational agility. However, as discussed above, organizational agility is dependent on agility at the suborganizational levels, such as the team level. For example, in the digital transformation study of LeadTech (Baiyere et al., 2020), the digital business unit was focal in achieving digital agility. Likewise, for Volvo (Svahn et al., 2017), the transformation challenge was at the organizational level but the agility of the digital car development units and teams was critical to achieving agility.

Furthermore, our conceptualization of digital agility attributes the emergence of threats and opportunities to digital technology. "Digital technology" in the definition presumes the generative potential of digital technologies. These technologies present themselves as a double-edged sword—that is, as a vista of opportunities and a source of threats (cf. Ross et al., 2019, Bharadwaj et al., 2013). This implies that digital agility reflects the need to continuously capitalize on the opportunities as they emerge while simultaneously navigating the disruptive threat they can represent. As Bogers et al. (2018, p. 8) put it, "there is uncertainty as to which emerging disruptive technologies we should publicly encourage ... This uncertainty is not new, but it has never been so intense."

The definition is intentionally left generic. When applied to the organizational contexts addressed in this study, the definition identifies the agility context through two central aspects: digital technology causing emergent opportunities for firms in developing their offering, and constrained competitive time frames referring to short time frames in developing value offerings for converging digital markets. We do, however, recognize that other types of organizational contexts in the digital era may involve similar pressures for the exploration of digital technologies within constrained time frames, thus making them suitable for being analyzed through a digital agility lens.

4.3 Conceptualizing Digital Agility: Agile Behaviors and Structures in Digital Firms

In this paper, we posit that organizational digital agility does not result from independent enablers but rather results from the interaction between the enablers and their capacity to reinforce each other—hence, our proposal is a shift toward an *integrative view*. Before engaging in theorizing the interaction between enablers, a refinement of the three main enablers is required. Digital firms are, in many ways, different from organizations that were studied in the 1990s and early 2000s. Also, the two streams of research (organizational and ISD agility) have produced partly incompatible concepts. Hence, while keeping lessons from organizational agility and ISD agility in mind, we use them as our conceptual starting point.

Our refined view of the three enablers thus aims primarily at emphasizing the behavioral and structural enablers that deserve special attention in digital agility, considering the realities in digital firms and converging markets. The refined agility enablers also illustrate a shift toward the integrative view, as they open up interconnections with other enablers, thus questioning the potency of any single enabler alone to be sufficient for agility. Figure 4 presents a basic conceptualization of agility in digital firms, based on an adaptation of traditional agility enablers, while also showing the limitation (gray dotted arrows) of the independent and siloed focus on individual enablers in achieving digital agility.

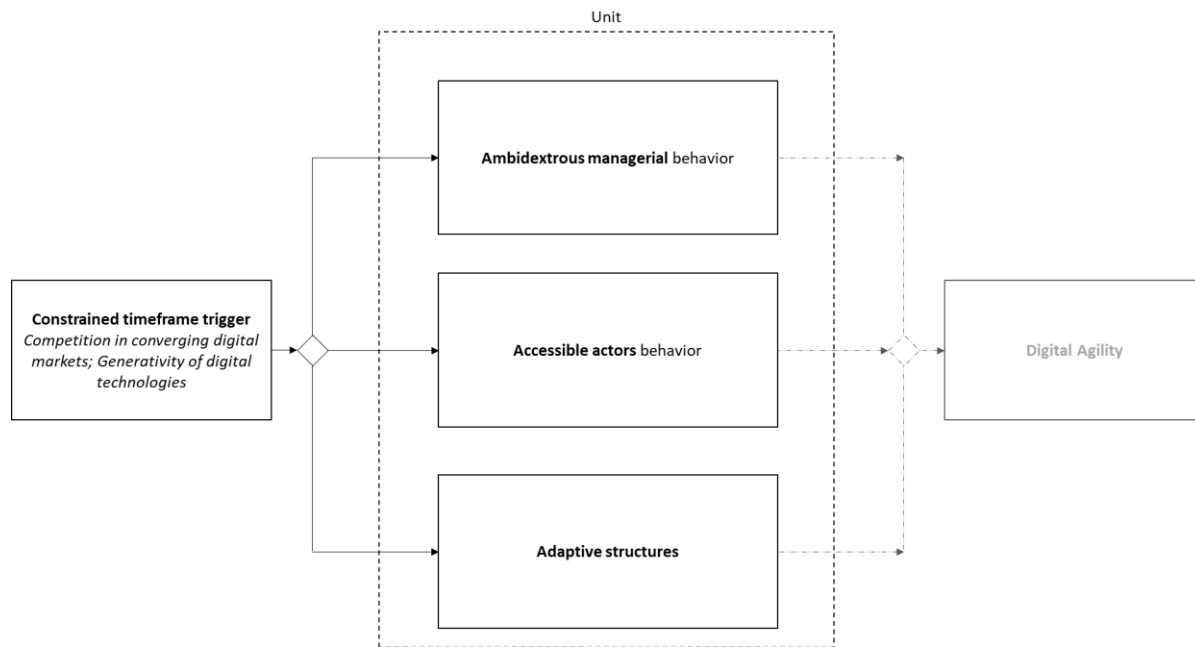


Figure 4. Framework for Analyzing Agility in Digital Firms

4.3.1 Ambidextrous Managerial Behavior

As noted earlier, in the digital era, a critical *enabler* of agility is the ability of management to *exploit* existing knowledge and resources—inter alia, human and technological—to sustain existing business operations, while simultaneously assigning internal and external resources for development teams to *explore* new knowledge and opportunities related to the deployment of digital technologies (cf. Galliers, 2011). Thus, as we conceive of it in this paper, managerial ability represents an agility enabler that captures the capacity of an organization’s management to perpetually explore and exploit (Tushman and O’Reilly, 1998). This implies the need to exercise foresight and strategizing to recognize emerging opportunities and threats in digital converging markets, while simultaneously maintaining stability in the established operations of the organization. Such strategizing will most likely involve not only the management team itself but also middle managers and internal and external specialists, including lawyers and investment bankers as needed (Galliers, 2007; Whittington, 2003).

This challenge, one that emerges in digital transformation studies (Baiyere et al. 2020, Wessel et al. 2021), is not new but is in line with the original conceptualization of dynamic capabilities in the 1990s (Teece et al., 1997). Indeed, ambidexterity was first conceptualized in the 1970s, building upon innovation research contrasting mechanistic and organic firms in the 1960s (Duncan, 1976). However, in digital agility specifically, ambidextrous management is a necessity rather than an option for the reasons outlined earlier.

For executive-level managers, the key concern is how to organize and assign resources for digital development projects, given the fact that such projects may require completely new knowledge, as well as prior knowledge and resources from existing business. Likewise, for managers responsible for such digital development projects, an important requirement is to acquire sufficient knowledge from the “old organization,” including employees and external parties. Separating organizational agility from agility in projects concerning the creation of digital offerings can become problematic in the digital era because paying attention to one at the expense of the other can result in chaos or missed opportunities. Hence, success is likely to depend on strategizing between these two sets of managers—executive managers and digital development project managers.

In both the Volvo and LeadTech cases, managers’ capability to seek a balanced approach appears to form a critical agility enabler that requires them to engage internal and external groups in the strategizing process. In LeadTech, managers chose to build a separate digital business unit responsible for developing new digital services and engaging in the further development of the digital component of the physical product. However, the new unit and its projects related to developing the data analytics-based digital offering were dependent on existing resources. In Volvo, the app development group became focal in developing new cloud-based services but it found itself having to resolve arising conflicts among the traditional applications produced by suppliers and those produced by new external partners. These conflicts became

evident, for example, in the type of contracts that needed to be negotiated with these new partners. The existing contracts had been drafted with the traditional supplier logic in mind, but the new logic demanded a co-creation mindset. Another illustrative example can be found in a case study in the newspaper industry by Utesheva et al. (2016), where a separate team was assigned to create and innovate digital online services. As online services gradually started to replace the traditional newspaper, the company deliberately combined employees with knowledge of the traditional offering (newspaper) and those with knowledge of the digital offering (online services) to further develop both.

4.3.2 Accessible Actors' Behavior

In a context where organizations can no longer rely only on their internal know-how and expertise, it becomes important that organizations are able to access the expertise and capabilities of external actors outside their traditional boundaries. As Marchjzack and Malhotra (2020) and Lakhani (2016) argue, these actors are not employees to be directed but external actors that need to be accessed and collaboratively engaged in order to contribute to the goals of the organization. This is evident in fairly recent trends that are increasingly defining the digital era, such as open innovation (Chesborough & Bogers, 2014), open strategy (Hautz et al., 2017), crowdsourcing (Marjczak & Malhotra, 2020), and platformization (Parker et al., 2016). This is not to undermine the importance of employees as enablers of agility—they still play a pivotal role. Rather, our conceptualization draws attention to the value of considering other actors beyond the organizational boundary able to assist in attaining digital agility. As Majchrzak and Malhotra (2020) note, groups of people who spend only minutes of their time on a topic can generate innovative and useful solutions when galvanized into action, despite having little in common with each other and receiving minimal financial incentives. Thus, accessible actors as enablers of digital agility provide organizations with additional opportunities for maneuvers that would not exist by relying solely on employees.

In the case of Volvo, management initiatives (including Volvo Cars Challenge and Volvo Idea Hub) were used to engage with external stakeholders. Volvo used network-based platforms called Volvo Idea Hub and Volvo Cars Challenge to garner inputs from external stakeholders. These initiatives were aimed at involving two of the most important external stakeholders—customers and industry actors—in new product and service ideation. In the case of LeadTech, the company recognized that although it had developed strong expertise in its traditional manufacturing industry, creating digital offerings was not its forte. Although the company had a team of software developers in-house, the company opted for hackathons, engagement with university collaborations, and an

extensive co-creation initiative to engage customers as part of both defining their digital value propositions and creating their digital offerings.

4.3.3 Adaptive Structures

While still relevant and useful, given the nature of competition in converging digital markets, and fluid organizational boundaries (Vial, 2019; Baskerville et al., 2020), a static structure—for example, the Scrum method, a particular organizational structure, or a specific technological application or infrastructure—is not a panacea for agility. Rather than arguing for a specified structure to be the formula by which agility may be achieved, we propose adaptive structures as an agility enabler, suggesting rather that structures should not be presented as final destinations but as something that should evolve and adapt as new change scenarios confront them. The notion of adaptive structures presents a view in which structures are not seen as end states but as instruments for attaining agility in contexts characterized by constant change; adaptiveness reflects the capacity for structures to be morphable along with the changes they confront. This idea of adaptive structures is not new, as companies and industries have often been seen changing between more rigid structures, enabling efficiency in the era of stability, and providing more fluid structures in the era of transformation and temporary periods of hypercompetition in markets (Utesheva et al., 2016; Volberda, 1996).

Adaptive structures also emphasize collaboration with external partners who are equally involved in co-creating digital offerings. The ability of a single organization to control—for example, the design of development methods, supportive information infrastructure, or organizational arrangements to support digital offering development teams—is bound to be more limited. In the digital era, structures can exist outside the immediate organization, offered as a digital service or platform, in the form of innovation services, hackathons, or crowdsourcing. The structures of digital platform ecosystems may become a more significant agility enabler, compared to those existing within the organization. Nevertheless, the ability to deploy and adapt structures as needed can be just as important for enabling digital agility as the design of internal structures.

The case of Spotify (Kniberg & Ivarsson, 2012) provides a vivid illustration of how a company adopted and adapted Scrum beyond its original specification in order to be able to contend with the hypercompetitive market landscape, the constant flux of digital technology opportunities, and the emerging startups constantly threatening their business. Spotify adopted an agile mindset but did not enforce a specific agile method to accommodate the various nuances that characterize the operational context of each unit. This led to a situation where different units deployed

various agile methods such as Scrum and Kanban, leveraging what they refer to as agile coaches to transfer knowledge between the units to reflect contextual shifts (Baiyere et al., 2017).

5 An Integrative Theory of Digital Agility

The reason for proposing an integrative framework is twofold and relies both on contextual considerations related to digital firms as well as theoretical considerations. In digital converging markets, close interaction between ambidextrous management, accessible actors, and adaptive structures may be more important for agility than for excelling in only one enabler. This is likely true in traditional firm contexts as well as software firms. After all, as defined in the original work by Goldman and Nagel (1993), agility is accomplished by *integrating* three resources—technology, management, and workforce—into a coordinated, independent system. However, in digital firms, the ability to create an integrated whole of ambidextrous managerial behaviors, accessible actor behaviors, and the design of adaptive structures becomes increasingly significant.

Digital agility, as we conceptualize it, is not achieved by meticulous attention to one component in isolation from the other enablers. For example, it would be difficult for firms to drive digital agility by solely focusing on ambidextrous management behavior in strategizing while relegating the design of adaptive structures or accessible actors to the background. Similarly, a sole focus on the operational outlook of accessible actors can be likewise problematic—for example, can agile actors do “whatever they like adaptively” in designing and delivering value offerings, without any managerial interaction or strategic direction?

With this premise, we build further on the acknowledged interactions presented in the prior arguments to articulate three mechanisms that relate to the three digital agility enablers (Figure 5). In overview, our message thus far is that the characteristics of the digital era (i.e., the generativity of digital technology, fluid organizational boundaries, and converging markets) challenge the three enablers of agility (i.e., managerial, employee and structure) needed to succeed in the digital era. Instead, the digital era requires attention to digital agility enablers (i.e., ambidextrous management, adaptive structures, and accessible actors). To obtain digital agility, we theorize three *mechanisms* that digital firms must engage in that lie in the interaction between the enablers. These mechanisms capture the interactions between the enablers and form the premise of the integrative theory of agility that we propose.

5.1 Open Engagement: Proposition on the Interaction Between Managers and Actors

The interaction between accessible actors and ambidextrous management captures the mechanism for a collaborative engagement that enables actors to swiftly capitalize on emergent opportunities and threats at a strategic or operational level, as appropriate. Specifically, we draw on Chesborough and Bogers (2014) to describe open engagement as a distributed governance process based on purposively managed action that flows across organizational boundaries. In this sense, open engagement captures the adaptive bundle of practices that enable internal and external actors across organizational boundaries to leverage their capabilities in responding to evolving contingencies (Hautz et al., 2017) emerging from their digital context. This is particularly pertinent in situations where prompt action could be decisive in determining whether an opportunity is leveraged or lost or whether a potential disruption is averted or not. Hence, we propose that:

P1: The open engagement of managers and accessible actors improves digital agility

This mechanism suggests bidirectionality, which implies that agility does not stem merely from managers giving instructions while other actors are procedural agents executing these instructions. Rather, agility stems from the input of actors on both sides (accessible actors and ambidextrous management), jointly co-shaping how the organization capitalizes on emerging opportunities and threats. Consistent with Nambisan et al. (2018), the notion of open engagement constitutes a mechanism for gaining speed, sourcing ideas and opportunities, diffusing risks, navigating threats, and exploiting digital innovations more rapidly. Future research focusing on open engagement could additionally build upon the theoretical work surrounding strategizing and strategy-as-practice (Whittington, 2006, Peppard et al., 2014), for example, to examine the trust-based organizational control processes of the agile teams developing the digital offering (cf. Goh et al., 2013).

While open engagement that simultaneously aims for a change in management (toward ambidexterity) and employee (toward accessible actors) behavior would appear to be difficult, published cases often describe this as being central to agility. For example, Fuerstenau et al. (2019) show how OTTO practiced open engagement in its transformation from a catalog order retail business to become the leading e-commerce platform in Germany. In this case, OTTO remained one of a handful of retail stores that survived the competition of the converging market introduced by Amazon and other such e-commerce startups.

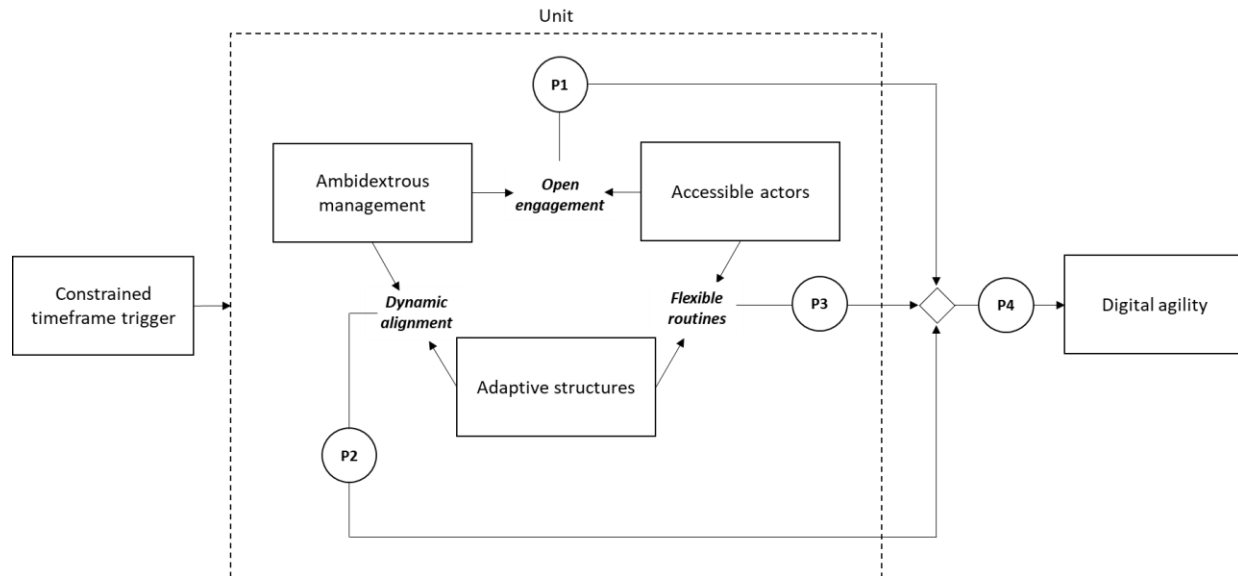


Figure 5. An Integrative Framework of Digital Agility

The ability to capitalize on the opportunities of digital technology in responding to such emerging threats as these required intricate open engagement with the open-source community to develop the company's current e-commerce platform—one that enabled it to not only survive but thrive as a digital marketplace. The challenge here is that OTTO's competence and workforce were traditionally oriented toward a catalog retail store. Yet, the competence it required to become a leading digital marketplace was readily available outside the boundaries of the organization. The interaction between the ambidextrous management enabler and the accessible actor enabler provided open engagement as the nexus for agility in this case.

5.2 Dynamic Alignment: Proposition on the Interaction Between Managers and Structures

Dynamic alignment captures the mechanism via which management modifies adaptive structures to be swiftly adjustable to accommodate the strategic and structural changes (Karpovsky & Galliers, 2014) needed to capitalize on emergent opportunities and threats. The dynamic capability view has provided a sound theoretical foundation for studying this relation, and many studies, in particular in relation to IT-enabled organizational agility, refer to dynamic capabilities as their theoretical foundation. As illustrated in Figure 5, dynamic alignment represents the interaction between the management and structure enablers of agility in a digital context. This conception draws parallels with the ability to sense and seize in the theory of dynamic capabilities (Eisenhardt & Martin, 2000; Helfat & Peteraf, 2015; Teece et al. 1997), with the addition that

the alignment between strategic objectives and structural affordance needs to occur within a constrained time frame in order to be effective.

In essence, dynamic alignment reflects the fit between managers and structure as agility enablers that interact to allow an organization or unit to take advantage of opportunities or navigate threats in a timely manner (Weill et al., 2002). The idea of dynamism in alignment stems from the need to continually strive to adapt (Brown & Eisenhardt, 1997; Eisenhardt & Martin, 2000), while that of alignment per se stems from the need to restore a form of equilibrium or fit between the praxis of ambidextrous management and an adaptive structure each time either of the two shifts to accommodate an emergent need for change. The dynamic capability view offers an established theoretical basis for examining dynamic alignment (Teece et al. 1997), but the dynamic alignment proposed here as an agility enabler emphasizes the interaction between both the design of structures and managerial decisions to promote ambidexterity in dealing with emerging opportunities and constrained time frames. Hence, we propose that:

P2: Dynamic alignment (i.e., the ability of managers to adapt to changing structures and vice versa) improves digital agility.

While dynamic alignment aimed at simultaneous change in management (toward ambidexterity) and structures (toward adaptiveness), is not without its challenges, published cases often describe this as being central to agility. For example, LeadTech is inherently a case of dynamic alignment, where managers established a separate unit to take the lead in digital development teams. The structures, technology, and

culture of the new unit were purposefully designed to be adaptive. This also led to a change in management toward being more ambidextrous. The aim here was to keep the old units as they were; however, this did not go as planned. Traditional business process structures were upended and replaced by adaptive structures in order to cope with the flux of changes that was increasingly characteristic of their context. The case indicates that dynamic alignment can be challenging—and yet also very critical for agility.

5.3 Flexible Routines: Proposition on the Interaction Between Actors and Structures

The relationship between actors and structures captures the mechanisms for enabling structural and behavioral practices in order to quickly evolve in accordance with new and emergent situations. Focusing on the interaction between structures and actor behavior rather than separating them can open up new opportunities for a large number of organizational theories, such as the theory of routines (Feldman & Pentland, 2003; Orlikowski, 1996), to explain how actors can deviate from historical patterns and thus gain the ability to improvise and adjust their work routines as required by the situation at hand (Zimmer et al. 2020). Such flexibility suggests a propensity and readiness to adjust in order to respond to or capitalize on ever-changing situations—be it an opportunity or a threat within the time constraint necessary for action. Flexible routines also capture the agency of actors to interact within adaptive structures (Sarker & Sarker, 2009) in shifting contexts such that even activities that are considered regular or recurring allow for accommodating deviations.

Sensitivity to the opportunities of a volatile environment is achieved through the appropriate interaction of structures and actors that promote bricolage at the lower levels of the organization (Eisenhardt & Martin, 2000; Levi-Strauss, 1966; Weick & Sutcliffe, 2006). Such interactions should provide flexibility so that actors can focus their attention and be confident enough to act in highly uncertain situations (Eisenhardt & Martin, 2000 p. 1112). Flexible routines align with Conboy's (2009) articulation of agility as the readiness to rapidly create, embrace, and learn from change.

P3: Flexible routines (i.e., the ability of actors to capitalize on and enact adaptive structures) improve digital agility

Many theories already exist and the idea of interaction between structures and behavior is well established in the literature. However, the idea within flexible routines that both internal and external actors jointly develop structures and keep structures simple, modular, and adaptive is complicated. Yet published

cases illustrate this “bricolage” quite consistently. For example, the Spotify case (Kniberg & Ivarsson, 2012) provides an illuminating account of flexible routines that demonstrates the value of the interaction between adaptive structures and accessible actors. Indeed, Kniberg and Ivarsson (2012) captured this with a matrix contrasting autonomy and alignment, where autonomy emphasizes the allowance for organizational units to decide on the best pathway to achieve the objectives and targets set before them. However, alignment ensures that despite the freedom to decide on the chosen approach, there is a clear compass that ensures that the end objectives align with the big-picture mission of the organization.

5.4 The Integrative View: Toward a Proposition Channeling the Interactions

Focusing on each individual interaction may make it appear as though the interactions are independent and isolated from each other. However, by definition, to attain one interaction, other interactions are also necessary. For example, an organization claiming to possess the open engagement interaction would need to also have both ambidextrous management and accessible actor enablers. Yet having an ambidextrous management ability implies that the organization also has a certain view toward external actors and that it is able to put adaptive structures in place to enable the bridge between the changes necessary to accommodate these externally accessible actors. This implies that striving toward one interaction necessitates other interactions. This can be visualized as a yo-yo where every tug on one part of the string affects other parts of the ensemble.

We note, however, that the extent or degree of any interaction within the ensemble is dependent on the specific context. In line with the third part of our definition of digital agility (see Section 4.2), digital agility is not a binary but a spectrum—the implication being that although the three interactions are required for digital agility there may be different levels in the degree to which an organization excels at each interaction. Yet, each interaction needs to be duly represented, as digital agility lies in channeling the interactions between the enablers. Thus, we propose:

P4: The ensemble of open engagement, flexible routines, and dynamic alignment leads to digital agility.

6 Conclusions

This paper directs attention to a new organizational context emerging in the digital era—one in which an organization's agility can no longer be easily separated from its agility in developing its digital offerings. Our search for explanations of agility in this context is based on the premise that such organizational arrangements are becoming increasingly common in the digital era, as

firms in many traditional industries integrate digital technologies with their products and services to improve the value offering. Our contributions in explaining agility in this new context are threefold.

First, we provide a reflective review of the concept of agility and use this to advance both a generic definition of agility and a more specific definition for digital agility. The first contribution in this regard is the synthesis of agility definitions and identifying the generic structure used in these definitions. In particular, we abstracted “constrained time frame” from these definitions as a distinctive component of agility that distinguishes it from other related concepts in the IS and general management literatures. This provides a conceptual clarification of the term and offers a foundational frame on which we build our theorizing of digital agility. It also provides the foundation to clarify the relationship of agility to closely related concepts such as flexibility, dynamic capabilities, and mindfulness, which could be an asset as a scientific concept within the IS discipline and beyond.

Second, we build upon the three dominant enablers of agility identified in prior literature (i.e., managers, employees, and structure) which we further reconceptualize for the digital era (i.e., *ambidextrous* management, *accessible* actors, and *adaptive* structures). This theoretical grounding provides a conceptualization that caters to the culmination of ISD and organizational agility research in studying agility in the digital era. The proposed enablers are more broadly pertinent to organizations in industries that are experiencing profound changes due to the digitalization of their value offerings. Overall, the conceptualization of agility enablers for the digital era provides a foundation for future studies to position work within agility depending on the theoretical goals or particular empirical contexts.

Third, we develop and outline the implications of an integrative theoretical framework of agility for the digital era. Specifically, we propose considering the interaction between the enablers, thereby shifting the analytical focus from enablers to the mechanisms

underlying the interactions between the enablers. Consequently, we articulate *open engagement*, *flexible routines*, and *dynamic alignment* as an alternative theoretical apparatus for both the practical and scholarly utility of digital agility. By doing so, this paper provides researchers with a theoretical view of agility that integrates prior enablers and arguments that underpin the concept while at the same time being cognizant of the contextual shifts that characterize the digital era. The integrative theoretical framework and the advanced propositions provide conceptual toolkits that can be leveraged in advancing future scholarship in this area.

A theoretical framework concerning agility for the digital era is of benefit to researchers and managers alike. For researchers, its contribution is to provide a novel theoretical lens for studying digital agility in an organized, comprehensive, parsimonious, and meaningful manner that accounts for the convergence of industries and the generative, pervasive nature of digital technologies in today’s business environments. Future studies can draw on this theoretical premise in building a cumulative collection of findings about the antecedents and value of digital agility. Furthermore, since we have focused on the organizational level in our theorizing, this leaves ample room for future research to theorize digital agility at the individual, societal, and industrial levels. For practitioners, the components of the integrative theoretical framework provide a means to reconsider how to leverage agility at an organizational and project level. In addition, the paper provides a framework that aims to help in reconciling strategic and operational agility initiatives.

Agility is an important challenge for researchers and practitioners alike. Much is already known about agility but much more remains to be learned in these new contexts that characterize the digital age. The theoretical framework proposed herein can serve as an impetus to researchers and practitioners seeking to understand and practice agility better given the changed and changing realities of the digital era.

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Appendix A

Table A1. Definitions of Agility

Source	Definitions of agility
Goldman & Nagel, 1993, p. 27.	The <i>agile manufacturing enterprise</i> confers decisive competitive advantage in an open market because it is able to bring out totally new products quickly. It assimilates field experience and technological innovations easily, continually modifying its product offerings to incorporate them.
Breu et al., 2001, p.21	<i>Agility</i> is defined as an organization-wide capability to respond rapidly to market changes and to cope flexibly with unexpected change in order to survive unprecedented threats from the business environment.
Sambamurthy et al., 2003, p. 237	As contemporary firms face intense rivalry, globalization, and time-to-market pressures, <i>agility</i> —or the ability to detect and seize market opportunities with speed and surprise—is considered to be an imperative for success.
Lyytinen & Rose, 2006, p. 183.	In the context of information system development (ISD), <i>agility</i> can be defined as an ISD organization's ability to sense and respond swiftly to technical changes and new business opportunities.
Lyytinen & Rose, 2006, p. 183.	An <i>agile ISD organization</i> , one that develops and maintains information system[s] (IS), has the capability to sense and respond to unexpected environmental changes and to hone these skills to quickly deliver IS.
Holmqvist & Pessi, 2006 (abstract)	<i>Agility</i> relates to an organization's ability to sense and respond rapidly to unpredictable events in order to satisfy changing customer demands.
Overby et al., 2006, p. 121	<i>Enterprise agility</i> is defined as the ability of firms to sense environmental change and respond readily.
Doz & Kosonen, 2008, p. 8.	<i>Strategic agility</i> [is] an ongoing capability for real-time strategic sensitivity, quick collective commitments, and fast and strong resource redeployment
Conboy, 2009, p. 340	The continual readiness of an <i>ISD method</i> to rapidly or inherently create change, proactively or reactively, embrace change, and learn from change while contributing to perceived customer value (economy, quality, and simplicity), through its collective components and relationships with its environment.
Tiwana & Konsynski, 2010, p. 290	We define this capacity of the IT function to rapidly adapt to changing line function demands as <i>IT agility</i> .
Lu & Ramamurthy, 2011, p. 933	<i>Market capitalizing agility</i> refers to a firm's ability to quickly respond to and capitalize on changes through continuously monitoring and quickly improving product/service to address customers' needs.
Lu & Ramamurthy, 2011, p. 933	<i>Operational adjustment agility</i> refers to a firm's ability in its internal business processes to physically and rapidly cope with market or demand changes.
Ngai et al., 2011, p. 232	<i>Supply chain agility</i> is the organization's ability to respond to unexpected market changes and convert these changes to business opportunities.

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