2018

Agility of Business Processes – Lessons from a Digital Transformation Context

Abayomi Baiyere
Copenhagen Business School, Denmark, aba.digi@cbs.dk

Tommi Tapanainen
Pusan National University, South Korea, tojuta@gmail.com

Hannu Salmela
University of Turku, hannu.salmela@utu.fi

Follow this and additional works at: https://aisel.aisnet.org/mcis2018

AGILITY OF BUSINESS PROCESSES – LESSONS FROM A DIGITAL TRANSFORMATION CONTEXT

Baiyere, Abayomi, Copenhagen Business School, Denmark, aba.digi@cbs.dk

Tapanainen, Tommi, Pusan National University, South Korea, tojuta@gmail.com

Salmela, Hannu, University of Turku, Finland, hannu.salmela@utu.fi

Abstract

The process of digital transformation entails changes in both the processes, practices and routines of organizations. This flux of changes, brings to question the conventional notion of documented business processes and highlights the importance for agility and flexibility in the configuration of organizational processes during digital transformation. Prior research provides a thorough view on the value of meticulous and preplanned business processes as well as capabilities for identifying and capitalizing on new opportunities. However, these studies typically focus on organizations operating in regular business conditions, while studies examining these concepts in periods of digital transformation process are still relatively few. In this study, we focus on the digital transformation processes in a manufacturing technology company that seeks to expand its business to providing data based services for its customers. Our study draws from an empirical base of 60 interviews, supported with company documents, participation in strategy workshops, and several meetings for over 16 months. The paper describes changes that the company is implementing, both in its organizational structure, technology infrastructure, as well as in its business processes. Our observations highlight the difficulty of relaxing the control of business processes and technology infrastructures, required for flexibility, and creation of new processes. The paper advances four principles of agility during digital transformation - mindfulness, light touch routines, flexible infrastructure and ambidextrous organization.

Keywords: Digital Transformation, Agility, Business Process, Organizational change

1   Introduction

Digital transformation is becoming an important issue for companies, as the advances in digital innovation and technologies open up a plethora of opportunities to improve existing processes, products and services (Nylen and Holmstrom 2015, Yoo, Henfridsson and Lyytinen 2010). Simultaneously, digital disruption is increasingly becoming a source of threat for the survival and competitiveness of many organizations today (Baiyere and Salmela 2015, Weill and Woerner 2015). The desire to take advantage of the potential of digital innovations as well as the need to proactively avoid the challenges of digital disruption are driving many organizations to embark on digital transformation. This is evidenced by the spike in the use of the term in practitioner journals and organizational publications (Horlach et al. 2016, Moore 2017). Although prior academic research provides us a thorough view on business process formulation as well as IS agility, studies describing their efficacy during digital transformation process are still relatively few (Broadbent et al 1999, Lu and Ramamurthy 2011, Sambamurthy et al. 2003). Hence, there is a paucity of scholarly knowledge about the essence and mechanisms underlying the process and practices of digital transformation.

Our study is presented as one building block towards enriching our knowledge of the process of digital transformation The paper draws from an in-depth study of a manufacturing technology company that is in the process of a digital transformation. The company, which we will name Swiftx, seeks to expand its business from mainly hardware and embedded software based technologies to providing data based services and products for its customers. Following the principles of a longitudinal case research method (Pettigrew 1990, Benbasat, Goldstein and Mead 1987), the leading author participated in conducting data collection via participant observations and interviews over a period of 16 months. This approach enabled a deeper overview of the processes and practices in the organization and how the digital transformation agenda is impacting these long standing structures and mode of operation within the organization. In consonance with the principles of process theorizing and longitudinal studies, our empirical base was suitable in unpacking how the digital transformation process unfolds over time (cf. Lyytinen and Newman 2008). Our empirical evidence is based on 60 interviews, supported with company documents, and participation in strategy workshops, and several meetings during the years 2016-2018.

2   What is digital transformation?

Digital transformation is a theoretical concept that is gaining attention in scholarly research in recent years. Despite the growth of studies using the term digital transformation, there appears to be no consensus on the definition of the term. Weill and Woerner (2017) conceptualize it as a two dimensional transformation process i.e transformation along operational excellence (internal processes) and transformation along customer experience (business offerings). With this view digital transformation seats at the intersection of change along these two dimensions of internal and external objectives. El Sawy et al. (2010) considered digital transformation to be a transformation process that is triggered by a "simultaneous increase in environmental turbulence, the requisite speed of organizational change, and the intensified ubiquity of digital technologies.

Positioning digital transformation within prior IS research, shows that it draws on similar premise as IT/IS-enabled organizational transformation (Berente et al. 2016, Mithas et al. 2011, Singh et al. 2017). While prior views of IT-enabled organizational transformation remain relevant as streams of IS research, digital transformation differs in its focus on abstracting beyond the IT and extending into the interrelationship between digital technologies and the business domains of an organization (Besson & Rowe 2012, Paul et al. 2013; Hansen & Siew Kien 2015). This is particularly so as the concept of digital and its utility happens and is driven in different functional units of an organization and not necessarily from the IT department (Weill and Woerner 2017). This possibility is driven by trends and advances in digital technologies such as – bring your own device, social media, data analytics, mobile,

and cloud computing. This technologies are increasingly endowing users and business professionals some capacity to rethink their units in terms of these technologies (Ross, Beath and Sebastian 2017).

Prior research on digital transformation have highlighted the importance of digital transformation and contributed to our understanding of different approaches to pursuing it. Weill and Woerner (2017) articulate four pathways that organizations can follow in their digital transformation journey towards becoming a future ready organization. These include first, transforming the customer experience and then transforming the operational excellence. Second, an organization may take the path of transforming its operational efficiency before embarking on transforming the customer excellence. Third, an organization may choose to take a stepwise path in which they make transformation on either of the two dimensions with small increments in one dimension before transforming the other dimension. Lastly, an organization may embark on digital transformation by creating a completely new organization or business unit. Another area of contribution that can be derived from prior literature is the difficulty in achieving digital transformation. Scholars such as Singh et al. (2017) and Lucas et al. (2013), highlight that managing digital transformation is a challenge that many organizations are struggling with.

Despite the emerging wealth of knowledge about digital transformation in extant literature, we are yet to uncover how the changes due to digital transformation impact the existing processes of an organization. Considering, that many IS theories were formulated in settings of regular business operations, digital transformation provides us a unique opportunity to explicate our theories in situations characterized by constant internal and external change. This is particularly the case since the change requirements that digital transformation means to the organizations, processes and the workforce, entails a different mode of operation as well as thinking about IT and digital technologies with the involvement of different actors. Hence, we argue that a study examining the impact of digital transformation on existing business processes, provides us an important avenue to understand how organizations can leverage existing and emerging knowledge in navigating the demands on digital transformation as well as providing us further knowledge on the extent to which prior business process theories hold in situation of concurrent changes.

3   Theoretical Framework

Like all major business transformations in rapidly changing competitive environment, also digital transformation is an endeavour at all levels of the organization (Goldman, Nagel, & Preiss, 1995b). Strategic transformation as such, is not a new issue, and an abundance of literature exists, that explains how strategic transformation takes place, and also why it often fails. One useful framework for analysing such strategic transformation is provided by Volberda (1996). Because his framework summarises and conceptualizes research on strategic management and organization studies, we adopt it as an initial lens for analysing digital transformation. As illustrated in Figure 1, Volberda's framework posits that flexibility of the entire organization (to cope with its particular environment and competitive pressures) is an outcome of interaction of two dimensions (Volberda, 1996, p. 361):

- The dynamic control capacity of management depicts the management challenge: Can managers respond at the right time in the right way?

- The controllability or responsiveness of the organization depicts the organization design challenge: Can the organization react at the right time in the directed way?

Interaction between these two elements must be in balance, reflecting also the nature of environmental pressure (variety and speed of changes in environment).
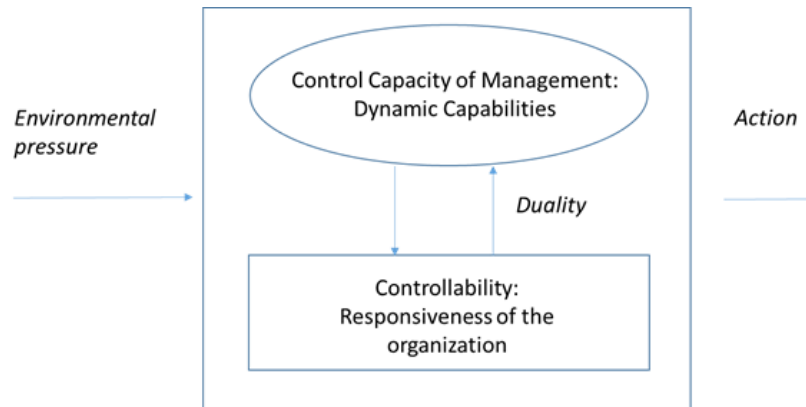
Figure 1: *Paradox or duality of control capacity and controllability (Volberda, 1996, p. 361)*

The control capacity of management refers to the capacity of owners and senior managers seizing and capitalizing to market and technology disruptions (Christensen, 1997; Teece, 2012). Success of strategic moves will depend upon their capability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Helfat & Peteraf, 2015; Teece, Pisano, & Shuen, 1997). Making the right choices will require senior managers to consult not just business unit managers but also staff at all levels, given that their knowledge on everyday actions can have strategic impact (Whittington, 2006; Jarzabkowski & Spee, 2009).

From the management perspective, controllability of the organization refers to the organization design task – a particular design of an organization; its technology, structure and culture, affects both controllability and responsiveness. Strategic transformation is a particularly difficult challenge for large and established companies. Organization studies in the 1960s and early 1970s (Burns & Stalker, 1966; Lawrence et al., 1967; Thompson, 1967) observed that large, mechanistic and bureaucratic organizations faced difficulties in adapting to the fast pace of environmental change. An organic (flexible) form, with appropriate structures, technology and culture, were found to be better able to explore and capitalize on opportunities (Volberda, 1996). To facilitate exploration of new business opportunities in large hierarchic organizations, ambidexterity (Duncan, 1976; Gupta et al, 2006) can provide a useful concept. It refers to "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). A new business unit is faster in exploring new business opportunities while existing units can focus on sustaining profitability and growth of existing business.

4 Study design

4.1 The case company

The case company – Swiftx – is a leading provider of manufacturing equipment with embedded software for the manufacturing industry. Swiftx is an European company that has a history of about 30 years in its current business area but it traces its history to the early 1900's. The company has for a long time occupied a unique niche in its area of business within the manufacturing industry. However, with the pace of digitalization, it is increasingly seeing competition from unexpected angles. For example, Swiftx has typically considered itself in competition with other manufacturing companies, but recently there has been an increasing number of competition form "software only" companies. Considering that this new breed of competition do not have the legacy issues and capital intensive hardware in their business, it appears the competition landscape is changing and there is a need to respond swiftly. Particularly considering the speed with which the software technologies are increasingly catching up and threatening the current product line and business model. This has been one among

many motivations for the need to embark on a digital transformation. It is at the stage of embarking on this transformation that we had the opportunity to begin our study of this case.

4.2   Data collection and analysis

Our study draws on a longitudinal case study spanning a period of over 16 months in a manufacturing company. We adopt the principles of a qualitative method within a longitudinal case study in conducting our research (Benbasat et al. 1987, Pettigrew 1990, Walsham, 1995). This is an appropriate research approach for understanding and observing the process of change during the digital transformation process as opposed to taking a snapshot view of events in a single point in time. This approach provided us the possibility to immerse in the case and probe for meanings and mechanisms underlying what is observable in the surface. This gave us the potential to provide deeply grounded, multiple sources of empirical evidence and, therefore, enable a more robust theorizing of the phenomena under study (Eisenhardt & Graebner, 2007; Stake, 1994). Our choice to conduct this research with Swiftx as our case organizations is informed by two reasons. Firstly, Swiftx provides us the contextual premise to conduct a study on digital transformation as they were in the process of embarking on a digital transformation process. Secondly, considering the dynamic and continuously changing nature of digital transformation, it was important that the study is conducted in a setting that allows for a longitudinal study and the collection of multiple forms of data over time. Swiftx provided us a unique data collection opportunity and a platform to observe the whole digital transformation process, without which our theorizing would not be possible (Eisenhardt 1989; Siggelkow 2007).

For our data collection, we relied on multiple sources of data to help us get multiple perspectives and triangulate the evidence that is being gathered. Our data sets include two sets of semi-structured interviews, an extensive archival data covering a period of 1986-2018, and participant & non-participant observations. We collected two sets of interviews – a first set of interview focused on understanding the motivation for the digital transformation and the intended plans for achieving the proposed plan. This involved 41 interviews with participants at the lower and middle management level as well as the strategy team and leadership of the organization. This was followed by another set of 19 interviews about a year later with emphasis on uncovering specifically the relationship between the business processes and the IT processes of the organization in relation to the ongoing digital transformation. All the interviews were conducted as semi-structured interviews, which allowed room to probe deeper into emerging areas of insights (Myers and Newman 2007). We supplemented our interview data with observations. Observation data were important in order to examine and validate the message received from the interviews with the actual actions and practices taking place in the organization. Observations took the form of participant and non-participant observations. Some of the observations happened during active participation in workshops, meetings or organized events in the company. Other form of observations occurred during informal discussions as well as via direct requests for explanations on how certain things are done and why they are done that way. Detailed field notes were taken from these observation events either directly after the events or at later times to ensure that the data remains documented (Lofland et al. 2005).

Lastly, the study drew insights from archival documents. The study benefits from access to the internal intranet of the organization from where discussions around the digital transformation can be observed. Importantly, these provided us access to see what is documented about certain processes and the real approach of the individuals in carrying out this processes. These multiple source of evidence provided us a rich overview of the digital transformation journey of the case. Additional, these allowed us to be able to triangulate the emerging themes and conclusions drawn from the study (Leech and Onwuegbuzie 2007).Taking the above focus, two researchers analyzed the collected data in consonance with the procedures of constant comparison as outlined by Gioia, Corley and Hamilton (2012). The lead researcher thematically interpreted the field notes as well as the archival documents by abstracting contents and events observed in the case. He worked together with a second researcher to analyze the interview transcripts into themes, which were then discussed among all of the paper's authors. The ap-

proach in extracting information from the transcripts was based on a labeling method akin to the techniques of the Grounded Theory method (Strauss and Corbin 1990). Although it is expected that an interpretive approach would highlight the voice of the informants, this however does not limit the judgement of the researchers (Nag and Gioia 2010). Hence, we as researchers further interpreted and structured the data with respect to both the contextual dynamics as well as prior theorizing (Nag and Gioia 2010). Based on our analytic lens, we firstly analyzed the strategy used to drive digital transformation as well as the organizational response to this strategy. This organizational response consisted of changes that were observed leading to the desired end state, but also changes that were seen as impeding the transformation. This led to a focus on uncovering the underlying bricolage in the approaches taken in circumnavigating these impediments (Baker and Nelson 2005). Consequently, we zoomed our analysis to a focus on the initiatives that had been implemented or attempted as part of the digital transformation.

5 Results

5.1 Digital Transformation and Strategizing Journey

Swiftx embarked on its digital transformation journey by firstly establishing a digital-centric organizational strategy. The process of formulating the strategy took place over two years (2016-2017) with different attempts and iterations carried over the period of 2012-2017. A first major step toward executing the strategy took place in 2016 when it was announced that there will be a complete reorganizing of the company. With this reorganizing, it was decided that the new organizational structure would have a new business unit named the digital business unit - DBU. This unit will be tasked with two overarching goals. First, they would be responsible for generating new digital offerings in terms of digital products and digital services for customers. Second, the DBU would also be responsible for infusing digital into existing products and services of the organization. This eventual reorganization, which took place in 2017, marked the beginning of tangible efforts towards the digital transformation agenda of Swiftx. Swiftx's strategy had initially been focused on their traditional business which is predominantly in the development of leading edge manufacturing equipments. With the new intention to undergo a digital transformation, the company's new strategic outlook in 2017 shifted from its traditional focus to a form of ambidextrous outlook, where they aim to keep their existing business operations while at the same time exploring new frontiers with digitalization. This is evident from a key statement in the organizational strategy:

"The future potential to differentiate and grow, lies in digitalization of manufacturing. With this strategy, we have made digitalization an integral part of our doings and development of future value creation." – Archival document

Besides the digital-centric organizational strategy, the DBU was also required to create its own digital strategy to outline what its visions are and the strategic targets of the unit. This led to a number of workshops and meetings from which the guiding strategy for the digital transformation would depend in mid-2017. While still working on formulating its digital strategy, the DBU had already embarked on the mandate with which it was given and had put together digital products from existing technologies in the company as well as embarking on new digital innovation projects.

5.2 Changes in organization design and offerings

The changes in the organizational design that led to the creation of the business unit, also had impact on the mode of operation of the other business units. Rather than just adding the DBU unit as just one more business unit, Swiftx embarked on a general overhaul of the organizational structure. The organization moved from having four existing business units without DBU to four business units with DBU as one of the new four. This implies a change in the internal processes of the organization as existing departments were dissolved or absorbed into the new units. With these changes the mode of operation

and thinking was fundamentally changed in various parts of the organization as different units and individuals took on new roles. These became key reference points in the transformation journey and created a sense of change throughout the organization as Swiftx pursues its ambidextrous strategy in order to take advantage of advances in digital technology while still keeping it's current "cash cow" functional for the traditional business.

For the information technology division digital transformation had major implications. It was absorbed by the digital business unit and its tasks were significantly altered. In the past, the key role of the IT division was to provide services for the entire organization and ensure that IT processes are in alignment with the changing business needs of each of the business units. In the DBU, it still had this responsibility, but it also shared a responsibility to participate in the development of digital platforms and services for Swiftx customers. In the new task, they were also expected to collaborate with software development unit that had previously been developing embedded software for manufacturing equipment. Interviewees recognized the new role that was required of them in this change:

"We are now part of the digital BU, where we come together with software development overall and then of course many people's roles will change from the basic ICT support provision to... directly supporting business applications or creating these new services." (ICT unit lead)

However, this new role had not been well understood throughout the company. The IT unit was still seen as a traditional provider of technology to support the business, and this mindset had been internalized by business professionals so that they would expect problems: *"...somebody said that I have an idea, but I don't know if it can be done because... the ERP is like so limiting then and everything is so awful to use, and we're like hey, everything is possible. We can do everything."* (IoT Innovation lead).

Hence, the newly formed Digital Business Unit was immediately facing a challenge of dealing with very different team cultures, and conflicting demands from supporting existing businesses, while also exploring new business and technology opportunities.

5.3   Reengineering of business processes

Another immediate challenge was related to ensuring continuity in business processes. The company had meticulously followed the recommendations of creating business processes with very detailed documentation of many business processes (Becker and Rosemann 2000, Trkman 2010, Van der Aalst, La Rosa and Santoro 2006). However during the period of digital transformation, many of the conventional business processes are now obsolete and these brings to fore different approaches and practices adopted in achieving desired objectives without resulting to the documented process. For instance, workers relied on oral transmission of knowledge instead of checking process documentations:

"... there's a plan, and there's a process existing [however] the documented version is not so easily available. I know [very] well what I'm supposed to do because I have discussed with my foremen and they have told me that this is how this goes." (Process manager)

While such workarounds are possible in small organizations, it is easy to see that bypassing the standardized way of working can also have drawbacks. As one illustrative example, with the digital transformation, there were a number of new employees recruited and some business managers had not had a new recruit to their team in a long time. One consequence was that the HR system was not used by the business managers to trigger the onboarding process to the IT department when a new employee is employed because it was considered cumbersome process requiring additional tasks to their already packed workload. The typical process is that the HR system will alert the IT unit to prepare work infrastructure and tools for the new incoming worker. The IT staff were then forced to react on short notice when new employees arrived and needed a laptop PC with all software installed and ready to use. As this was inconvenient to the IT staff, they decided to assist the HR staff to provide needed in-

formation by prompting the HR unit for advance information using a pre-filled Excel form, thereby circumventing the unused HR system:

"We are trying to make it work with these small changes that they can now forget about the HR system. HR will take care of it, and they just have to fill the form. Actually I have filled some forms for them because I know I get it faster…" (IT support manager)

The tedious process involving the HR system was also posing as a bottleneck with the off-boarding process as there were lots of employee leaving or being fired as the organization was embarking on renewing its organizational competences to align with the transformation goals. Another worker described his experience as follows:

"At the breakfast I heard that oh, that guy has left, and I was like who? … Then I contact HR that is this person working in here, because he has all [user] accounts open, and so on. Emails, he can actually access all information… and then we finally figured out that okay, he's gone for a couple months ago." (IT support manager).

The above shows a dose of mindfulness in how the actors enact their initiatives in carrying out required activities. Particularly in the IT unit, a sense of deploying light-touch routines can be seen in play in contrast to attempting to enforce rigidly defined business processes.

5.4   Building of technology platform

From an infrastructure perspective, the existing IT systems were amenable to the changes without an extensive need to reconfigure the IT processes or acquire huge capital-intensive investments. The IT department however had to embark on an IS development project involving the creation of an IoT platform to enable the products have a data-enriched and data capable components – particularly for the hardware equipments. According to the CIO:

"…we have this IoT platform which is actually an excellent integration platform which makes development faster, because this has its own databases and from here you have already different ready-made connectors." (CIO)

At the same time, Swiftx faced a serious barrier in companywide data management because its ERP system had not been integrated with other systems. This had been due to the prohibitive cost and difficulty of maintaining a customized system; the drawbacks of this decision were recognized by IT staff:

"…our ERPs… having changes there, probably always affects also to somebody else, which makes it very difficult to make changes there… I would say, the ERP system is the main challenge that limits quite a lot what we can do when we are changing or redesigning our processes." (Customer Service Director)

While the ERP system stood out among systems requiring overhaul, a perhaps more serious issue for the company was the lack of a system architecture. The digital transformation effort made it all the more obvious that the company should invest in systems planning and limit the number of new applications that were deployed yearly:

"Maybe from the IT side and the IT management side we should actually have a stronger role of keeping the big picture not going [on a] need by need basis. It´s leading to a situation that we are implementing one new software per year and not getting rid of any of the old… Really support this architecture definition what [the CDO] has been speaking about we really need to generate system architecture in the company." (Project Manager)

In addition, there were tensions in terms of the push and pull dynamics between the IT department and the business departments. IT claims that business does not adopt its suggestions and ideas for exploiting digitalization. And business claims that IT is at times a bottleneck that constrains them in achieving things the way they would want. While the infrastructure still supports the transformation and business processes, the building frustration and the need to develop an IoT platform for leveraging

data for innovation purpose, suggests a need and drive for a flexible infrastructure that is unwieldy and can accommodate changes.

6 Discussion

The findings from our case suggests a need for revaluating our prior theorizing about business processes particularly in the contexts of digital transformation. Our study highlights that old processes designed for incremental change and efficiency (Trkman 2010, Van der Aalst, La Rosa and Santoro 2006) may not be sufficient when faced with the dynamic flux of an ongoing digital transformation journey (Weill and Woerner 2018). Although the knowledge accumulated in the business process literature remains valid and important for the day to day operation of an organization (Becker and Rosemann 2000, Trkman 2010), the assumptions underlying the theorizing in this body of literature may be limited in helping us understand how to navigate digital transformation. This is important because many digital transformation efforts have been reported to have failed or to be abandoned. A recent study shows that only 16% of companies embarking on a digital transformation claim to have actually made significant progress and scale with their transformation (Bughin and Zeebroeck 2017). The focus on the conventional conception of business process may be one of the bottlenecks stifling the digital transformation objectives of many organizations. Drawing from the findings in our case, we posit that the conception of business process may benefit from incorporating some of the components of agility in theorizing about business processes in digital transformation contexts.

Several reasons can be highlighted that could lead to the change dynamics experienced in the digital transformation which consequently impacts the continued viability of existing norms, processes and practices. We highlight some of these issues here to illustrate the deficiency of the prior business processes to handle the demands of these changes. Firstly, there was ambiguity in the interpretation of the organizational strategy driving the digital transformation by some of the employees. Particularly, the decision to restructure the organization led to some initial confusion in terms of who owns what process in lieu of the changing roles and positioning in the organization. These led to the morphing of prior processes as the actors changed responsibilities. Similarly, there were new processes that became necessary in order to pursue the digital transformation agenda which were not yet clearly defined or articulated in the form of a documented process but were implicitly acknowledged as processes that need to be done. In addition, the internal changes also required infrastructural changes and IT had to consider IT alignment between the prior processes and the emerging processes.

The move from rigid to planned and ultimately flexible or even chaotic organization design involves many changes, such as higher reliance on social networks, organic forms, non-routine technology and revitalization as opposed to routinization (Volberda, 1996). Volberda's focus is clearly in strategic management, and he does not explicitly address the role of the workforce, which is also a limitation of his framework. The idea of a flexible form can, however, be easily related to the notion of agile firm (Goldman and Nagel, 1993), where knowledgeable workforce, expected to display initiative and creativity, is seen as the single greatest asset of an agile firm. It is also concordant with the ideas, that strategic transformation can result from identifiable work processes, such as product development (Eisenhardt & Martin, 2000), appropriate use of methods that leave room for individual, mindfulness, and bricolage at relatively low levels of the organization (Levi-Strauss, 1966; Eisenhardt & Martin, 2000; Weick & Sutcliffe, 2006).

Despite its limitations, we believe that Volberda's framework can usefully serve as an initial lens for examining also digital transformation. Given the competitive or disruptive potential of current digital technologies – owners and managers are actively searching for ways to capitalize swiftly on them. The paradox of controllability remains, however, and managers are critically dependent on the responsiveness of the organization, not least because of the completely new role that information technology plays in the strategic transformation. If lack of alignment between business and IT has been a nuisance for management for decades, now it is becoming a major obstacle for managers, both in initiating and executing a strategic response to fast technology based competition.

7   Implications and future research opportunities

In Swiftx, although existing practices, business process procedures, infrastructure configurations and operational routines have been rooted in years of success as an engineering company, this inevitably influences the implementation of digital transformation changes. This would explain the prior focus on detailed documentation of processes. However, the requirements of attaining a digital transformation raises a question about the agility of these taken for granted norms that work well in conventional state of calm business operations. We identify four agility principles by abstracting from our observation and analysis of the approach with which the actors in the organization have responded to situation of uncertainty and constant change; as well as the dynamic interaction of the actors with the new organizational structure, evolving tasks and the technology (Levitt 1964, Lyytinen and Newman 2008). These four agility principles are: a) mindfulness of actors, b) light-touch routines in processes c) flexibility of infrastructures and d) ambidextrous organizational structure. Herein, we describe what they mean and submit them for consideration and verification for those conducting future research on digital transformation.

Mindfulness of actors : This principle captures the capacity of the individual actors in the organization to make conscious decisions towards the attainment of an objective or the transformation goals without conforming to a dogmatic application of predefined processes. It reflects the valence of the employees to demonstrate sensitivity to the general direction of the organization and take intuitively calibrated choices that align with this direction (Butler & Gray 2006, Swanson & Ramiller, 2004). This is apparent in the case with the deviation from a rigid followership of the detailed business process document. This is particularly so in cases where the old process may not reflect the changes in other dependencies along the execution of the process or may even impede the objectives for which they were initially intended.

Light-touch routines: This reflects the capacity for routines to be structure in a way that allow for easy reconfiguration and adaptability to changing situations. This is exemplified in the case by the example of the cumbersome HR system, which was replaced by an easily reconfigurable excel sheet that was delivered through direct email communications. Light-touch routines are in contrast to rigidly fixed routines that places hurdles along the way and are hard to adapt to situations of change (cf. Berger & Beynon-Davies, 2009; Lanzara, 1999; Lyytinen & Rose, 2006; Wang et al., 2012)

Flexible infrastructures: This refers to the capacity to swiftly orchestrate the IT infrastructures in a way that makes them amenable to different situations and purposes. While Swiftx's ERP system provided the functionality for IT to perform most of its activities, it remained a huge bottleneck considering the time and effort plus cost required each time there is a need to make changes to the system. This led to the introduction of the IoT platform as an infrastructural investment that not only provides value as a data aggregator for multiple systems but also as the hub for exploiting and exploring business model opportunities from data collected from Swiftx's customers. In essence, a flexible infrastructure would better support an organization's digital transformation efforts by its capacity to evolve, and support the continuous redesign of business and related processes (Duncan, 1995, Kim, Shin, Kim, and Lee, 2011; Schmidt and Buxmann, 2011; Joachim, Beimborn, and Weitzel, 2013)

Ambidextrous structure: This is a principle of agility in these contexts that capture the capacity of the organization to establish processes to sense the need for a change in its business environment as well as to seize the opportunities opened up by digitalization. Hence it relates to the organization design and the capacity of the organization to balance itself at the crux of exploration of new opportunities while simultaneously exploiting existing technologies and products of the company (Duncan, 1976; Gupta et al, 2006). This is also apparent in the case with its effort at creating a digital business unit while concurrently maintaining a close view on the existing business lines.

As demonstrated by the case, the establishment of digital transformation journey brings in confusion. As indicated by the quotes of the people. In situations of digital transformation, we see that there might be a need for mindfulness and light routines and ambidexterity in order to engage in and navi-

gate these challenges as opposed to keeping to a documented approach of doing things. Hence, our study suggests that the likelihood for agility in the business process of an organization undergoing digital transformation can be higher, if the activity is carried out by individuals whose skills and attitudes promote situated judgement (rather than e.g. task specific professional knowledge), if light touch routines are in place to promote collective mindfulness and creativity (as opposed to detailed and precise instructions for each individual), if organizational structures are organic or ambidextrous (rather than formal and hierarchic), and if technologies are kept standardized and simple (as opposed to proprietary and complex).

References

Baiyere, A., & Salmela, H. (2015). Wicked yet Empowering-When IT Innovations are also Disruptive Innovations. *Proceedings of International Conference of Information Systems 2015,* Fort Worth Texas.

Baker, T., & Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative science quarterly*, *50*(3), 329-366.

Becker, J., Rosemann, M., & Von Uthmann, C. (2000). Guidelines of business process modeling. In *Business Process Management* (pp. 30-49). Springer Berlin Heidelberg.

Berger, H., & Beynon-Davies, P. (2009). The utility of rapid application development in large-scale, complex projects. *Information Systems Journal, 19*(6), 549-570.

Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS quarterly*, 369-386.

Broadbent, M., Weill, P., & StClair, D. (1999). The implications of information technology infrastructure for business process redesign. *MIS Quarterly, 23*(2)

Bughin, J. (2017). The best response to digital disruption. *MIT Sloan Management Review*, *58*(4).

Butler, B. S., & Gray, P. H. (2006). Reliability, mindfulness, and information systems. *MIS Quarterly, 30*(2), 211-224.

Christensen, C. M. (1997). The innovator's dilemma: When new technologies cause great firms to fail. Boston, Massachusettes: Harvard Business School Press.

Duncan, R. (1976). The ambidextrous organization: Designing dual structures for innovation. R. H. Killman, L. R. Pondy, D. Sleven, eds. The Management of Organization Design. North-Holland, New York, 167–188.

Duncan, N. B. (1995). Capturing flexibility of information technology infrastructure: A study of resource characteristics and their measure. *Journal of Management Information Systems, 12*(2), 37-57.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organizational research methods*, *16*(1), 15-31.

Goldman, S. L., Nagel, R. N., & Preiss, K. (1995b). Agile competitors and virtual organizations. Manufacturing Review, 8(1), 59-67.

Gupta, A. K., Smith, K. G. & Shalley C. E. (2006). The interplay between exploration and exploitation. Academy of Management Journal 49(4) 693–706.

Helfat, C. E., & Peteraf, M. A. (2015). Managerial cognitive capabilities and the microfoundations of dynamic capabilities. Strategic Management Journal, 36(6), 831-850. doi:10.1002/smj.2247

Horlach, B., Drews, P., & Schirmer, I. (2016). Bimodal IT: Business-IT alignment in the age of digital transformation. *Multikonferenz Wirtschaftsinformatik (MKWI)*, 1417-1428.

Jarzabkowski, P., & Spee, A. P. (2009). Strategy-as-practice: A review and future direction for the field. International Journal of Management Reviews, 11(1), 69-95.

Joachim, N., Beimborn, D., & Weitzel, V. (2013). The influence of SOA governance mechanisms on IT flexibility and service reuse. *The Journal of Strategic Information Systems, 22*(1), 86-101.

Kim, G., Shin, B., Kim, K. K., & Lee, H. G. (2011). IT capabilities, process-oriented dynamic capabilities, and firm financial performance. *Journal of the Association for Information Systems, 12*(7), 487-517.

Lanzara, G. F. (1999). Between transient constructs and persistent structures: Designing systems in action. *The Journal of Strategic Information Systems, 8*(4), 331-349.

Lawrence, P. R., Lorsch, J., & Garrison, J. S. (1967). Organization and environment : Managing differentiation and integration. Boston: Harvard University.

Lu, Y., & Ramamurthy, K. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. *MIS Quarterly, 35*(4), 931-954.

Lyytinen, K., & Newman, M. (2008). Explaining information systems change: a punctuated socio-technical change model. *European Journal of Information Systems*, *17*(6), 589-613.

Lyytinen, K., & Rose, G. M. (2006). Information system development agility as organizational learning. *European Journal of Information Systems, 15*(2), 183-199.

McAvoy, J., Nagle, T., & Sammon, D. (2013). Using mindfulness to examine ISD agility. Information Systems Journal, 23(2), 155-172.

Moore, S. (2017) Embrace the Urgency of Digital Transformation. Retrieved February 11th 2018 from https://www.gartner.com/smarterwithgartner/embrace-the-urgency-of-digital-transformation/

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and organization*, *17*(1), 2-26.

Nag, R., & Gioia, D. A. (2012). From common to uncommon knowledge: Foundations of firm-specific use of knowledge as a resource. *Academy of Management Journal*, *55*(2), 421-457.

Nylén, D., & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, *58*(1), 57-67.

Pettigrew, A.M., 1990. Longitudinal field research on change: Theory and practice. Organization science, 1(3), pp.267-292.

Ross, J. W., Beath, C. M., & Sebastian, I. M. (2017). How to Develop a Great Digital Strategy. MIT Sloan Management Review, 58(2), 7.

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

Schmidt, C., & Buxmann, P. (2011). Outcomes and success factors of enterprise IT architecture management: Empirical insight from the international financial services industry. *European Journal of Information Systems, 20*(2), 168-185.

Strauss, A., & Corbin, J. M. (1990). *Basics of qualitative research: Grounded theory procedures and techniques*. Sage Publications, Inc.

Swanson, E. B., & Ramiller, N. C. (2004). Innovating mindfully with information technology. *MIS Quarterly, 28*(4), 553-583.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. Strategic Management Journal, 18(7), 509-533.

Teece, D. J. (2012). Dynamic capabilities: Routines versus entrepreneurial action. Journal of Management Studies, 49(8), 1395-1401. doi:10.1111/j.1467-6486.2012.01080.x

Thompson, J. D. (1967). Organizations in action : Social science bases of administrative theory. New York: McGraw-Hill.

Trkman, P. (2010). The critical success factors of business process management. *International journal of information management*, *30*(2), 125-134.

Van Der Aalst, W. M., La Rosa, M., & Santoro, F. M. (2016). Business process management. Bus Inf Syst Eng (2016) 58: 1.

Volberda, H. W. (1996). Towards the flexible form: How to remain vital in hypercompetitive environments Organization Science 7(4), 359-387.

Whittington, R. (2006). Competing the practice turn in strategy research. Organization Studies, 27(5), 613-634.

Wang, X., Conboy, K., & Pikkarainen, M. (2012). Assimilation of agile practices in use. *Information Systems Journal, 22*(6), 435-455.

Weill, P., & Woerner, S. L. (2015). Thriving in an increasingly digital ecosystem. *MIT Sloan Management Review*, *56*(4), 27.

Weill, P., & Woerner, S. L. (2018). Is Your Company Ready for a Digital Future?. *MIT Sloan Management Review*, *59*(2), 21-25.

Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary—the new organizing logic of digital innovation: an agenda for information systems research. *Information systems research*, *21*(4), 724-735.