

Digital Transformation of Software Companies - brilliant Idea or unnecessary Action?

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Abstract

Novel digital technologies in the form of digital innovations drive digital transformation in companies across all industries. While the topic of digital transformation has already been studied for many industries, studies on the software industry can hardly be found. Moreover, software companies are particularly interesting in the context of digital transformation because these organizations were forced to deal with the opportunities and risks of novel digital technologies much earlier than others. Hence, they can be referred to as “digital pioneers” and represent an excellent opportunity for researchers and managers to see best practices and gain valuable insights. Therefore, this short paper introduces the concepts of digital innovation and emphasizes the need for a systematic approach toward the digital transformation by presenting two dedicated cases of one software company and one software-based company. Compared to other companies, we see in both cases a quicker “run” to the status of a Digital defined Organization and no need of new management roles like a CDO in the transformation phase.

Keywords

Digital Transformation, Digitization, Software Company, Software Industry, Media Companies

1. Introduction

Digitalization and the resulting digital transformation are omnipresent topics and particularly interesting for companies. Many organizations have already started a set of transformation and digitalization projects, some are still starting their first major initiative. The emergence of new technologies often acts as a driver for digital change. Analog products and services, business processes, and business models are becoming either entirely digitized, expanded, or enriched with digital elements. The result is a change in companies’ value and organizational structure. The question that arises from those changes is how to systematically approach digitalization and digital transformation.

The topic of digital transformation has already been studied for many industries. However, studies on the software industry can hardly be found. Thus, this short paper provides valuable insights from the software industry to close this gap.

The digital transformation poses considerable challenges for organizations. Industry-specific trends, different priorities, and the need for dedicated Information Technology (IT) knowledge result in various approaches toward the digital transformation. Moreover, the importance of information technology and its strategic value differ considerably across industries. The software industry, similar to the media industry, is particularly interesting in the context of digital transformation. Organizations in those industries have long been exposed to changed consumer behavior, thus, were forced to deal intensively with the opportunities and risks of new emerging digital technologies much earlier than other companies. Hence, nowadays, we can see that software and media companies seem more advanced and, therefore, one step ahead in the context of digital transformation than organizations in other industries.

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We start by introducing the concept of digital innovation, its specific characteristics, and its impact on companies. Subsequently, the three steps of the digital transformation journey with a practice case of a German media company are introduced. After that, we elaborate on the unique characteristics of the software industry in the context of digital transformation. We further highlight the perspective of software for the digital transformation and the digital transformation of software companies by presenting two dedicated. Finally, we draw our findings from the presented cases and present valuable insights and implications for practitioners and further research.

2. Digital Transformation as a Management Concept

2.1. Digital Innovations

The driver of digital change are “digital innovations” [11,14, 20]. A digital innovation comprises two integrated components: an innovative digital solution and a complementary digital business concept. Traditionally, organizations' impetus for digital innovations came from new business requirements. The implementation of such new business requirements is enabled through novel digital solutions. Therefore, new business requirements lead to the search for new technological opportunities (technology-pull). Today, as a consequence of the increasing prevalence of novel digital technologies, the impetus for digital innovation often arises from the emergence of novel digital technologies, which trigger new business opportunities (technology-push).

Digital innovations can be distinguished into different categories [14]. A joint separation is a classification into Digital Product and Service Innovations, Digital Process Innovations, and Digital Business Model Innovations which all are interrelated and usually lead to changes in the value structure of an organization. Additionally, we see that the change in the value structure of an organization through digital innovations also leads to changes in the management systems. Typical examples are the introduction of agile organizational structures.

2.2. The three Phases of Digital Change

For more than 40 years, organizations across industries have been dealing with digital innovations, for example, the gradual redesign of business processes or the implementation of technology-supported accounting systems [11]. In this state, the main tasks of the IT department were defined around the business process support for non-IT business units and the provisioning of IT infrastructure (IT operations). Such companies find themselves in the primary stage of digital transformation and can be referred to as “IT-enabled Organizations”. At that stage, a specific organizational structure, high financial investments, or close attention from top management were not necessary.

The digital transformation is not an infinite journey that requires companies to be in a special state of the digital transformation forever. Instead, the digital transformation is a finite process and consists of definable stages that require certain organizational constructs and capabilities. Hence, there must be constellations where a company is completely transformed [11]. Figure 1 illustrates the digital transformation journey and separates it into three dedicated stages.



Figure 1: Embedding of Digital Transformation in the Digital Change (based on Hess, 2022, p. 212)

The digital transformation is a unique and comprehensive management approach that requires extensive investments, a proper organizational structure, and close attention from top management.

Whenever companies do not take the necessary steps during the digital transformation, they will fall back into the prior status of an “IT-supported Organization.” However, we see that most companies have realized this risk and started necessary transformation initiatives. Hence, most companies find themselves today as “companies in digital transformation”. In this stage, companies invest high amounts of money and time towards large transformation initiatives, appointing new management roles, e.g., Chief Transformation Officers (CTOs) or Chief Digital Officers (CDOs), and creating new departments in form of digital innovation units (DIUs) to combine their digital and IT capabilities more centrally. This change in value and the organizational structure helps companies to act adequately toward the significant opportunities or critical threats that emerge from new digital technologies [11]. Nevertheless, it will not work to set a company in the stage of digital transformation forever. What is required in this case is instead a “digital defined organization” oriented towards the constant challenges from the digital transformation arising from new emerging technologies.

How such a “digital defined organization” looks like or which specific capabilities it possesses can only be roughly seen today. Nowadays, we see a number of companies started with a digital product or service and hence, have no analog past. This applies especially to software companies and software-based companies with software as their core product. They are either “digital born” or have been dealing with digital transformation for a long time. Hence, the digital transformation topic has already been passed into their DNA.

2.3. Managing digital transformation

To adequately identify, manage and implement digital innovations, organizations must enable digital innovation by enabling their organizational structures, capabilities, organizational culture, and the companies’ IT application portfolios [10]. Capabilities in the context of digital transformation refer, on the one hand, to the traditional IT capabilities that enable the organization and employees to solve IT hardware and software-related issues and include knowledge to provide necessary IT infrastructure and business process support. On the other hand, capabilities in the context of digital transformation refer to digital capabilities focusing on the effective use of digital technology and include the organization and employees' capabilities to identify, manage and implement digital innovations. In addition, companies must not forget to adapt their culture to open up the company's and employee's mindset towards technology. A so-called “digital culture” is open to the use of new technologies and emphasizes the implementation of such technologies. Furthermore, it sets the guideline for digital transformation for all employees, managers, and business partners and provides an ethical and value-created playing field [20].

The first step for organizations to enable digital transformation is to prepare their IT landscape properly in advance to accommodate digital innovations. An organization's IT application portfolio consisting of IT systems and the underlying IS infrastructure must accommodate the changes triggered by digital technologies. The integration of digital innovations often leads to a shift from decentralized structures towards more networked and centralized platforms [2]. Therefore, organizations and their organizational structures require an adequate level of “organizational agility” [18]. An adequate level of organizational agility allows organizations to mitigate rigidities, balance tensions of organizational ambidexterity and develop and leverage necessary technological and digital capabilities [7,17]. Organizations can build up capabilities either organically, e.g., through employee training programs, job rotations, or webinars, or acquire them inorganically, e.g., through M&A activities or outsourcing [20].

The described changes in an organization's value and organizational structure lead to the need to build up a cultivated and dedicated digital transformation governance (DTG). A DTG consists of three main areas: dedicated structures, dedicated processes, and dedicated relational mechanisms [4, 9, 12, 19]. In practice, we often see different perspectives on how such a DTG is approached. The most common approaches involve allocating tasks to the central IT department or dedicated DIUs. Along with this change, we often see a shift of responsibility from the Chief Information Officer (CIO) towards newly created roles such as a CDO. The start of such a DTG often is the formulation of a company-spanning digital transformations strategy that includes all tasks and activities related to an organization's overall digital transformation. If aligned with other organizational or functional strategies (e.g., IT or

business strategy), a digital transformation strategy can enable companies to coordinate and prioritize their digital transformation efforts across all business functions [20]. Whenever companies want to implement those formal governance structures, social interaction and relationships between actors play an important role [13]. In these cases, relational mechanisms act as a connecting piece to foster active participation and information exchange between different internal and external actors [6, 12].

The concept of technology-push and pull, the enabler for digital innovation, and the DTG are strongly interrelated [20]. The manifestation of digital innovation in three different categories can only manifest in the presence of the respective organizational and IT based enablers. Furthermore, realizing and employing the enablers of digital innovation require a company-wide dedicated DTG. Figure 2 shows this interrelation in a linking framework.

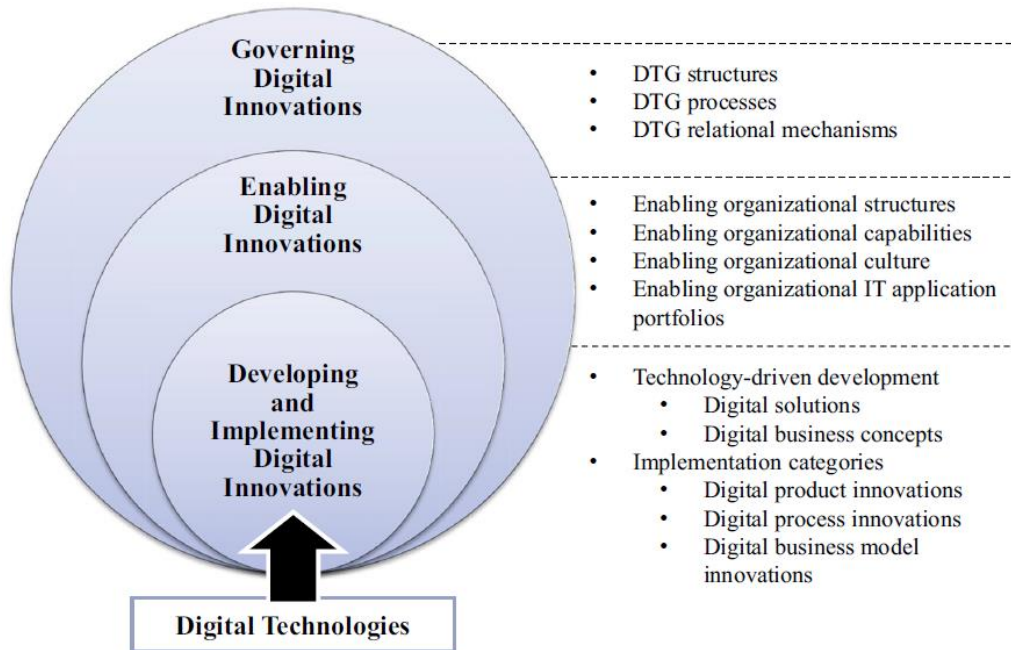


Figure 2: The three-ring framework of Digital Transformation (based on Wiesböck & Hess, 2020)

2.4. The typical Journey of a Media House to a Digital defined Organization

The following case of a family-owned media company, founded in early 1900 in Germany, is an excellent practical example to illustrate how companies can successfully manage through the digital transformation. The company started by producing and selling paper-based products but expanded quickly in several other media-related business areas. Today, the product portfolio consists mainly of digital products and services, e.g., news websites, comparison online portals, and social media platforms. Moreover, with over 10.000 employees and sales in billions, the organization is regarded as a pioneer of digitalization and one of the largest German media companies.

The company's founders embraced an open mindset towards technology early, which allowed the company to work closely with manufacturers on new products and services. With the rise of the internet and personal computers, the topic of IT and digital technologies became prevalent. In the 1980s, the organization found itself in the first stage of digital transformation. The company adapted its management structure to react to the changing environment, introducing a central IT department. This department acted as a corporate driver for IT across the whole organization. However, without the necessary attention of the top management and missing budgets, the IT department focused on providing the IT infrastructure and improving existing business processes rather than being the core department to drive the digital change across all business lines. Moreover, the majority of IT and digital capabilities at that time stayed with the technical workforce in the central IT department. This favored the creation of so-called "IT islands" [1], where important capabilities were locked up.

The beginning of the digital transformation started with a significant change in the company's organizational structures in the early 2000s. Top management began understanding the opportunities of emerging novel technology and the issues arising from IT islands. Therefore, the company created new digital business units responsible for driving new digital products, services, and brands. To adequately staff these units, the company rearranged its workforce into the digital business units for a wider distribution of digital capabilities. At the same time, the company decided to change the oversight role of its digital units and non-digital core product departments to a new management role in the form of the CDO. Thus, the company's digitalization and transformation efforts were combined under one responsibility that drove both digital and non-digital products and services throughout the years. As a result, areas of new digital products, digital business models, and brands were growing rapidly and, after a few years, were responsible for most sales. Furthermore, former core products, e.g., print and offline distribution channels, were digitalized and eventually developed into their digital counterparts. Nevertheless, with the change of digitalization and product-near efforts being shifted towards digital business units, most technical capabilities remained with the technical workforce in the central IT department.

In 2017, the transition from a company in the digital transformation into a digital defined company began with a break-up of the prior introduced digital business units. Despite their importance throughout the digital transformation, digital business units were no longer necessary for the third stage of digital transformation. On the contrary, it was more important for the company in this state to distribute its digital capabilities to all business departments rather than having them focus on the digital business units only. With this step, the organization was able to identify, manage and implement digital innovations without the need for further big transformation or digitalization initiatives.

Similar to prior stages, the IT department stayed mainly responsible for IT operations. However, with the emergence of IT infrastructure and cloud service providers, the IT department became the main department for external provider management.

3. The Digital Transformation of Software Companies

3.1. Digital Transformation as a challenge for software companies

The unique characteristics of the software markets make the software industry fundamentally different from other industries [5]. Organizations that operate in the software industry experience intense global competition with nearly no “home advantage” that often creates winner-takes-all markets. This mainly arises from the unique characteristics of software as the core product. Like all other digital goods, software products can be cheaply reproduced. While the first product includes relatively high development costs, it is relatively simple to create a different version of the software without losing quality.

It all began with the development of software by direct orders from customers. This business model massively changed over the years, responding to competition and changing customer needs. Today, we observe a wide range of different software companies (e.g., application developers, operating system (OS)-, hardware-, and cloud services providers) operating based on different business models (e.g., software-as-a-service, licensing, open source). Along the lines of digital born companies, current technological advances enabled business transformation towards software-based or at least digital-augmented companies, even in companies with non-digital roots [1, 15]. Thus, we distinguish between software and software-based companies. These “software-based companies” (e.g., Netflix and Amazon) offer products and services with software as the underlying core. This extends the definition from traditional software companies that develop software for individual clients or the mass markets by including web-centric and embedded systems companies [16]. However, the underlying technological and economic mechanisms remain similar or even identical to traditional software companies or pure IT service providers.

Typical digital innovations of software companies are cloud computing solutions (e.g., change from on-premise to on-demand) and agile project and development structures. In addition, software-based companies find themselves extensively using novel digital technologies in the form of, e.g., video on demand, virtual reality, or process mining to greatly improve current business models, processes, or products and services. The openness towards technology, combined with the extensive use of software

and other technology solutions, emphasizes the high importance of new technologies for software and software-based companies. The impact of digital innovations on the company's value and organizational structure and their interrelation is emphasized in figure 3.

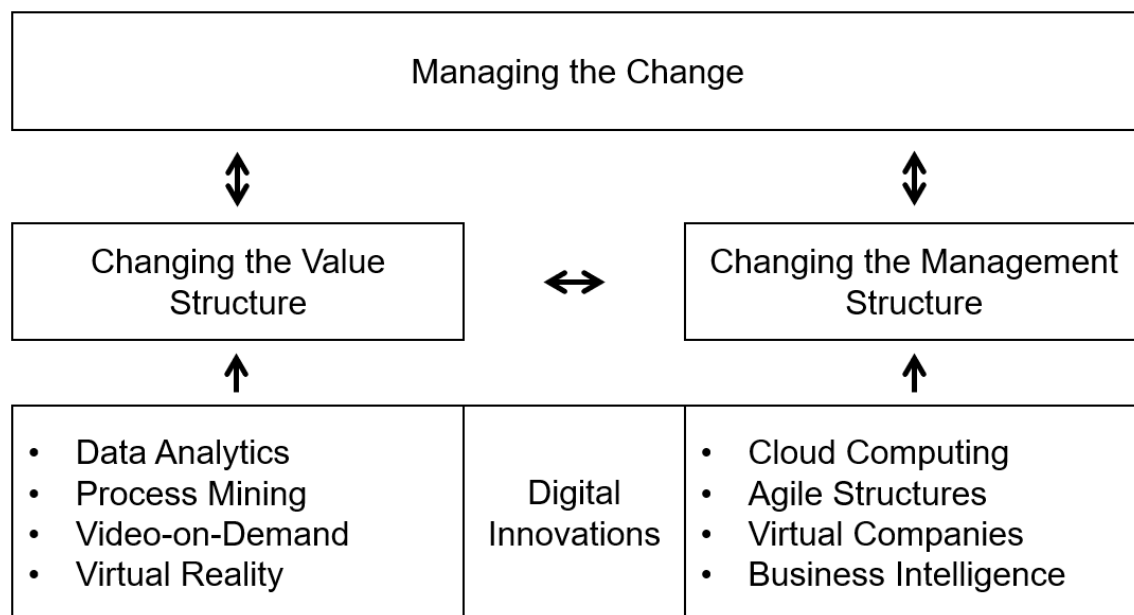


Figure 3: Digital Change of Software Companies

In the context of digital transformation, digital innovations are seen as a key driver, and adequate IT and digital capabilities are necessary. Therefore, it could be implied that software and software-based companies with their strong knowledge of technology and a relatively high technical workforce (e.g., software developers, data scientists, and engineers) may transform into a “digital defined organization” without high transformation-related efforts. To examine this argument, we present two practical cases of a software company and a software-based company in the following.

3.2. The Journey of two software Companies

This first case presents the digital journey of a software company founded in Germany around 1970. A group of young businessmen founded the company as a start-up for IT consulting and software solutions. Almost 50 years later, the organization is one of the global players in providing software-as-a-service solutions to business and private customers worldwide. The central IT department and several product development departments were the basis of the organizational structure at the beginning of the digital journey. Both departments were key drivers for IT and consisted primarily of technical employees. IT and digital capabilities were therefore concentrated in those departments. This organizational structure implies that even in the early stage of the digital transformation, software companies may naturally have more IT and digital capabilities than other companies.

Similar to the case of the media company before, the software company started major transformation initiatives in early 2000 to react to the external changes emerging from the availability and rise of novel digital technologies. However, mainly due to its available capabilities, the organization identified promising digital innovations relatively early in the form of new products and services, digital business processes, and new digital business models. Those digital innovations led to a massive change in the company's value and organizational structure. One significant aspect of the digital transformation was the introduction of agile structures for all product development departments. This change enabled a more flexible and aligned structure and helped the development teams to react faster to upcoming changes. Moreover, a central product development platform replaced the former decentralized technologies and embraced more effective internal communication and collaboration. Surprisingly, the creation of new management roles and, therefore, a change in responsibilities on the management level

was not necessary. Thus, the CIO remained responsible for the digital transformation throughout the digital journey.

After approximately 15 years, the company finalized the last transformation initiative and defined itself as completely transformed. As a result, the organization was able to identify, manage and implement digital innovations globally more effectively. In the stage as a “digital defined organization”, digital capabilities were distributed in the product development departments and mainly with the technical workforce. Once again, business process support and the responsibility over the IT infrastructure remained by the central IT department. Contrary to the prior case, changes in the organizational structure after the digital transformation were not observed. However, the software company identified a major issue in its current state. The company failed to create a company-wide transformation strategy during the second stage of the digital transformation that considered IT-related departments and non-IT-related departments (e.g., Human Resources and Finance). As a result, non-IT-related departments still worked with outdated software and inefficient business processes. Therefore, several further projects and investments are now needed to bring these departments on par. Moreover, employees in those departments reported a stronger resistance to the digital transformation, making much-needed changes even more difficult.

This second case presents the digital journey of a non-digital company toward one of the world's most successful online entertainment companies as of 2022. The organization was founded around 1995 in the United States of America (US). At that primary stage of the digital journey, the company had a business model that focused primarily on the distribution of videos in cities in the US. Nevertheless, the founders were keen to grow the company quickly. Therefore, they built a strong company culture on four core characteristics: a positive failure culture, flat hierarchies, high employee empowerment, and openness towards new technology. A combination of those characteristics enabled the company to effectively use new technologies as a driver for digital change when novel technologies rapidly emerged around the year 2000.

In the second stage of the digital transformation between 2005 and 2010, the company began to set up transformation initiatives that acted as a vehicle to bring novel technology solutions into the organization. Two major changes in the value and management structure were observed. First, the company started extensively using new technology in the form of data analytic tools and process mining solutions. With these tools, the company could analyze large data sets and use the insights generated for further decision-making. As a reaction to changing customer needs, the company launched its first digital service. Not long after that, the company transitioned its remaining non-digital products and services into its digital counterparts, e.g., video-on-demand and recommender system solutions, over the following years. Therefore, at this second stage of the digital transformation, the company transitioned from its former non-digital characteristic to a software-based company with software as its core product.

The second change occurred in the organizational structure when the management committed to innovation as the primary strategic goal. This was a strong positive signal toward digital technology. As a result, the company began to transform and digitize every business department. Furthermore, a large number of new hires had a technical background. This fostered the mix of employees in all departments and, thus, a wide distribution of capabilities throughout the organization.

After approximately ten years after its foundation, the company developed from a non-digital organization to a “digitally defined company” with a strong “digital DNA”. From 2010 onwards, the company structure consisted of several small business departments responsible for certain digital products and services. Furthermore, business departments were closely connected and strongly supported by cross-section departments such as the IT department or data analytics teams. Thus, IT and digital capabilities were widely spread across the whole organization and enabled through the interconnection of different departments. Moreover, employees in this department were highly empowered and could decide and act quickly when necessary. As a result, flat hierarchies and less managerial roles were observed at the management level.

4. Conclusion

The cases introduced in this short paper clearly show that digital innovations were and are the drivers of digital transformation. Therefore, like any other organization, software and software-based companies need a transformation program and a sound digital transformation governance to manage the change in value and organizational structure resulting from the digital transformation. Moreover, the cases show that the digital transformation consists of three dedicated stages. However, we recognize that organizations in these stages can look different from company to company and that there is more than one “right” approach that leads to a successful transformation.

The example of the media company shows that novel digital technologies play a key role in the digital transformation and must be enabled accordingly. This further implies that the digital transformation is “technology-driven” [11]. At first, this is not surprising. However, this case further implies that it is not enough to simply digitize products, services, or processes. On the contrary, to manage digital innovations, a company needs to approach the digital transformation systematically. This can be done, e.g., by introducing new digital business units or creating new roles and responsibilities such as the CDO. These changes in the structure of a company emphasize that a high attention from the top management is necessary. Hence, the digital transformation is fundamentally important and a broad management approach [11].

The software and software-based company cases show that digital technologies are particularly important for those companies. Moreover, the correct and timely usage of novel digital technologies is key to adjusting the value and organizational structure adequately and timely to react to changes appropriately. Contrary to what is usually observed in the second stage of the digital transformation, the case of the software industry shows that new roles, such as a CDO, are not always needed. Furthermore, digital capabilities and their distribution throughout the organization play an important role in the digital transformation. Therefore, companies must distribute their capabilities to all business lines and departments. This enables companies to identify, manage and implement digital innovations timely and more effectively. However, issues in achieving this goal can occur from former structures (e.g., knowledge silos and IT islands) or insufficient transformation programs that did not consider a company-wide view of all business lines and instead focused on core business lines only.

From the observation of the software-based company, we see a much quicker “run” through the three phases of the digital transformation compared to other companies. Reasons for this may lie in a more flexible organizational structure and openness towards change in general and new technology. From the case of the software-based company in the US, we can observe that a commitment to innovation as a strategic goal, compared with flat hierarchies, employee empowerment, and openness towards technology, drives the extensive use of digital technologies and, therefore, fosters the distribution of capabilities in all business lines and the development of a strong digital DNA.

This short paper aims to shed light on technology- and software-centric industries. We showed that companies that operate in these industries offer valuable insights for researchers and practitioners to better understand the characteristics of digital transformation. Examining those companies further will help to analyze concrete patterns, best practices, role allocations, structures, and tools that play a significant role in the context of digital innovation and digital transformation. These insights will also help organizations and managers in other industries to prepare for upcoming challenges to successfully travel through the journey of digital change.

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