# A Framework for Digital Transformation for Research and Practice: Putting Things into Perspective

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**Abstract** The past years of researching digital transformation and the accumulated experience of practitioners in deploying projects of novel digital technologies have allowed us to gain much valuable insight about the process. From this assembly of knowledge, there is a lot we can learn about how to conduct future research, as well as a depth of knowledge regarding best practices that can aid practitioners. In this chapter, we provide some key input on how research and practice can approach digital transformation and discuss some ideas that are likely to be central in the near future. We draw on some streams of literature which have yet to be fully integrated in the current discourse of digital transformation research and provide some practical guidelines that can aid practitioners at different levels. We conclude with a brief overview of some key technologies which are likely to be in the spotlight of attention in the upcoming years and discuss their implications for research and practice.

## 1 Introduction

In the cases presented in the previous chapters, there are some key takes that can contribute to both research and practice. In conjunction with the vast body of literature on the domain of digital transformation, we can adopt a reflective lens and identify some important themes that permeate recent academic studies and practice. In doing so, this chapter aims to present a future-looking framework for digital transformation which identifies some themes that are likely to be of increased

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significance in the upcoming years. We therefore build a research framework which draws on some ongoing challenges for current and future research and provide some suggestions about how researchers could delve into these questions. Furthermore, we present a number of practical suggestions of how stakeholders at different levels within organizations should process in their digital transformation efforts, highlighting some recurring challenging issues that emerge and ways to overcome them.

Through some prominent literature reviews in the area of digital transformation [1–4], several prominent research themes have emerged. While there is some overlap between these research agendas, there is also significant variation between them as they adopt a different viewpoint on digital transformation. These differences stem from a focus on specific industries [5, 6], epistemological approaches [7], as well as scientific domains [8]. Similarly, when it comes to suggesting practical implications and key takes on digital transformation, the literature has ranged from selected case studies [9], guidelines and rulebooks [10], and use of best practices [11]. The objective of this chapter is to provide an overview of some of the most important research themes and practical recommendations when it comes to digital transformation. Extending on these, we discuss how emerging digital technologies are likely to change the competitive landscape and introduce new challenges and opportunities in relation to digital transformation.

In the section that follows, we present a framework for digital transformation that builds on some important research themes and discuss the implications of past findings for practice. The framework is rooted in an amalgamation of research and practice-oriented models of digital transformation, covering some key themes without being exhaustive. The final section follows some of the key trends and identifies hype cycles that are likely to occupy research and practice attention in the years to come and provides a brief overview of how they are likely to create shifts in the way organizations operate [12].

## 2 A Framework for Digital Transformation for Research and Practice

In the framework presented in Fig. 1, we identify four main phases that underpin digital transformation initiatives. These phases include among others the following activities: First, organizations must develop an in-depth understanding of the current competitive landscape and the dynamics that characterize their industries; decode the relationships with key business partners, customers, and other stakeholders; and identify technological shifts and disruptive new digital tools. Doing so enables organizations to have a better awareness of the landscape in which they operate and chart the different forces that shape ongoing and future initiatives. Second, digital transformation should be approached as a strategy that is pursued by the entire organization and deployed within organizations in a top-down approach. This requires that strategies should be adapted to the different levels they are relevant.
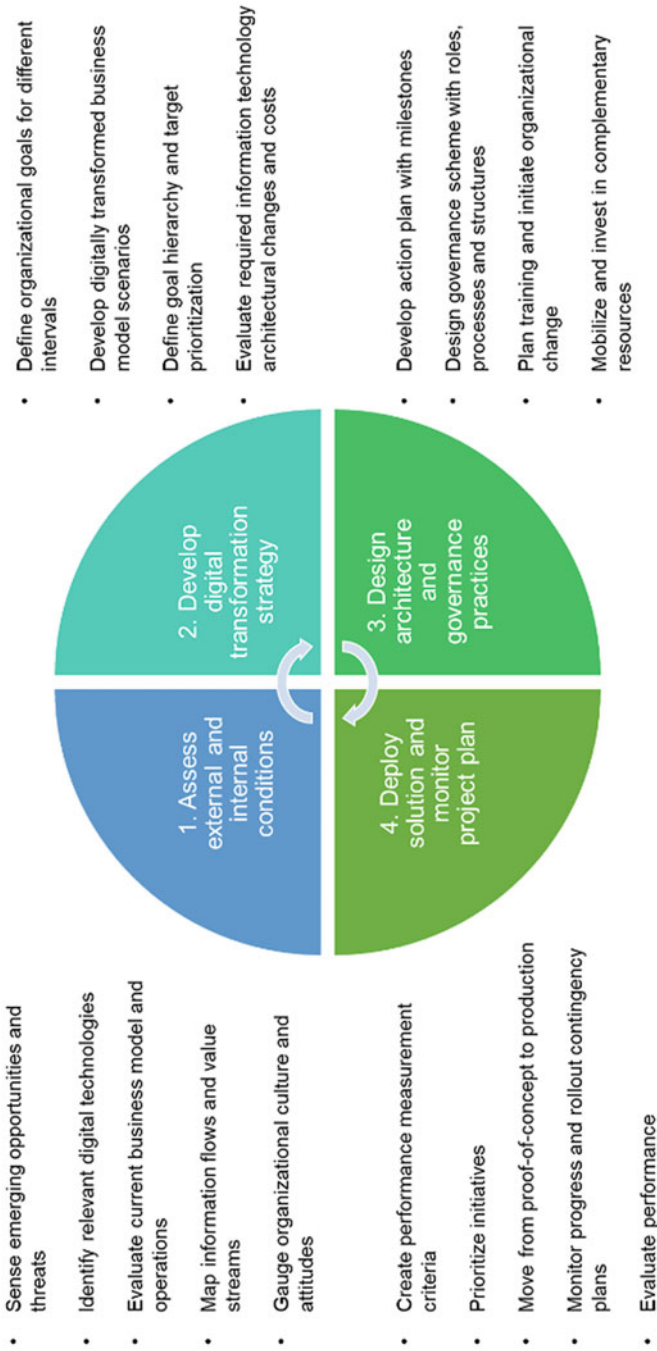
- Sense emerging opportunities and threats
- Identify relevant digital technologies
- Evaluate current business model and operations
- Map information flows and value streams
- Gauge organizational culture and attitudes

- Create performance measurement criteria
- Prioritize initiatives
- Move from proof-of-concept to production
- Monitor progress and rollout contingency plans
- Evaluate performance

- Define organizational goals for different intervals
- Develop digitally transformed business model scenarios
- Define goal hierarchy and target prioritization
- Evaluate required information technology architectural changes and costs

- Develop action plan with milestones
- Design governance scheme with roles, processes and structures
- Plan training and initiate organizational change
- Mobilize and invest in complementary resources

1. Assess external and internal conditions

2. Develop digital transformation strategy

3. Design architecture and governance practices

4. Deploy solution and monitor project plan

**Fig. 1** A framework for digital transformation

Third, new business models and strategies should be translated into concrete action plans and governance practices that dictate how the technological and other resources are leveraged. During this phase, organizations must mobilize and structure their resources in order to transition to digitally transformed operations. Fourth, it is important to monitor key performance indicators, develop a prioritization plan, and evaluate the progress of transformation efforts in order to ensure that they do not diverge from the set strategies. The framework is positioned in an iterative visualization denoting that digital transformation is not a process with an end goal, but rather a continuous process of identifying emerging opportunities in the new digital landscape and capitalizing on them.

## 2.1 Research Implications

While the framework presented above is predicated on a practice-based view of digital transformation, it can also be used by researchers to explore some emerging issues that still occupy research on digital transformation. These areas, or themes, can broadly be distinguished into the following: impact of technology, organizational change management, co-evolution, and non-economic performance effects. We briefly sketch out these themes next.

### 2.1.1 Impact of Technology

One of the underlying themes that have characterized digital transformation literature has been that the impact that is assumed is highly dependent on the type of digital technology at hand. A key consideration in this regard is that the emerging technologies are likely to have differential impacts not only on the types of performance measures used to evaluate their effect but also on the industries they will influence most. For example, RFID technologies have been instrumental in industries such as logistic, transport, and supply chain management, whereas the emergence of touch screen devices has created major shifts in the consumer electronics, gaming, and software industries. Hence, it is important for future studies to understand the specific shifts new digital technologies create for specific industries, or the processes to which they are likely to have a more pronounced effect. In this part, it is also important that there is a vision of how emerging digital technologies that have not been developed for any specific industry can be harnessed in a way that creates a competitive advantage. In doing so, it is important that researchers examine the role that consumers have in shaping such preferences of technology use and what type of pressure they exert on organizations to move in certain directions.

### 2.1.2 Organizational Change Management

A key understanding in practice is that digital transformation is an ongoing process that does not have a specific endpoint. This strongly contrasts the prevailing view in research where digital transformation is largely seen as a state that needs to be attained. As such, it is important that future studies engage more deeply with the process of enacting change in the organization as a result of digital transformation initiatives. Several sub-themes within this area are worthy of examination: what is the role of power distribution in enabling or inhibiting change, how does structure influence outcomes, and what changes do digital transformation necessitate? In addition, while there is some discussion on the phases that characterize technological deployment, there is limited research on the socio-organizational arrangements of digital transformation. In other words, we know very little about how to plan for preparing humans and teams to be open for change. Furthermore, a prominent theme is how to develop a culture that not only is open to change but also seeks it actively and is geared toward seeking digital innovations and piloting them in different operations. This essentially translated to building a digitally oriented culture which sees novel digital technologies as key components of remaining competitive and actively seeking ways through which to gain an edge by leveraging them appropriately.

### 2.1.3 Co-evolution

The notion of co-evolution in the context of digital transformation entails both internal synchronization with external shifts and the capacity to prompt change concurrently and in harmony with important business partners and other entities. While there is ample evidence highlighting the importance of creating digital interfaces with supplies, business partners, and even customers [13, 14], there is limited empirical research on how such ventures should co-evolve. Typically, digital transformation is seen as a process that has an impact on the abovementioned entities by redefining how focal organizations interact with them. Nevertheless, as organizations become increasingly embedded with their business partners and customers, it is important to understand how they can jointly engage in digital transformation that provides value for all. This becomes a challenging problem as different entities typically also have different requirements as well as oftentimes competing goals. To add to this challenge, organizations face a constant challenge of adapting to changing externa, conditions, which necessitate frequent repositioning of their competitive strategies and as a result of their business partners [15]. Therefore, the role of platform architectures in enabling such loose but not lax collaborations without compromising the ability to effectively co-create value is an important aspect of digital transformation that is likely to occupy future studies. Furthermore, the role of platform arrangements as either enablers or inhibitors of future change can create

new opportunities in exploring the importance that technology has in eco-system formations [16, 17].

### 2.1.4 Non-economic Performance Effects

One of the criticisms of the extant literature on digital transformation is that it typically evaluates results and builds on a premise that economic outcomes are the primary objective that needs to be satisfied. Nevertheless, in recent years, there has been a move toward business models and strategies that promote sustainability principles, such as circular economy strategies. The use of digital technologies to support such strategies has been argued to create radical shifts in several industries [18, 19], transforming how operations are currently done and prompting changes that span entire industries. Nevertheless, despite a more comprehensive outlook on the non-economic effects that digital transformation can result in, there are still limited studies that take an empirical approach in examining how non-economic measures are fulfilled. Such measures can include the social and environmental impact that digital transformation has, as well as looking at phenomena at the micro- and meso-levels [20]. In addition, the recent work-from-home mandate due to the COVID-19 pandemic has placed a renewed emphasis on the human aspect, and especially the psychology and well-being of individuals [21]. As a result, it is important to understand what the effects on cognitive and emotional aspects of individuals are and how these influence other organizational outcomes.

## 2.2    Practical Implications

When it comes to the practical implications by reviewing findings on studies of digital transformation over the past two decades, there are several key points which can help guide practitioners at different levels. We summarize these in accordance with the framework presented in Fig. 1.

### 2.2.1 Assess External and Internal Conditions

One of the most important recurring findings of prior literature is that when organizations are planning their digital transformation strategies, it is important that they have an accurate assessment of the conditions that characterize their industries, country of operation, as well as their internal organizing. Doing so allows for a better positioning in terms of the business requirements and contingencies of the internal and external environment. Thus, any plans toward digitally transforming operations must take into account a thorough analysis of the immediate and long-term changes that are likely to emerge. Several useful tools have been developed to aid managers and other practitioners in this task, such as adapted digital

transformation canvases, deciding on the right digital business models, design thinking, performing persona identification and developing empathy maps, as well as several other tools and methods that can increase understanding of the environment which organizations operate in [22–24]. In addition, organizations can utilize their existing tools, digital technologies, and data in order to identify emerging opportunities and threats and create an organization-wide sensing capability [25].

### 2.2.2 Develop Digital Transformation Strategy

A common theme among many IS researchers articles is that although digital transformation should be seen as an ongoing process, it should also be documented and tied to a clearly documented strategy [26]. This includes developing awareness about the transformative role of digital data across an organization's value chain [27]. Essentially, this translates into a necessity for top managers to consider the effects of digital transformation in their broader competitive strategy and to see emerging technologies as a means of developing unique and hard-to-imitate capabilities that are likely to give them a competitive edge. Therefore, it is important that there is a clear vision of how digitally transforming operations will provide an organization an edge over their rivals and prioritize the areas which are of higher importance in the new digital business strategies. As part of this planning, it is also important that organizations take into account the costs associated with different options, as well as the different ways through which they can realize their digital transformation initiatives. From the academic literature, the resource orchestration perspective can provide practitioners with an overview of the process of structuring, bundling, and leveraging the relevant resources to pursue competitive strategies [28, 29].

### 2.2.3 Design Architecture and Governance Practices

Following the definition of high-level objectives and goals, organizations must further detail their digital transformation processes by deciding the governance practices that will characterize their projects. Doing so entails defining roles and responsibilities, establishing and communicating processes, and setting up relational practices internally and externally [30]. This set of activities has also been defined as seizing by Teece [31], where organizations set out to mobilize their relevant resources in support of a given strategy. Within the information systems literature, there has been a lot of work focusing on approaches and practices for planning and mobilizing IT and other complementary resources [32], as well as on defining enablers and inhibitors of governance practices with their corresponding outcomes [33]. These studies provide an in-depth analysis of the value and associated risks with adopting specific approaches and document best practices of managing digital transformation [34]. One important point however is that such mobilization of resources does not only concern technical infrastructure and data, as human-related

resources are equally as important. It is therefore critical that organizations make plans about how to secure employees with the necessary skills to drive digital transformation or to develop educational programs in order to re-train their current personnel [35].

### 2.2.4   Deploy Solution and Monitor Progress Plan

During the deployment of any new digital technology into production, it is important that organizations have established some key metrics to monitor effectiveness and performance and have placed feedback mechanisms in order to critically assess outcomes. Some prominent examples of digital transformation have shown that in the absence of such metrics, organizations suffer heavy losses due to misalignment with strategic objectives or novel technological solutions not functioning as anticipated [36]. Some practical solutions for avoiding such unintended consequences include gradually moving from proof-of-concept projects to production through carefully planned phase projects [37], as well as defining a priori a set of key performance indicators that can effectively monitor project performance. Furthermore, an important practical recommendation is to formulate contingency plans and have systems in place to avoid any disruptions in operations that might be caused by malfunctions of newly deployed technologies. This is particularly important in critical operations that require constant uptime. Finally, to develop a culture of learning from prior initiatives, it is important that organizations set up clear feedback mechanisms and identify aspects that worked well as well as those that caused delays or inhibited digital transformation.

## 3   Emerging Technologies and What Lies Ahead

In the previous sections, as well as in the chapters that preceded, we have discussed about what lessons can be learned from digital transformation in research and practice and placed a focus on the contingencies of the Norwegian context. Nevertheless, new trends in digital transformation projects are largely shaped by emerging technologies, which are then adopted and adapted by organizations. As such, it is important to examine how digital technologies that are in the early stage of development might influence different industries in the coming years. This analysis is solely based on how the authors envision organizational activities might change due to new emerging digital technologies.

First, the rapid pace at which AI-based applications are being adopted by organizations and their growing capabilities in conducting tasks previously performed by humans is likely to accelerate [38, 39]. Specifically, AI-augmented software engineering is likely to be a breakthrough in the upcoming years, where much of the manual coding and design of systems is now automated. This will lead to a greater access to custom-made software applications for organizations, as well as a

significant reduction in cost developing such applications. Nevertheless, this is not the only areas where AI-based augmentation is likely to have a significant impact, as advances in the domain of generative AI are also likely to influence domains such as fashion, product and digital design, architecture, and art. For example, the music industry will be significantly disrupted with content being created by AI applications based on rich data collected over streaming services. Similarly, generative AI will likely create disruptions in the art industry, with a lot of content catering to different types of customers being fully or partially generated by AI algorithms.

Second, blockchain technologies are likely to see increased applications in several areas such as verifying product authenticity, establishing smart contracts, and as a means of transaction [40]. In fact, many governmental organizations have begun the process of designing their digital currencies, and blockchain technologies will become a major part of the infrastructure that supports such a transition [41]. This will result in transactions being executed directly without the requirement of an intermediary entity. In addition, tracking authenticity of products through supply chains is an application area where blockchain technology is already being implemented [42]. The value of blockchain in such applications is that it allows higher security and transparency and enables more precise authenticity tracking and trust. This is particularly important as global supply chains grow larger, more distributed, and complex. Nevertheless, blockchain technologies come at a cost, at least in their current status, of high environmental impact by requirement of vast amounts of energy.

Third, multi-experience applications that allow many different concurrent modalities such as touch, voice, and gesture, as well as the rapid maturation of augmented and virtual reality devices (AR/VR), create manifold opportunities for organizations in the entertainment industry, as well as in manufacturing, healthcare, and retail sectors, among others. We are already seeing a wave of applications that go beyond gaming, to VR meeting applications, collaboration tools, and immersive learning programs [43]. Such uses of AR/VR are likely to become increasingly common in many industries and for on-job training in professions that require direct exposure to physical locations and equipment. In addition, through the maturation of haptic devices, future applications are likely to include remote operations conducted by humans, as well as robotic training from humans.

While these are just a select few future digital technologies that are likely to disrupt entire industries, there are obviously many more which either we are currently unaware of or are still at very early stages of maturity. In closing this chapter, we wish to highlight the importance of both research and practice in being alert for novel technical developments. This requires considerable effort as it is difficult to discern the application areas of early prototypes; however, it will result in a forward-looking perspective that embraces change.

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