

Advancing Digital Transformation: Integrated Digital Transformation Framework for a Successful Deployment

Munir Majdalawieh

Information Systems and Technology Management Department

Zayed University

Dubai, UAE

munir.majdalawieh@zu.ac.ae

Abstract

In today's knowledge-based digital economy, the pace of innovation is accelerating with disruptive technologies being discovered and introduced rapidly. The new global business environment has pressured many organizations to be more aggressive in adopting innovation and emerging technologies and use them as the cornerstone of their competitive strategy. Moreover, changing customer behavior, demand and requirement have led to complex changes and created an urgency to digitally transform an organization. In such an environment, rapid transformation is needed to accelerate and innovate business activities, business processes, models, and, ultimately, the workforce competencies. In such a situation, many c-suite executives are facing various challenges such as rigid processes, risk avoidance, digital disruption, interdepartmental conflict, disinterest in new ideas and complacency to move forward. These challenges require a vastly different approach to digitally transform a company's business. The objective of this paper is to propose an integrated digital transformation framework by integrating the business-need space (model elements), problem space (design thinking), solution space (Waterfall, agile) and change management space methods for a successful digital transformation deployment.

Keywords

Integrated framework, digital transformation, design thinking, change management, agile, system development life cycle, information systems

1. Introduction

In recent years, Digital Transformation has attracted increasing attention from researchers and practitioners (Nikolova and Antonova, 2019; Haverkort and Zimmermann, 2017; Hess et al. 2016; Bonnet et al. 2012; Capgemini and MIT, 2011; Lucas Jr. and Goh, 2009). The transformation affects every aspect of a company's business in its entirety and leads to changes in the way of doing business (Haverkort and Zimmermann, 2017) and even in its business process models (Lucas Jr. and Goh, 2009). Therefore, it is essential to understand the technological options as well as the impact of adopting these technologies in the enterprise.

Digital transformation is the profound transformation of business and organizational activities, processes, competencies and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way, with present and future shifts in mind.

With emerging technologies like artificial intelligence, blockchain, IOT, big data, sensor technologies, cloud and mobile disrupting the marketplace in all industries, enterprises are facing a substantial threat from startups, modern IT solutions and other enterprises who are integrating these technologies into their enterprises in agile processes. For example, Blockchain has created a threat to the entire traditional banking system. Chatbots will be the cornerstone of future customer service, such as the work of consumer helpdesks.

Digital transformation is a highly complex, enterprise-wide endeavor (Hess et al. 2016). Digital transformation has become a high priority on the c-suites executives' strategic agendas. Bonnet et al. (2012) concluded that nearly 90% of executives in the U.S. and U.K. are expecting information and digital technologies to make an increasing strategic

impact to their overall business in the coming decade. Adopting and integrating new digital technologies into the enterprise infrastructure is one of the biggest challenges that companies are currently facing.

Today, every organization tries to grasp value from IT while engaging in an increasing complex range of IT-related risks. The effective use of best practices can help to avoid re-inventing wheels, optimize the use of scarce IT resources and reduce the occurrence of major IT risks, such as: project failures, wasted investments, intellectual property theft, data loss and data breaches, system disruptions, failure by service providers to understand and meet customer requirements, and compliance penalties.

To take advantage of digital transformations and to unlock new business opportunities and to remain competitive, enterprises must create a practical roadmap based on a series of milestones. Digital transformations depend on several factors, including the nature of the industry in which the company competes, the age and size of the company, the number of legacy tools and processes that must be transformed and the motivation of company owners and leaders to impact change in their businesses. Several challenges have been identified that are associated with digital transformations including: initiation challenges, execution challenges and governance challenges (Capgemini & MIT, 2011).

This paper focuses on helping enterprises to take advantage of Digital Transformation to address the transition issues and development and implementation and deployment challenges. The objective of this paper is to propose an integrated framework for a successful digital transformation. The paper will try to integrate the business-need space (model elements), the problem space (design thinking), solution space (SDLC), and the change management space to help enterprises produce a product/service that best meets the enterprise goals and objectives.

Following the introduction, Section 2 provides an overview of the methods, frameworks in the identified spaces whilst Section 3 presents the analysis of the framework. The proposed framework is discussed in Sect. 4. Finally, limitations of this research and future work are addressed with the conclusion.

2. Research Motivation

This research focuses on helping enterprises to digitally transform their business in an effective and efficient manner. The aim is to produce an integrated digital transformation framework by aligning well-known methodologies such as Design Thinking, Agile SDLC, Waterfall SDLC and Change Management into four spaces (business need, problem, solution, operational) to address the challenges posed by Digital Transformations. This research aims to deliver a better integrated framework to produce a product or a service that best meets user/customer needs with minimum waste and time, and enables the business to achieve efficiency comparing with island and traditional sequential approaches. The rest of the paper is organized as follows.

3. Digital Transformation

Digital Transformation is a current, evolving field and it challenges almost all business sectors. It is severely under-researched and more research in the area should be done as it is expected to impact all business sectors. Many researchers and practitioners have defined Digital Transformation in different ways. Even businesses defined it differently in the same industry. It has a different meaning in various businesses and even companies in the same business having a unified definition is something difficult to make (Westerman et al., 2011). For example, i-scoop (2016) defines digital transformation as “the profound transformation of business and organizational activities, processes, competencies and models to fully leverage the changes and opportunities of a mix of digital technologies and their accelerating impact across society in a strategic and prioritized way, with present and future shifts in mind”. According to Congdon (2015): “Digital transformation is the integration of digital technology into all areas of a business, fundamentally changing how you operate and deliver value to customers.”

As such, digital transformation is about integrating digital technology into all the functional areas of the enterprise (finance, marketing, production, and human resources management, etc.). This requires a fundamental change to how enterprises run their business and how they deliver value to their customers/users. Moreover, digital transformation requires the acceptance by the enterprise’s employees since it frequently has a major change in the operations and responsibilities of employees (Bonnet, Westerman & McAfee, 2014).

In recent years, enterprises have conducted several initiatives to explore new digital technologies and to exploit their benefits. Enterprises need to establish management practices to govern these complex transformations (Matt et al., 2015). This requires the formulation of a digital transformation strategy that serves as a central concept to integrate the entire coordination, prioritization, and implementation of digital transformations within the enterprise (Matt et al., 2015). The exploitation and integration of digital technologies often affect large parts of enterprises and even go beyond their borders by impacting products, services, business processes, sales channels, and supply chains. Potential benefits of digitization are manifold and include increases in sales or productivity,

We drew our inspiration for the proposed framework from the keywords associated with the definitions of digital transformation like “Digital disruption, fundamentally changing, faster deployment, digital transformation strategy, integration, stages, ongoing journey.”

i-scoop (2016) describes digital transformation as a journey that needs a staged approach with a “clear roadmap, involving a variety of stakeholders, beyond silos and internal/external limitations.” According to i-scoop (2016), the roadmap should consider that “end goals will continue to move as digital transformation de facto is an ongoing journey, as is change and digital innovation.”

4. Methods, Frameworks in the Identified Spaces

Methodologies, such as Business-Need, Design Thinking, Agile, SDLC and Change Management are applied and familiar in many enterprises. The four spaces identified above are well-defined in enterprises. The application of the methodologies is often localized to specific business units (departments), specific phases of the product/service lifecycle (Nikolova and Antonova, 2019) and specific spaces. For example, design thinking is applied in the problem space in the initial phases of the problem discovery stage, while agile methods are being used in the solution space in the product execution stage.

A holistic approach, integrating methodologies with their appropriate spaces, will reshape the management role into a more strategic paradigm, consistently integrating iterative models of business need, problem-solving and change, to deployment of new products/ services or updates.

The framework that we present in this paper supports the need for a holistic approach for a need-driven process. The framework is based on aligning the methodologies with the four spaces to ensure consistency and the complete development of the lifecycle.

Let’s briefly examine the methodologies and the four spaces.

4.1 Business Need Space

Accurately identifying the business need is key to ensuring not only that the appropriate digital technology solution is chosen but that it can potentially deliver significant business value. The goal of digitization should not be primarily to increase business efficiency and effectiveness, but also to establish new business models and change the way of thinking for the benefit of users and/or customers. As such, a stage-by-stage IS/IT/business plan is essential to build a bridge between business and IS/IT, and to align IS/IT strategy with the business strategy. The user requirements, user requests, and the existing systems and data need to be fully analyzed for smooth integrations of new digital technologies.

Understanding the customer requests and requirements and identifying the business need early in the process gives a clear understanding of why the change is being initiated. Any digitalized solution option that does not satisfy the business needs and the business goals should be eliminated from consideration because it serves no purpose.

Digital transformation embraces the realignment of technology and new business models to more effectively engage digital customers at every touchpoint in the customer experience lifecycle. Therefore, successful digital transformation begins with an understanding of consumer behavior, preference requirements and choices. It then leads to major consumer-centric changes within the organization that address these requirements. Such a consumer-centric process

has significant consequences for enterprises. Enterprises will need to continue managing existing products and services, while developing strategies to manage the shift in the business model.

4.2 The Problem Space: Design Thinking

The problem space is the current state of the enterprise where the users/customers and their requirements live. The current state must be understood so that the enterprise can leverage its resources' creativity and innovation to define a new state and a map between the two.

In recent years, Design Thinking has attracted increasing attention from researchers (Stewart, 2011; Volkova and Jākobsone, 2016; Shapira et al., 2017), companies (Kolko, 2015), and the media (Brown and Martin, 2015) as a novel problem-solving methodology. Design Thinking focuses on developing innovative products, processes, systems, and solutions by applying design principles to the way people work (Brown, 2008; Plattner et al., 2011; Kolko, 2015). Potential solutions are identified through a creative and iterative process, which helps users better manage complexity.

Disruptive technologies, changing customer requirements, rapidly changing world and markets and shifting economic and political landscapes have led to complex challenges requiring innovative solutions. To discover these new opportunities and reshape towards digital transformation, many enterprises have turned away from traditional analytical thinking towards design thinking, a method that does not immediately consider a solution upfront, but examines both present and future conditions and parameters of the problem, ultimately exploring alternative solutions. In this article, the Stanford's Design Thinking Process (Brown, 2008; Plattner et al., 2009) will be used. It consists of the following five stages: Empathize (Connect with and understand the users); Define (Identify (reframe?) the core problems); Ideate (Brainstorm lots of ideas); Prototype (Narrow down the ideas and build prototypes); and Test (Use the results to support decision-making).

In the last few years, Design Thinking has gained increasing attention from researchers and practitioners (Stewart, 2011; Volkova and Jākobsone, 2016; Shapira et al., 2017; Kolko, 2015; Brown and Martin, 2015; Lindberg et al. 2011; Lindberg et al. 2010) as a methodology to solve ambiguous problems (Tilman et al. 2010). Design Thinking focuses on developing innovative products, processes, systems, services and solutions by applying design principles to the way people work (Kolko, 2015). Design thinking is a user-centric methodology, given its propensity to connect both enterprises and users in the local context (Johansson-Sköldberg, Woodilla & Çetinkaya 2013). Design thinking primarily adds value in the problem space.

It is suggested that typically, the larger a company, the less likely they are to consider design thinking methods as an approach to solving problems due to pressure from stakeholders who value reliability over validity. More recently, however, Kolko (2015) has identified that a shift is occurring towards utilizing design thinking within larger organizations. This shift is focused on applying the principles of design to the way in which people work to create a design-centric culture within an organization, which removes design from historical associations with aesthetics and craft and instead elevates the role of design towards imparting a set of principles to all, to help bring ideas to life (Kolko 2015).

In the early stages of development, the Design Thinking approaches were circular approaches whereas later ones are sequential (Efeoglu et al. 2013). More recently design thinking has been put forward as a step-by-step method that anyone can follow and have become widely popular and used. The rapid acceptance of design thinking as a technique has however become a cause for concern from researchers and practitioners. To prevent design thinking from being applied superficially, advocates argue that design thinking should be seen as a series of overlapping spaces, as opposed to a sequence of orderly phases (Brown and Martin, 2015).

Kolko (2015) indicated that design thinking “works extremely well for imagining the future. But it’s not the right set of tools for optimizing, streamlining, or otherwise operating a stable business”. He added, design thinking “helps people and organizations cut through complexity. It’s great for innovation.”

4.3 The Solution Space

The solution space is where products, services, processes, maintenance and experiences that fulfill users'/customers' live. The solution can only be as good as the problem is discovered and understood. The solution is determined by producing new ideas, models and prototypes that potentially solve the problem.

The challenge for managers lies in deciding when to move from problem space to solution space. As a rule, a certain amount of validation about the problem must be considered before commencing with SDLC. Moving from the problem space to the solution space should carefully consider the strategic fit and the portfolio fit. The project's fit with the portfolio's markets and technologies are tied to the overall business strategy (Behrens and Patzelt, 2015). Moving from the problem space to the solution space should be considered a Go/No-Go decision.

Several methods and techniques used for the system development life cycle (SDLC) such as the waterfall and agile approaches. The goal of the SDLC is to bring the problem space to the solution space. SDLC lives entirely in the solution space along with other solution methodologies such as agile.

Agile is an approach and scrum of building product or service based on a process of continuous iteration. Iteration allows cycling within a phase and between phases. Therefore, there is always a way to move back and forth between the problem and solution space (Lindberg et al., 2010). With each iteration, the design thinker's knowledge will increase in both the problem and the solution space, until an acceptable state of solution has been found (Cross, 2007).

4.4 The Change Management Space

The business environment in today's competitive climate is very complex and needs a deep study. As such, change management has been widely investigated. Change management is defined by Moran and Brightman (2000) as "the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of the marketplace, customers and employees."

Change is a recurring process. To really implement change effectively, you need to be doing several things at the same time. Change management cycles repeatedly go through the following phases:

- (1) Assess for change (understand the current situation)
- (2) Prepare for change (determine the desired state)
- (3) Plan for change (develop a change plan)
- (4) Implement the change
- (5) Sustaining the change (track and stabilize results)

Figure 1 presents these phases graphically.



Figure 1: Change Management Phases

Change management activities must operate at a high level today since the rate of change is greater than ever (Saka 2003). Change must be viewed as an integrated, dynamic and continuous process of organizational improvement. It is not a matter of “adding-on” or “adding-in” new or missing functionality of capability to the current environment.

In the era of digital transformation, there are several brutal consequences if organizations fail to build the capacity to change quickly and efficiently (Miller and Proctor 7-8, 2016):

- Organizations can't keep up with their competitors (where the marketplace has been disrupted by new entrants)
- Recovery is tough (after a decline)
- The engagement of employees becomes far more difficult (engaged workers)
- Employees suffer from change fatigue
- Business performance deteriorates rapidly (profit, market share)

In the era of digital transformation, there is an urgent need to replace the contingent style of change management with the need to accommodate emergent change. In which, the need to establish the capability to process change on an as-needed and more ‘immediate’ basis and not wait until the pressure for change builds up to the point that urgent and significant step changes are required.

Having a holistic and progressive approach to change management helps to define and characterize an organization and contributes positively to the need to present a positive image to the organization's stakeholders such as users, customers, suppliers, potential employees and the ‘competition’.

5. Analysis

Recent research has been largely concerned with providing guidance on certain aspects of digital transformation; it has not addressed a holistic approach to the development and implementation of an enterprise digital transformation strategy (Hansen et al 2015). Some researchers argue for a digital business strategy that combines IT and business strategy (Bharadwaj et al 2013).

Though a digital business strategy may indicate a company's wide digital business vision, it typically lacks a clear specified guideline on the certain transformational steps and how to approach digital transformation and implement a well-defined digital transformation strategy (Hess et al., 2016; Bain & Company, 2015).

Capgemini & MIT (2011) discuss how to overcome digital transformation issues and challenges in order to successfully achieve the business goals and objectives. Organizations need to do more to gain value from their IT investments, while also envisioning more radical new ways of running their business. Capgemini & MIT (2011) state that successful digital transformation comes from “reshaping the organization to take advantage of valuable existing strategic assets in new ways”. The risk taking in digital transformation is becoming “a cultural norm as more digitally advanced companies seek new levels of competitive advantage” (Kane et al. 2016).

6. The Proposed Framework

To resolve transition issues, development, implementation, deployment and operational challenges, and to reduce the deployment risk, we propose an Integrated Digital Transformation Framework (IDTF). The IDTF integrates four spaces that in concert are essential for the formulation and implementation of a digital transformation deployment: business need space, problem space, solution space and the operational space (Figure 2).

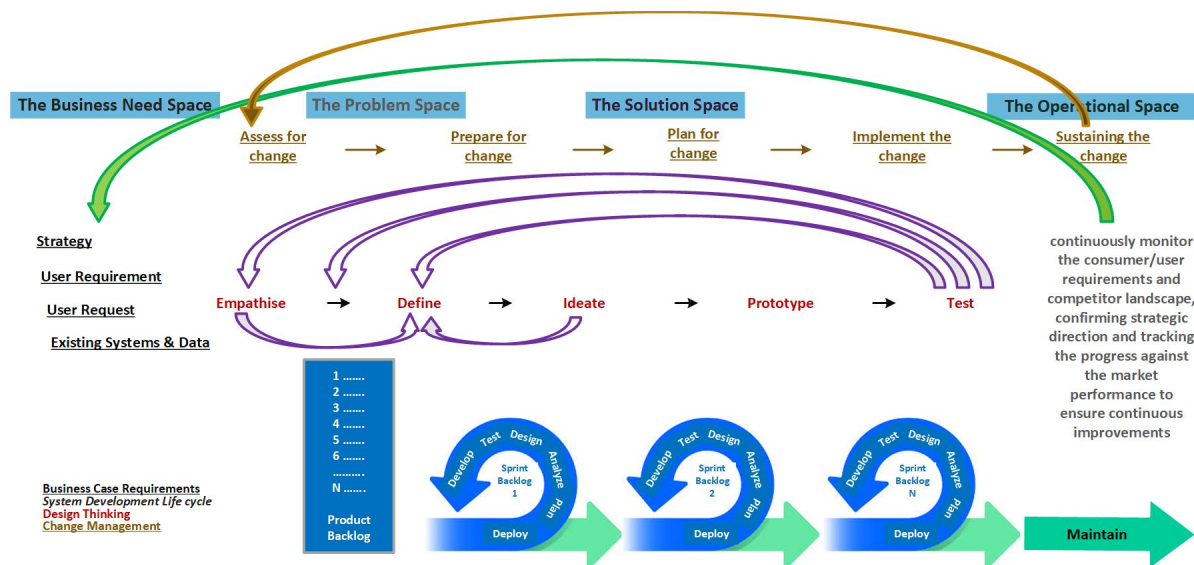


Figure 2: The Integrated Digital Transformation Framework

The joint framework is to have one integrated framework drawing from the four identified spaces and the identified methodologies. Integrating the joint framework with the other organizational activities will guarantee the seamlessness of the deployment and the integration of the digital technologies into the enterprise. The joint framework allows enterprises to: (1) implement a single and integrated method that delivers value to the customers/users; (2) set priorities to accomplish their strategic goals and objectives; (3) keep up with digital trends to stay effective and relevant to the customers/users; (4) seamlessly and rapidly integrate emerging technologies into their infrastructure; (5) lower costs through the whole value chain.

7. Limitations and Future Work

The proposed framework was developed based on existing methodologies and literature on Design Thinking, Agile SDLC, Waterfall SDLC, and Change Management and align them into four spaces: business need space, problem space, solution space and operational space. Attention was given to prior academics and practitioners research and findings were considered while developing the framework. However, the framework hasn't been tested in the real environment yet. This research framework can be extended/adapted to any type and/or size of any enterprise. This research is not focused on a specific change management or agile method to follow. Future research may focus on verifying the framework and integrating other spaces and methods for digital transformation.

Conclusion

In this paper, we presented an enhanced integrated digital transformation framework by mapping well-known methodologies such as Design Thinking, Agile SDLC, Waterfall SDLC and Change Management to four identified spaces (business need, problem, solution, operational). The framework will guide managers to implement sustainable digital transformation practices / principles for achieving an effective and efficient operation. Managers need to consider the strategic fit and the portfolio fit of the digital transformation in the business need space and to avoid jumping into a solution space too quickly. Moving into a solution space should be considered only after there is a sufficient validation about the problem.

The main contribution of this paper is to propose an integrated framework and the analysis of the issues and challenges posed by traditional approaches. This paper contributes the body of knowledge on digital transformation research.

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Biography

Munir Majdalawieh is the head of the information systems and technology management department at the College of Technological Innovation and the Provost Advisor on continuing Education and Outreach, Zayed University, Dubai, UAE. Prior to joining ZU in 2012, he worked for the American University of Sharjah (AUS) in UAE for six years and worked for Booz Allen Hamilton, Hewlett Packard, Compaq Computer Corporation, and Digital Equipment Corporation in the USA for more than 22 years. He has published many peer-reviewed papers in international journals and conference proceedings covering topics like enterprise business processes, internal auditing and control, IT security and privacy, MIS, risk management, green logistics and SCM, corporate and IT governance and strategic changes in IT/IS technologies and management. He obtained his Ph.D. in IT and his EMBA from George Mason University, Fairfax, Virginia and his MSc. in Computer Science and Applied Math from Northeastern University, Boston, Massachusetts. He has been teaching several courses in information systems and technology management including SCM & logistics, ERP, MIS, project management, systems analysis and design, business process management, IT strategy and governance, IT audit and control and green computing. He is member of IEOM, INFORMS, ISACA, IIA, and IEEE.