Digital Transformation Technologies Trend and Future and Opportunities

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Abstract: The world is changing faster than ever, in addition digital technologies are bringing about unprecedented transformation and changing our work and lives in ways we have never anticipated. Digital transformation is not about technology—it is about strategy and new ways of thinking. In 2017, the Organization of Economic Cooperation and Development (OECD) launched a new global project –"Going Digital: Making the Transformation Work for Growth and Well-being". Its goal is "to help policymakers better understand the digital transformation that is taking place and create a policy environment that enables their economies and societies to prosper in a world that is increasingly digital and data-driven" (OECD, 2018) [1]. A digital transformation requires instilling a culture that supports the change while enabling the company's overarching strategy. The main objectives of this chapter was to provide a digital Transformation: History, Present, and Future Trends, throw a concepts for understanding of the concept of digital transformation model, specifying its key elements/components/categories.

Keywords: Customers, Competition, Data, Innovation, and Value.

1. Introduction

There are many definitions for Digital Transformation, There are many research discuss the digital transformation strategies [2], [3], [4], [5].[6], [7], [8], [9].

Table 1: Definitions of Digital Transformation

Source	Definition
European Commission (2019)[10]	"Digital transformation is characterized by a fusion of advanced technologies and the integration Of physical and digital systems, the predominance of innovative business models and new processes, and the creation of smart products and services."
OECD (2018)[]	"Digital transformation refers to the economic and societal effects of digitization and digitalization. Digitization is the conversion of analog data and processes into a machine-readable format. Digitalization is the use of digital technologies and data as well as their interconnection which results in new or changes to existing activities.
Ismail, Khater, and Zaki (2017)[11]	[Digital transformation is a] "process through which companies converge multiple new digital technologies, enhanced with ubiquitous connectivity, with the intention of reaching superior performance and sustained competitive advantage, by transforming multiple business dimensions, including the business model, the customer experience (comprising digitally enabled products and services) and operations (comprising processes and decision-making), and simultaneously impacting people (including skills talent and culture) and networks (including the entire value system)."

Schwertner (2017)[12]	"The application of technology to build new business models, processes, software and systems that result in more profitable revenue, greater competitive advantage, and higher efficiency.
Deloitte (2018)[13]	"Digital transformation is the use of technology to radically improve the performance or reach of an organization. In a digitally transformed business, digital technologies enable improved processes, engaged talent, and new business models."
Bloomberg (2018)[14]	"Digital transformation requires the organization to deal better with change overall, essentially making change a core competency as the enterprise becomes customer-driven end-to-end. Such agility will facilitate ongoing digitalization initiatives but should not be confused with them."

Also there are many research me be use to integrate this field: [15],[16],[17],[18],[19],[20],[21],[22] ,[23] in addition in the geospatial fields [24], [25], [26], [27], [28] , [29], [30], [31], [32], [33] , [34], [35], [36], [37], [38] , [39], [40], [41], [42], [43], [44], [45], [46],[47],[48]. [49],[50].

Why Is Digital Transformation Important?

There are several answers to this question, but the most important answer is that it is crucial for the survival of businesses. Digital transformation is the driver that carries businesses forward into the future.

As times advance and new technologies arrive, customer behavior also differs. Satisfying customers is at the crux of all businesses today. Thus, adapting to digital transformation is key for providing exceptional customer experiences.

And not just that, digital transformation technologies empower businesses to embrace innovation and improve the efficiency of their work. It enables them to make better decisions, strengthens their business relationships, and overall helps a business board a safe flight into the future.

2.   Digital Transformation Domains

According to Professor Rogers, there are five domains of strategy that digital is changing. Outlined below are those five domains of strategy: Five Domains of Digital Transformation Customers, Competition, Data, Innovation, and Value. [51].Customers, Competition (how businesses compete and cooperate with other firms.), Data (how businesses produce, manage, and utilize information.), Innovation (the process by which new ideas are developed, tested, and brought to the market by businesses.), and Value (a business delivers to its customers—its value proposition.).
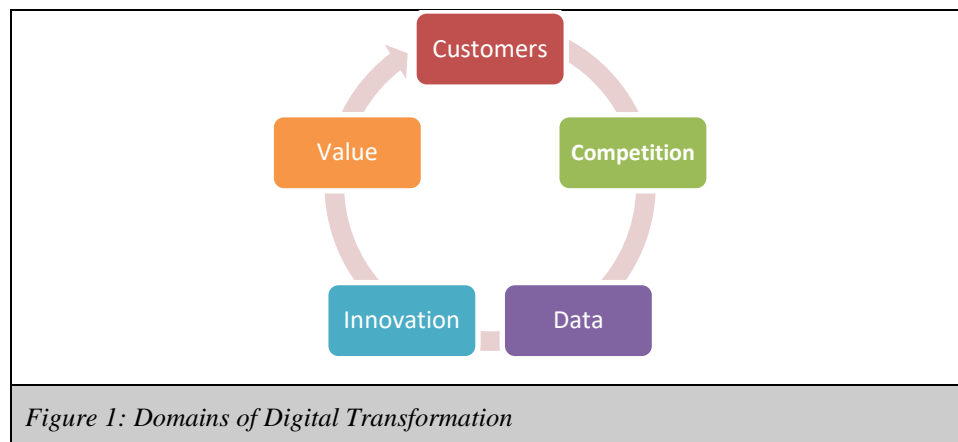

Figure 1: Domains of Digital Transformation

Table 2: Changes in Strategic Assumptions from the Analog to the Digital Age

	From	*To*
Customers	*Customers as mass market*	*Customers as dynamic network*
	Communications arebroadcast to customers	*Communications are two-way*
	Firm is the key influencer	*Customers are the key influencer*
	Marketing to persuade purchase	*Marketing to inspire purchase, loyalty, advocacy*
	One-way value flows	*Reciprocal value flows*
	Economies of (firm) scale	*Economies of (customer) value*
Competition	*Competition within defined industries*	*Competition across fluid industries*
	Clear distinctions between partners and rivals	*Blurred distinctions between partners and rivals*
	Competition is a zero-sum game	*Competitors cooperate in key areas*
	Key assets are held inside the firm	*Key assets reside in outside networks*
	Products with unique features and benefits	*Platforms with partners who exchange value*
	A few dominant competitors per category	*Winner-takes-all due to network effects*
Data	*Data is expensive to generate in firm*	*Data is continuously generated everywhere*
	Challenge of data is storing and managing it	*Challenge of data is turning it into valuable information*
	Firms make use only of structured data	*Unstructured data is increasingly usable and valuable*
	Data is managed in operational silos	*Value of data is in connecting it across silos*
	Data is a tool for optimizing processes	*Data is a key intangible asset for value creation*
Innovation	*Decisions made based on intuition and seniority*	*Decisions made based on testing and validating*
	Testing ideas is expensive, slow, and difficult	*Testing ideas is cheap, fast, and easy*
	Experiments conducted infrequently, by experts	*Experiments conducted constantly, by everyone*
	Challenge of innovation is to find the right solution	*Challenge of innovation is to solve the right problem*
	Failure is avoided at all cost	*Failures are learned from, early and cheaply*
	Focus is on the "finished" product	*Focus is on minimum viable prototypes and iteration after launch*
Value	*Value proposition defined by industry*	*Value proposition defined by changing customer needs*

	Execute your current value proposition	*Uncover the next opportunity for customer value*
	Optimize your business model as long as possible	*Evolve before you must, to stay ahead of the curve*
	Judge change by how it impacts your current business	*Judge change by how it could create your next business*
	Market success allows for complacency	*"Only the paranoid survive"*

3. Digital Transformation Tool

There are many strategic planning tools : Customer Network Strategy Generator, Platform Business Model Map, Competitive Value Train, Data Value Generator, Convergent Experimental Method, Divergent Experimental Method, Value Proposition Roadmap, Disruptive Business Model Map, Disruptive Response Planner, These tools can be categorized as follows:

- *Strategic ideation tools*: Tools for generating a new solution to a defined challenge by exploring different facets of a strategic phenomenon (Customer Network Strategy Generator, Data Value Generator)
- *Strategy maps*: Visual tools that can be used to analyze an existing business model or strategy or to assess and explore a new one (Platform Business Model Map, Competitive Value Train, Disruptive Business Model Map)
- *Strategic decision tools*: Tools with criteria for evaluating and deciding among a set of generic options available for a key strategic decision (Disruptive Response Planner)
- *Strategic planning tools*: Step-by-step planning processes or methods that can be used to develop a strategic plan tailored to a specific business context or challenge (Convergent Experimental Method, Divergent Experimental Method, and Value Proposition Roadmap).

4. Digital Transformation Technologies

Today, new digital transformation technologies are emerging, existing technologies are strengthening- the concept of digital transformation.
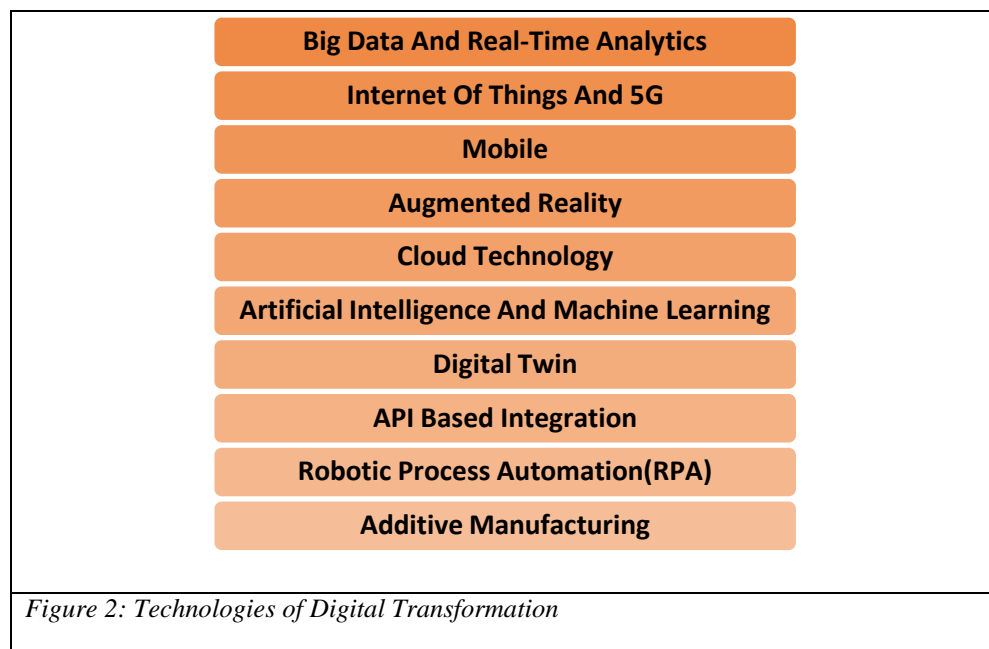
Big Data And Real-Time Analytics

Internet Of Things And 5G

Mobile

Augmented Reality

Cloud Technology

Artificial Intelligence And Machine Learning

Digital Twin

API Based Integration

Robotic Process Automation(RPA)

Additive Manufacturing

Figure 2: Technologies of Digital Transformation

6.1. Big Data And Real-Time Analytics

The increase in the number of connected devices in recent years has resulted in the accumulation of data like never before. At this rate, we are creating 2.5 quintillion bytes of data every day, in the form of structured, unstructured, and raw data. This exponential growth of data is expected to further increase in the coming years.

Now, data is great. It is essentially a game-changer that can give businesses great insights and facilitate their working. But the challenge lies in the processing of this data.

Data in fragmented forms can be difficult to organize and can even have adverse effects on organizations.

According to IBM, these fragmented data cause businesses in the US to lose $3 trillion annually. So the organization of data is the need of the year. This is where big data and analytics make things easy.

By implementing big data analytics, it is possible to process the humongous amount of data to extract the right information for a particular business to help them model their strategies and take relevant decisions. By providing tangible results, big data empower organizations to carry on with their transformation strategies more effectively.

6.2. Internet Of Things And 5G

IoT and 5G are two revolutionary digital transformation technologies that promise to bring excellent efficiency across several industries.

With the Industrial Internet of Things (IIoT), the manufacturing industry is taking leaps in digital transformation. This technology is helping manufacturers update their operations and make them more flexible, innovative, fast, and safe.

In the retail industry, IoT plays a significant role in increasing customer satisfaction by delivering valuable insights.

In healthcare, telemedicine is able to prosper and provide valuable services, thanks to IoT.

And with the deployment of 5G, IoT applications will reach a new standard. In this era, where businesses have to stay connected at all times, the 5G network with its high speed, greater capacity, and lower latency is the technology that we need.

IoT devices need more bandwidth, fast transmission capabilities, and seamless connectivity- all of this can be achieved with the integration of 5G.

6.3. Mobile

Mobile applications bring adaptability and portability to businesses. In today's times when remote working is thriving, and flexibility in work schedule is becoming more common, mobile is a powerful technology that will help people stay connected with a finger touch.

Mobile is also a powerful technology that is a basic necessity for many other technologies like AR, IoT, etc. Mobile enables people to work on the move, gives them more control, and improves their operations.

It facilitates real-time communication, which is a great boon in several industries like manufacturing, agriculture, etc. The portability offered by mobile devices empowers people to perform tasks, co-ordinate, and communicate, even when on-field.

6.4. Augmented Reality

AR is already a well-established technology in several fields but has immense potential for the future as well. The way it takes human-machine interaction to another level and provides seamless connectivity between the physical and digital worlds is set to remain in trend for years to come.

AR aids businesses improve productivity, quality and provide knowledge transfer, training, and excellent customer support. It paves the way for more intuitive methods of dealing with technology– a transformative approach that will revolutionize how we interact with digital systems.

AR will transform management in industries with its analytical outcomes. Manufacturing, health care, retail industry, etc., will enjoy the benefits of AR technology.

6.5. Cloud Technology

A key digital transformation technology that provides flexibility, scalability, and agility- Cloud is an inevitable component in digital transformation.

To handle large amounts of data cost-effectively and securely, traditional storage services are not enough. This realization has led industries to move towards Cloud technology. According to reports, in the next five years, the manufacturing industry will be adopting Cloud technology to a surprising extent.

Organizations can also choose between public, hybrid, or on-premise Cloud services according to their requirements. Hybrid Cloud is gaining popularity from the three options and is expected to be a significant digital transformation technology in 2022.

6.6. Artificial Intelligence And Machine Learning

Artificial Intelligence is no longer a fancy technology but is becoming the core of most businesses today. Organizations of all sizes are implementing artificial intelligence to aid their business operations and decision making.

With the extended availability of data, machine learning technology, and high-performance computing power, artificial intelligence is being used like never before to provide excellent analytical insights. This gives rise to new methods of solving problems, which opens up a door of vast possibilities in the future.

Automobile, healthcare, retail, IT industry, etc., are already utilizing AI and ML to improve their performance. AI will soon impact every significant decision that organizations and individuals make. The transformation that it is bringing about is so advanced that it will disrupt our lives in a good way.

6.7. Digital Twin

The digital twin is another digital transformation technology that will help reduce the gap between the physical and digital worlds. It is already making a great impact in mainstream industries.

In simple terms, we can define a digital twin as a digital copy of a physical thing such as products, processes, or tasks. Using this digital twin, you can simulate, collaborate, measure, predict and output information from the shoes of its physical counterpart.

It finds several applications in different fields. In healthcare, digital twins are being used to create a better diagnosis. In the automotive industry, it is being used to optimize manufacturing.

This technology is so promising that its market is expected to reach $35.8 billion by 2025.

To make real-time data-driven decisions, design new processes, explore new opportunities, and improve existing processes, digital twins will be used at an accelerated pace in the coming years.

6.8. API Based Integration

When we are looking at a future that projects connectivity, API based integration is a much needed digital transformation technology for businesses.

Its benefits are numerous and include reduced market time, rapid development, and increased accessibility of information. It empowers businesses to make smart decisions, drive innovation and improve customer experience- which are the very goals of digital transformation.

It is a flexible digital transformation technology that businesses can use to implement small budget investments. Popular e-commerce store eBay achieved a 60% increase in revenue by implementing API based integration.

6.9. Robotic Process Automation(RPA)

One of the first steps of digital transformation for most industries is automation. And RPA is emerging to be an effective tactic for automation. With the expectation of a $2.9 billion market in 2022, RPA is expanding rapidly.

When RPA is integrated with other digital transformation technologies like AI and ML, the value it can generate is incomparable. Robotics can take the burden of mundane tasks off employees' shoulders and help them focus on work that demands their expertise.

With RPA, Robotics grows beyond just this repetitive task automation and finds space in areas that need more human capabilities like analysis and decision making. It aids humans in their operations by bringing efficiency, speed, and accuracy to the tasks and empowering businesses through the robotic process.

6.10. Additive Manufacturing

A promising digital transformation technology, additive manufacturing, or 3D printing is expected to grow tremendously in the next five years. It is a technology that will revolutionize the manufacturing industry like never before.

It helps to speed up traditional manufacturing methods, aids in making operations more efficient, and overall reduce the cost of operations.

According to research, 36% of people think that additive manufacturing has changed the way their industry operates, and 55% think that it will soon bring a change to their processes.

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