

Digital Transformation Strategy Design for National Public Service

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Abstract

From the mid-to-late 2010s, technology was frequently mentioned in the definition of digital transformation. In the early stages, the private sector started actively using it, and the public sector started to take it seriously. Divided into “providing value and cultural change, the main goals of digital transformation were accomplished, and the ideas of creating new values in social and industrial systems and applying digital technology appeared to be related. Digital transformation, defined as the idea of combining digital solutions to boost competitiveness and add value, necessitates social innovation and cultural shifts at the national level. In order to encourage the digital transformation of the industry, the Industrial Digital Transformation Promotion Act was passed in December 2021. This set the groundwork for a comprehensive and organized approach to facilitating the use of industrial information. We will examine the nature and extent of digital transformation in this study, as well as discover the organizations and regulations that support it. We also want to examine the essential standards and technologies needed to put the digital transformation plan into practice. Lastly, We’ll make some conclusions about how this will affect public services’ digital transformation.

Keywords: Data Design, Data Governance, Data Strategy, Digital Transformation, Public Service.

1. INTRODUCTION

Digital Transformation [1, 2], also known as DX, DT, is a broad term that encompasses more than just using basic digital technology including Artificial Intelligence [3, 4, 5, 6] and Bigdata [7, 8, 9, 10] in a particular sector of the economy or business to effect cultural shifts on a national or pan-social level. Simple digitization is not the same as digital transformation. Digitization, which is the straightforward process of transforming the physical components of workflows and processes into digital components, can be considered a crucial initial step in this process of digital transformation. Similar ideas to digital conversion are common to digitization and digitization, which go beyond simply connecting digital technology; instead, they have acted as a catalyst to completely alter the social structure of the nation. Key components, types, steps, and strategies are all part of the comprehensive and methodical framework that has been used to promote digital transformation.

The target strategy, which is embodied through steps like maintaining the status quo, activities, consciousness, strategy, and adaptation, is realized through digital transformation through the use of

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proof-of-concept development, technology implementation plans, strategy improvement, and case studies. It is challenging to gauge the success of digital transformation by merely implementing new technologies; instead, it requires important national or pan-social components like experience, labor, change, innovation, governance, and culture. Digital transformation application fields, digital transformation organizations, digital transformation culture, digital transformation process, and digital transformation models are some of the categories used to categorize different types of digital transformation.

2. RELATED WORKS ON DIGITAL TRANSFORMATION INSTITUTION AND POLICY

First, to enhance our understanding of digital transformation institutions and policies, we would like to look at a representative example: the European Union's digital transformation program and the digital transformation strategy of German manufacturing.

2.1. European Union's Digital Transformation Program

The European Union (EU) is bolstering support for future digital innovation by promoting digital transformation through the 'Digital Europe' program (Programme Europe Numérique, 2021–2027), a funding policy. The program lowers digital gaps, eliminates remaining barriers within a single digital market, ensures appropriate legal and regulatory frameworks in information data, artificial intelligence, and cybersecurity, and supports digital leadership in terms of infrastructure structure. It also encourages investment, innovation, and the digitalization of businesses. In addition to offering subsidies for the acquisition of digital technology through various forms of education, the European Union assists the private sector in developing digital transformation strategies should it choose to move forward with the process. The European Parliament actively supports private digital education to help with the digitalization of public services and to guarantee the respect for fundamental rights and values. In its capacity as a legislator on digital transformation, the Parliament assists in the establishment of policies that will open up new opportunities for the private sector (individuals and businesses).

The 2030 Digital Compass Strategy, which outlines the objectives, measures, and vision of European digital policy with a 2030 deadline, was unveiled by the European Commission on March 9, 2021. Based on Europe's Shaping Europe's Digital Future, this 2020 digital strategy calls for creating legislative proposals to create a governance framework to support projects in significant EU member states and monitoring their progress. In order to strengthen digital manpower and capabilities, the European Commission decided that digitizing public services alone was insufficient. To this end, it expanded the scope of digital transformation innovation within the EU, distributed infrastructure, and introduced the concept of digital citizenship (Ctoyenneté Numérique), which includes citizens' rights and principles. This would guarantee every EU citizen the same level of access to digital media as they would have to offline media.

The European Council, also known as Le Conseil de l'UE, is advancing and establishing a new agenda for digital transformation within the European Union. On March 16, 2021, the European Union will launch a new initiative called Digital Europe, which will finance the adoption of cutting-edge technology in vital fields like cybersecurity, high-performance computers, and artificial intelligence. The European Parliament, or Le Parlement Europeen, is spearheading the innovation in digital transformation that the European Union prioritizes in order to fortify the European Union's response to emerging digital technologies. It seeks to give the private sector—individuals and businesses—new opportunities and serves as a means of participating in the formulation of EU policy.

2.2. Digital Transformation Strategy in German Manufacturing

The German government is presenting the policy vision of High-Tech Strategy and Industry 4.0 Strategy

(2016), which follows High-Tech Strategy (2021) and Industry 4.0 Initiative Strategy (2012), in order to promote nationwide digital transformation and enhance corporate competitiveness. Based on industry experience with digital transformation, the German federal government is putting into practice constant and consistent policies to establish industrial technology development strategies, innovation policies, audacious financial support, and structurally sound cooperation systems in order to maintain its leading competitiveness in the global manufacturing market. It is a major industry driver that seeks to use digital transformation to build an innovative value chain. Germany is closely collaborating with the public and private sectors at the national level to support technological innovation policies and digital transformation in traditional industries. Germany is the country that gave rise to the concept of digital transformation in manufacturing. Through the integration of digital technology into the manufacturing sector which is Germany's forte it seeks to bolster the country's industrial competitiveness.

3. PUBLIC UTILIZATION STRATEGY WITH ELEMENTS FOR DIGITAL TRANSFORMATION TECHNOLOGY

3.1. Digital Transformation Technology

Core technologies for digital transformation are largely divided into 10 types. These include Mobile Technology, Internet of Things, Robotics, Artificial Intelligence (AI), Augmented Reality (AR), Bigdata, Digital Twin, Application Programming Interface (API), Robotic Process Automation (RPA), and Cloud Computing.

A fundamental component of mobile technology is its ability to facilitate digital transformation. The frequency and speed of interactions between the public, private, and private sectors have increased thanks to mobile devices. Applications, websites, and online work must be accessible to members of all public and private organizations nationwide or throughout society through mobile-friendly interfaces.

The Internet of Things is a vast network of interconnected devices that have the ability to automatically gather and share data via linked devices. It establishes a connection with a centralized platform that gathers and retains data from sensors on devices in order to analyze it and make important information available to individuals, organizations, and governments.

Digitalization is incorporated into robotics, which has recently developed into a concept that, in contrast to traditional robotics, values machine-human interaction and enhances robot performance based on information exchanged with each other. When paired with IoT and AI technologies, robotics can yield significant outcomes that benefit organizations, individuals, and society at large.

Artificial intelligence is a field of technology that actively uses data and algorithms, such as machine learning, with the goal of emulating the way the human brain learns in order to gradually increase accuracy. This has a significant influence on digital transformation plans and roadmaps, enabling public organizations and governments to support prompt and accurate decision-making on the inside as well as offer top-notch services to the general and public externally.

The technology known as "augmented reality" expands the physical world into a virtual one by incorporating digital objects, audio, and other sensory elements. Through the use of mobile technology and real-time data, augmented reality can produce visual graphics and virtually explore systems that enable users and operators to use various capacities through mixed visualization.

Bigdata analysis is a crucial digital technology that translates vast amounts of heterogeneous, complex data into meaningful insights, including market trends, unknown correlations, and user patterns (including behaviors and interests). Owing to data complexity, content that is challenging to extract information from using current analysis methods can be analyzed, and real-time analysis is provided to assist in making decisions like diagnosis and prediction based on accurate status.

Using Three Dimension (3D) modeling, digital twins are used to virtually duplicate services or processes

and to replicate processes that forecast performance through data collection from simulations. By integrating with other digital conversion technologies like Bigdata, artificial intelligence, and the Internet of Things, this technology can drive innovation. It also makes it possible to create digital twins for every part, resource, work unit, process, etc.

The majority of digital conversion platforms use the application programming interface (API), a potent technology that connects two or more systems and allows for seamless data exchange between them. When combined with the platform, it provides a central hub where applications are kept according to the API and reacts with the appropriate API to keep participants' communication and information flow going.

The newest technology, robotic process automation, drives digital innovation by automating simple and repetitive manual tasks. It does this by giving organizations and businesses effective workflows, optimized results, reduced error rates, and strong system management capabilities.

Cloud-based technology is a notion of digital resource expansion that aims to increase resource ownership and sharing. It is a crucial part of digital transformation that offers institutions and organizations flexibility, scalability, and agility. It saves resources and ensures dependable maintenance for businesses by storing vast volumes of data in a shared area.

3.2. Technology Convergence Strategy for Digital Platform Government

Through the application or fusion of technology alone or in combination, the aforementioned digital conversion technology offers a variety of digital solutions. The following are the digital transformation technologies that the government of the digital platform requires for public service in four areas: one government, my smart government, a growth platform with the private sector, and a trustworthy and trustworthy digital platform government.

The first theme is 'One Government'. The domain's scope includes the implementation of digital platform government innovation infrastructure, fundamental resolution of data partitions, and overall innovation in the administrative system based on digital technology. Compute solutions that can analyze, store, and share large data sets; cloud-based cluster high-performance computing solutions; reasonably priced data archiving solutions for large-scale data record storage; reasonably priced and potent backup and disaster recovery solutions; cloud migration solutions for data and applications; reasonably priced, fully managed database migration solutions; application development solutions through rapid innovation cycles; hybrid cloud architecture solutions that allow IT infrastructure to grow; compute solutions that can analyze, store, and share large data sets; and the ability to deploy and run applications without servers are among the necessary components. Potential solutions for remote work and service delivery, serverless computing, etc.

The second theme is 'My Smart Government'. This field encompasses integrated services that culminate in a unified application, the deployment of super-personal services that self-manage without intervention, the establishment of a mutually beneficial environment, scientific administration grounded in data and artificial intelligence, the realization of an equitable and transparent digital democracy, and regional innovation grounded in digital platforms. Data processing, edge computing solutions that give end users analytics, comprehensive and scalable data rakes and analytics solutions, machine learning solutions with support for multiple frameworks, quantum computing solutions, robotics solutions, etc. are some of the essential elemental technologies.

The third theme is on a growth platform for the public and private sectors. This field's scope includes creating a platform for collaboration where the public and private sectors work together to identify and resolve social issues, encouraging the private sector to use public data and services, leveraging digital twins to propel the AI and data industries to new heights, bolstering support for the expansion of GovTech businesses, and actively leveraging the most recent AI innovations in the public sector. Elements of the required technology stack include: content, website, API, and other acceleration solutions; scalable and dependable front-end web and mobile development solutions; scalable and secure data distribution platform

solutions; Internet of Things (IoT) solutions that effortlessly scale to multiple devices and messages; dependable and scalable web sites and application hosting solutions, etc.

The last theme is the implementation of a reliable and reliable digital platform government. This field includes protecting individuals' right to privacy, protecting personal data, and putting in place a system of security that ensures the government's digital platform is safe. DevOps(a combination of software development and operations) deployment solutions for quick and dependable service development, blockchain solutions for trustworthy digital authentication between organizations and individuals, and digital authentication solutions are among the essential technologies.

4. IMPLICATIONS FOR DIGITAL TRANSFORMATION STANDARDS

4.1. Digital Transformation Standard

A representative technology committee called SC 40 (IT Service Management and IT Government) under ISO/IEC JTC 1 is closely collaborating on global standards pertaining to digital transformation. In addition to developing IT-related service standards, tools, frameworks, and best practices, SC 40 was created to create IT governance and cases pertaining to IT services. It also carried out IT-related standardization activities, including risk management, auditing, outsourcing, and IT-related service operation and maintenance. The primary goal of IT-related service standards is to standardize not only IT governance and IT service management, but also the general management and operation of an organization's IT systems, including BPO (business process outsourcing) and ITES (information technology enabled services). This SC 40 comprises 34 participating countries (Korea included in Table 1) [11], and 26 observational countries come together to run five working groups. There are five working groups. WG1 (information technology governance), WG2 (information technology service management), WG3 (IT-enabled services / business process outsourcing), AG1 (communication), and CAG1 (Chairman Advisory Group) are the groups involved in this topic.

Table 1. Current status of digital transformation policy implementation

Date	Government department	Announcement
2014. 06.	Ministry of Trade, Industry and Energy	Establishment of a manufacturing innovation 3.0 strategy
2018. 12.	Joint Government of Relevant Ministries	SME smart manufacturing innovation strategy
2020. 07.	Ministry of SMEs and Startups	Advanced manufacturing innovation for AI and data-based small and medium-sized enterprises
2020. 08.	Ministry of Trade, Industry and Energy	Innovative growth strategies for digital-based industries
2021. 01~06.	Ministry of Trade, Industry and Energy	industry DX spread series 1 to 17
2021. 04.	Ministry of Science and ICT	Promoting digital transformation support project

The IT governance configuration model is presented by the ISO/IEC 38500 standard series. The standard states that a number of IT-related organizations are working to standardize governance practices and guidelines that can be used with systems and technologies like blockchain, artificial intelligence, cloud computing, and information security-tenets of the Fourth Industrial Revolution that are essential to digital transformation. ISO/IEC 20000-1, the foundation of the ISO/IEC 20000 standard series, specifies requirements for IT service management, while ISO/IEC 20000-2 provides guidelines. The ISO/IEC 20000 standard series is a standard for actual IT service management.

Research on innovative BPO service strategies, including usage cases, BPO service governance, particular service-related risks, and industry digital transformation, is carried out by AHG.

4.2. Implications for Digital Transformation Promotion

To advance digital transformation on a national scale, policies that address private and public demand for each of the four public service domains that the digital platform government is promoting must be supported. Apart from technological innovation, it should encompass domains that establish suitable conditions for companies to utilize digital transformation and broaden their platforms. Institutional support is also required for this. Infrastructure should be used as a tool to support private companies that are not yet digitally capable. Building a digital transformation platform, training personnel in digital transformation, bolstering technology development and utilization capabilities related to digital transformation, creating tailored solutions through digital transformation, and enhancing infrastructure, systems, and consulting to support corporate digital transformation should all be included to meet various policy demands. Strengthening support for the use of digital transformation technology and solution development is necessary when promoting digital transformation in the industry, as this presents a challenge. To develop new digital technologies and strengthen utilization capabilities, both the public and private sectors must invest in public services. Additionally, an integrated support system including legal, system, standard support, and regulatory innovation should be prepared for the public and private sectors.

5. CONCLUSIONS

Thus far, we have examined the notion, establishment, technology, standardization, and so forth related to digital transformation. It also made an effort to come up with plans for public services' digital transformation. At the national level, policies that increase awareness of digital transformation must be promoted in order to implement specific items of public service in each of the four areas of digital platform government. It is vital to first advance digital transformation policies at the public level and encourage pan-social spread because there is currently a low level of awareness of this phenomenon in both the public and private sectors. One strategy to encourage the adoption of digital transformation policies is to provide education and training to individuals working in both the public and private sectors. The path of digital transformation ought to prioritize enhancing government administrative efficiency, bolstering private industry competitiveness, and fortifying public service. Enhancing industrial competitiveness should involve maintaining core technologies, developing new technologies, enhancing international competitiveness, etc.; enhancing public service should result in broadening the scope of services and enhancing service utilization; and enhancing administrative efficiency should encompass policy establishment, policy situation diagnosis and prediction, policy decision-making, etc.

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