The Government of the Republic of the Union of Myanmar

Ministry of Transport and Communications

MYANMAR E-GOVERNANCE MASTER PLAN 2030

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MYANMAR E-GOVERNANCE MASTER PLAN 2030

1. INTRODUCTION

Digital transformation is currently being prioritized throughout the world. The country's digital economy has advanced by adopting digital transformation in various areas, including the social, economic, and administrative sectors, enabling participation in the global value chain and delivering significant and valuable results.

In order to achieve effective, significant and sustainable outcomes, Master Plans are adopted with comprehensive strategies, technologies, methodologies and implementation models that are tailored to align with the geography, economic, socio-cultural and political contexts of the nation, while transforming into the digital era.

The use of Information and Communication Technology plays a critical role in successfully transitioning a country's digital maturity from the current state to the target state. However, relying solely focusing on the use of ICT technology will not lead to a comprehensive picture. The desired goal would be achieved by utilizing technology effectively in the establishment of digital relationships while providing timely and accurate information and services.

Although Myanmar's current e-government development lags behind, the country holds significant leapfrog opportunities due to its strategic geographical, economic, and political position in the rapidly developing ASEAN region. By taking these opportunities, it is essential to successfully implement e-government to drive Myanmar's digital transformation and engage with the global digital economy.

e-Government begins with the processes, which are often characterized by government-centric and technology-led approaches. Digital Government refers to the processes characterized by people-centered approaches and re-engineering public administration with priority through the use of digital technologies and data.

Nowadays, Digital Government has become a global phenomenon. Digital Government means making strategic decisions for using digital technologies and data to rethink how policies and public services are designed and implemented in order to fulfill the changing needs and expectations of citizens. While taking strategic decisions, it is critical to emphasize enabling information security in the digital environment, providing user-driven public services and mitigating the risks of digital technologies for individuals and societies.

Myanmar e-Governance Master Plan 2030 has been formulated and adopted with the vision of effectively and efficiently implementing Digital Government to achieve genuine, inclusive, and transformative economic development, in alignment with the strategies outlined in the Myanmar Sustainable Development Plan (2018-2030). The development of e-Government in Myanmar will be driven by the cooperative and collaborative efforts of ICT industries, the private sector and the people, with the key driving force of the Government of Myanmar. As a result, it will be able to create public digital environment where people can enjoy and be satisfied, and then leading to the development of sustainable and inclusive digital economy.

2. BACKGROUND

Since the early 2000s, e-Government has been initiated in Myanmar. In November 2000, at the fourth ASEAN summit was held in Singapore, leaders of the ten-member countries of ASEAN agreed to launch an Initiative for ASEAN Integration (IAI), and the "e-ASEAN Framework Agreement" was signed to begin a collective effort to plug ASEAN into the global networked economy. This Agreement covered measures to:

(1) facilitate the establishment of the ASEAN Information Infrastructure;

(2) facilitate the growth of electronic commerce in ASEAN;

(3) promote and facilitate the liberalization of trade in ICT products, ICT services and of investments in support of the e-ASEAN initiative;

(4) promote and facilitate investments in the production of ICT products and the provision of ICT services;

(5) develop an e-Society in ASEAN and capacity building to reduce the digital divide within individual ASEAN Member States and amongst ASEAN Member States;

(6) promote the use of ICT applications in the delivery of government services (e-Government); and others.

The Third Meeting between the Foreign Ministers of ASEAN and the Foreign Ministers of the People's Republic of China, Japan and the Republic of Korea (ASEAN+3) was held in July 2002. The ASEAN Foreign Ministers further welcomed the Initiative for ASEAN Integration (IAI), and expressed their appreciation to the People's Republic of China, Japan, the Republic of Korea and other donor countries for their support of necessary expertise and assistance to the IAI.

In 2005, with the aim of fostering the development of Myanmar's ICT sector, the Myanmar ICT Development Master Plan was formulated with the assistance of the Republic of Korea. Based on the Action Plans included in this Master Plan, initiatives such as e-Government, e-Education and e-Commerce were carried out alongside their respective implementation processes. Upon the completion of the short-term 5-year period of the Myanmar ICT Development Master Plan in 2010, the second Myanmar ICT Development Master Plan was developed as a follow-up project, with continued support from the Republic of Korea. This second Myanmar ICT Development Master Plan further advanced the implementation of e-Government initiatives.

In 2011, notable reforms in the telecommunications sector were initiated, including the introduction of mobile phone services and the expansion of internet services. These reforms laid the foundational groundwork to enhance digital infrastructure and broaden the delivery of e-Government services, toward advancing the digital transformation in Myanmar.

In 2014, the Government of Myanmar, in accordance with the "National Reform Process," developed a “20-Month Plan” aimed to accelerate the implementation of e-Government initiatives. However, the plan was not effectively executed. Although e-Government processes in Myanmar have been continuously carried out under the oversight of the country's leaders, it has been observed that the pace of progress remains slow.

In order to effectively and successfully accelerate the e-Government initiatives in Myanmar, the Ministry of Transport and Communications, with the assistance of the Asian Development Bank, commenced the development of the Myanmar e-Governance Master Plan in 2014, aiming for systematic adherence and continued

implementation by all relevant organizations within the government mechanism. The draft of the Master Plan was finalized in 2015.

In July 2016, the Government of Myanmar set up “the Economic Policy” as a national priority. To align with the new policies of the Government of Myanmar, the draft of the Master Plan was reviewed, revised and finalized for 5-year timeframe, from 2016 to 2020. This Master Plan was designated as a "Living Document," to adapt to the changing administrative, social, and economic conditions of the country, as well as the rapid advancements in information technology.

On January 23, 2018, at the national-level, the e-Government Steering Committee and the e-Government Implementation Committee were established to effectively integrate, oversee, and manage the e-Government processes outlined in the e-Governance Master Plan. These committees were formed to ensure coordinated and efficient implementation of the initiatives. Subsequently, on June 12, 2018, eight subcommittees were formed to implement the e-Government development initiatives of Myanmar. The e-Government Steering Committee and the e-Government Implementation Committee were reconstituted on April 4, 2021, and the eight subcommittees were reorganized on October 15, 2021. The e-Government Steering Committee was further revised and reconstituted on February 22, 2023, and efforts have been made to implement the e-Government processes are ongoing.

To successfully transition from e-Government to Digital Government, the essential requirement is the establishment and implementation of a National Strategic Vision. In implementing e-Government initiatives, it is essential to develop a Master Plan based on long-term visions, strategies, frameworks, and roadmaps, and to

pursue these efforts without interruption. Therefore, in light of the evolving administrative, social, and economic conditions of the nation, as well as the rapidly advancing global digital trends and emerging digital technologies, the "Myanmar e-Governance Master Plan (2016–2020) "has been reviewed, analyzed, and revised in order not to lag behind with these developments. As a result, the "Myanmar e-Governance Master Plan" has been extended and revised for the period up to the year 2030.

3. VISION

The Myanmar e-Governance Master Plan 2030 aims to facilitate Myanmar Digital Transformation through effective, efficient, and systematic implementation of Digital Government in order to foster the development of Digital Economy that is sustainable, transformative, secure, open to innovation and all-inclusivity, and integrated with the ASEAN community.

4. OBJECTIVES

Myanmar e-Governance Master Plan 2030 is designed to achieve inclusive and transformative digital economic development based on the following key objectives.

(1) Ensuring good governance;

(2) Improving efficiency in public administration by encouraging citizen engagement;

(3) Establishing a transparent and highly accountable government;

(4) Moving towards Digital Government in order to ensure the delivery of effective public services;

(5) Strengthening nationwide access to public services in order to promote the quality and socio-economic life of societies;

(6) Promoting cooperation and collaboration between the public and private sectors; and

(7) Enhancing public trust and confidence in the government in the pursuit of a progressive, contented and happy Myanmar nation.

5. THE KEY STAKEHOLDERS

e-Government requires active participation of responsible government, citizens and stakeholders. The benefits of e-Government can be shared and enjoyed by all stakeholders. Enhancing the role of the stakeholder in e-Government is a fundamental prerequisite for improving of public services.

Therefore, expanding and promoting the role of the stakeholders has led to increasing transparency as well as addressing corruption, through providing the government's public services. In addition, rural and far-flung remote areas are able to access government public services, and has contributed to narrowing the digital divide between urban and rural areas through socio-economic development. Consequently, there are numerous benefits that can create the better image of government. To sustain the digital transformation of the public sector, enhancing the role of stakeholders to overcome issues and obstacles facing developing countries in implementing e-Government. The key stakeholders can be classified as follows:

5.1 Individuals

Individuals including citizens, residents, visitors, tourists, and government employees in Myanmar.

5.2 Businesses

Business includes all businesses, industries, and professions that are engaged in the production or distribution of goods and providing services, for the purpose of making profits.

The utilization of e-Government services is positively correlated with the ICT capabilities of businesses, and it will bring numerous benefits, such as creating a

new intelligence generation, emerging new business ventures, and saving time and costs.

5.3 Government Entities

Government plays a leading role in e-Government, not only as a policymaker, coordinator, and regulator but also as the main providers of e-services. Individual government entities play a vital role in the effective implementation of e-Government.

Government entities retain ownership over their services and data. Government may share ownership of services at the business level with non-governmental partners, for example in public–private partnerships.

The government entities shall be responsible for complying with prevailing laws and regulations, strategies, tactics, technology standards, directions, policies, methodologies, processes, and specifications issued while implementing the e-Government Program.

5.4 e-Government Steering Committee

In order to successfully implement e-Government in Myanmar, the e-Government Steering Committee, led by the Heads of State with five key tasks, was established on 23 January 2018. Then, it was restructured on April 4, 2021 and February 22, 2023 respectively. The tasks of the e-Government Steering Committee are as follow:

(1) Establishing and directing the necessary policies to ensure the successful implementation of e-Government;

(2) Verifying and approving projects and funding proposals submitted by the e-Government implementation Committee;

(3) Guiding upon establishment of institutions, required for effective implementation of e-Government;

(4) Providing guidance on e-Government processes that should be prioritized in Myanmar, taking into account the best practices of countries that have been successfully implementing e-Government;

(5) Adopting directions to ensure the continuous implementation of action plans outlined in the e-Governance Master Plan.

Underpin of the e-Government Steering Committee, the e-Government Implementation Committee was formed on 23January 2018, with its 5 tasks, and restructured on 4 April 2021.The tasks of the e-Government Implementation Committee are as follow:

(1) Coordinating and supervising for the effective and successful implementation of the e-Government system in accordance with the policies and guidelines of the e-Government Steering Committee;

(2) Developing the prioritized plans of works and projects and submitting to the Steering Committee along with financial proposal;

(3) Adopting information security and cyber security measures;

(4) Coordinating for easy and efficient use of e-Government services by users;

(5) Providing leadership and oversight to fulfill the requirements of ICT infrastructure and other supporting measures for the successful implementation of the e-Government.

In addition, under the e-Government Implementation Committee, the eight subcommittees have been constituted on 12 June 2018 and restructured on 14

October 2021. The following subcommittees have been implementing Myanmar's e-Government development activities. Which are:

(1) Subcommittee on Supervision

(2) Subcommittee on Infrastructure, System, Model and Design

(3) Subcommittee on Procurement and Public Private Partnerships

(4) Subcommittee on Human Resource Development

(5) Subcommittee on Cybersecurity

(6) Subcommittee on Standardization

(7) Subcommittee on Research and Development

(8) Subcommittee on Information and International Cooperation

5.5 Policy Makers

Since policy commitment to the transition towards digital government is essential perquisite, the special attention of policy-maker is crucial. Hence, they are major stakeholders playing a vital role in e-Government.

In particular, to promote the development of e-Government, policymakers shall undertake the necessary reforms in the public sector that is required to ensure the accountability and responsibility of government agencies, and facilitation of the electronic services, shall put in place policies to ensure adequate investment in key e-Government initiatives.

5.6 Chief Information Officers (CIOs)

The previous Myanmar e-Governance Master Plan (2016-2020) calls to assign Chief Information Officers (CIOs) and Chief Information Security Officers (CISOs) in respective ministries for the implementation of e-Government process, as per the road-map. Those occupy these positions mentioned above should be at director level and separately assigned their duties, without being jointly assigned with other duties. Positioning can be specified as necessary, depending on the nature and magnitude of work in the department. It also mentioned that no clear definition of roles and responsibilities of CIOs.

Additionally, it stated that the responsibilities of CIOs involve implementing unique applications according to respective departments, and other areas such as technology, infrastructure and services. The responsibilities of CISOs involve cyber security of network and individual users, machines, and application implemented by their respective departments.

It is to nature Chief Information Officer (CIOs) with innovative ways to improve the electronic services of their organizations and achieve major accomplishment in their entities' digital transformation. Hence, the role of these CIOs should be activated yet in all entities. It is necessary to organize the CIO Unit with Chief Information Officers (CIOs) from various government entities, clearly defining their roles and responsibilities, under the guidance of the e-Government implementation Committee. This unit should be organized with Chief Information Officers who are responsible for the e-Government in their respective organizations, and should be headed by the focal department of the Myanmar e-Government. In doing so, CIOs of union government organizations and state and regional CIOs should have channels to communicate fast and easily each other.

The responsibilities of the CIO Unit should be defined as follows:

(1) To offer technical and consultancy support for the National Digital Government Strategies to the e-Government Implementation Committee and undertake the implementation of it;

(2) To provide innovative technologies and methods in order to approach digital government;

(3) To share the CIO's expert actions and ideas, and to establish an Analysis Model that observes their IT skill and the development process;

(4) To contribute coordination regarding the implementation of e-Government systems, establishment of technology infrastructure, and delivery of services;

(5) To ensure cyber security of e-Government application and systems, devices, networks and users;

(6) To perform non-intermittent monitoring the progress of e-Government activities, and report to the e-Government Implementation Committee; and

(7) To maximize the positive impact of e-Government on digital transformation and electronic public services, while making decisions, planning projects and implementation of e-Government activities.

5.7 The Private Sector and Non-Governmental Organizations

The involvement of the private sector and non-governmental organizations holds significant importance in the development of e-Government. The private sector serves as a key driving force for national economic growth and employment

generation. Enhancing the participation of private sector entrepreneurs in the establishment and maintenance of e-Services and ICT infrastructure will bring numerous benefits, including improved access to finance, strengthened partnerships, the development of new connections with global and regional communities, and the creation of an enabling environment that fosters foreign and domestic investment.

The participation of private entrepreneurs in e-Government initiatives will significantly contribute to the swift implementation. The role of non-governmental partners as key stakeholders in e-Government is expected to expand as governments increasingly adopt public-private partnerships and other alternative financing and management models to deliver e-Government services. Therefore, it is essential to encourage the involvement of transparent and competitive partnerships to enhance the quality of public services.

6. STUDY ON PREVIOUS ICT MASTER PLANS

In Myanmar, e-Government initiatives began around the year 2000, but significant progress has been slow, and the country remains at a low level compared to other nations globally, as indicated by the United Nations' e-Government Development Index (EGDI). To address this, the Myanmar e-Governance Master Plan has been developed, extending until 2030, to accelerate the transition to a Digital Government.

This Master Plan was developed builds on previous Myanmar ICT Development Master Plans and the Myanmar e-Governance Master Plan (2016-2020), analyzing implemented, ongoing, and future initiatives. It considers current economic, social, and political conditions, as well as advancements in digital technology, to outline a roadmap and action plans for Myanmar's digital transformation.

6.1 Myanmar ICT Development Master Plans

The Myanmar ICT Development Master Plan (2005-2030) was first drafted in 2005. In that Master Plan, short-term goals were set for the year 2010, while long-term goals were projected up to the year 2030. The strategies and measures for implementation were developed to reflect the current conditions of Myanmar, ensuring alignment with the country's existing circumstances. A second plan, Myanmar ICT Development Master Plan (2011-2015), followed in 2010. Key findings from these plans include:

(1) Detailed Sector Analysis: The previous Myanmar ICT Development Master Plan focused on specific ICT-related sectors, outlining recommendations for short-term, medium-term, and long-term goals, major tasks, challenges, directions, approaches, timelines, and action plans.

(2) Long-term Vision: The goal was to establish Myanmar Information Society, and integrating it into the Global Information Society by 2030.

(3) Eight Priority Areas: The Myanmar ICT Development Master Plans are designed to serve as guiding principles for the advancement of the ICT sector in Myanmar. These plans prioritize eight key ICT-related areas to foster growth and progress in the sector. It was not specifically designed for e-Government development These areas are as follow:

(a) ICT Infrastructure;

(b) ICT Industry;

(c) ICT Human Resource Development;

(d) e-Government;

(e) e-Commerce & Informatization;

(f) e-Education and Awareness Building;

(g) ICT Legal Framework; and

(h) ICT Standardization & Liberalization.

(4) Lack of Specific e-Government Focus: The Myanmar ICT Development Master Plans aimed to enhance its international competitiveness through the utilization of ICT in Myanmar. However, the detailed and precise organizational structure and strategies required for the implementation of e-Government, in alignment with the national development goals of the country, have not been clearly articulated.

(5) Partial Implementation: Among the priority e-Government projects outlined in the Master Plans, it has been observed that some processes

have already been successfully implemented as of today, while others are still in the process of being executed.

6.2 Myanmar e-Governance Master Plan (2016-2020)

The Myanmar e-Governance Master Plan (2016-2020) was initially drafted in 2014 and finalized in 2016. It has been designated as a Living Document. At present, the Master Plan has been extended with a Follow-Up Plan targeting the year 2030. Based on a comprehensive review and analysis, the findings from its review are as follows:

(1) To effectively address the evolving and potential changes within the ASEAN region and other parts of the world, it is essential to first establish and develop a long-term vision for e-Government measures. This vision should be forward-looking and strategically designed to guide the implementation of initiatives that align with both regional and global advancements. It is essential to first establish and develop a long-term vision to identify evolving and potential conditions within the ASEAN region and other areas worldwide. This will enable a forward-thinking approach to e-Government initiatives, ensuring they are strategically aligned with future developments.

(2) To effectively encompass the vast and diverse range of e-Government initiatives, it is essential to establish comprehensive guidelines and frameworks that encourage the systematic and efficient use of technology. This includes expanding and upgrading ICT infrastructure based on existing resources, widely utilizing application software to enhance public service delivery, and improving governance capabilities through technological integration. These measures will

ensure that technology is leveraged effectively to strengthen government operations and provide better services to the public. Clear and detailed guidelines are necessary to support these efforts and drive the successful implementation of e-Government initiatives.

(3) The implementation of e-Government in successful countries globally and neighboring nations has been analyzed across four key domains. These domains provide insights into the strategies and methods that have enabled these countries to achieve comprehensive success in their e-Government initiatives. To develop processes that are well-suited and adaptable to Myanmar's context, it is essential to present the following aspects from successful e-Government implementations in other countries:

(a) Vision and Goals

(b) Organizational Structure and Governance Models

(c) Legal Framework

(d) Approaches and Strategies

(e) Implementation Models

(f) Priority Measures

(g) Challenges and Solutions

(h) Lessons Learned and Best Practices

(4) In the sections analyzing the Digital Maturity of Myanmar and other countries, it has been observed that the assessment is based on four key domains. However, the categorization of data and content related to these domains and their evaluation lacks clarity. Similar or related content has been divided and presented across different sections, leading to inconsistencies in presentation. To ensure clarity,

completeness, and transparency in the assessment of Myanmar's current e-Government status compared to other countries, it is essential to clearly define and categorize the four domains used for evaluation, along with the specific criteria and data points for assessment.

(5) The outlined tasks to be implemented appear to be overlapping, and similar content has been presented under different sections, leading to overlapping. Therefore, it is necessary to clearly define and explain the framework while also outlining the essential tasks that need to be carried out based on the framework through well-structured sections.

(6) It is necessary to thoroughly review the existing ICT-related laws, policies, standards, procedures, and guidelines to identify necessary amendments and gaps. Based on this assessment, revisions and the formulation of new regulations will be carried out as needed. It is essential to formulate and implement clear laws, policies, standards, and strategies that facilitate seamless collaboration and connectivity among government agencies through the use of ICT. This will help create a broad and supportive environment for digital transformation while ensuring alignment with regional and global commitments, agreements, and standards.

(7) To drive the digital economy, which is a key catalyst for economic growth, it is imperative to implement e-Government and e-Commerce initiatives. These will provide significant support and impactful benefits during the digital transformation process. The development of e-Government and e-Commerce serves as a key driving force for the

balanced transition towards a Digital Government and Digital Economy. Therefore, it is essential to take their growth into consideration when formulating relevant strategies and policies.

(8) This Master Plan has been developed with a comprehensive, innovative, and results-oriented approach, taking into account the challenges and difficulties that may arise alongside the rapid global advancement of digital technologies. Therefore, in order to successfully achieve the desired outcomes, it is essential to develop and outline action plans that should be implemented within specific timeframes.

6.3 ASEAN Digital Master Plan 2025

The “ASEAN Digital Master Plan (ADM) 2025” is a five-year initiative (2021–2025) designed to foster digital integration among ASEAN member states. The ADM 2025 envisions: “ASEAN as a leading digital community and economic bloc, powered by secure and transformative digital services, technologies and ecosystem”.

ADM 2025 has specified the following eight desirable outcomes which the master plan should meet in the next five years: These desired outcomes are as follows:

(1) DO1: Actions of ADM 2025 prioritized to speed ASEAN's recovery from COVID-19

(2) DO2: Increase in the quality and coverage of fixed and mobile broadband infrastructure

(3) DO3: The delivery of trusted digital services and the prevention of consumer harm

(4) DO4: A sustainable competitive market for the supply of digital services

(5) DO5: Increase in the quality and use of e-government services

(6) DO6: Digital services to connect business and to facilitate cross border trade

(7) DO7: Increased capability for business and people to participate in the digital economy

(8) DO8: A digitally inclusive society in ASEAN

A key requirement of the development of ADM 2025 was to make it “more robust, innovative and outcome-based” than its predecessors (building on the lessons identified in the AIM 2020 review). To do this ADM 2025 identified a number of key challenges. ADM 2025 has been developed by taking into account these challenges, along with the global difficulties currently being faced. It describes in detail of the Desired Outcomes & Enabling Actions that how the how AMS governments should shape and implement it.

These Enabling Actions will significantly contribute to fostering the development of the nation's digital services, supporting digital transformation, and promoting the growth of the national digital economy. They will also help create a conducive business environment for efficient digital services, thereby providing substantial support in these areas. Therefore, in the development of this master plan, considerations have been incorporated to ensure alignment with regional programs.

7. CASE STUDY OF BENCHMARKED COUNTRIES' DIGITAL TRANSFORMATION

With the aim of the formulation of Myanmar e-Governance Master Plan 2030, a comprehensive analysis will be conducted through drawing on insights from international e-Government implementation models, vision, organizational structures, legal and policy frameworks, strategic directions, approaches, systems, focus areas, challenges and solutions, lessons learned, best practices, and the experiences of countries that successfully transition to digital government. Therefore, a case study was conducted on best practices, theoretical background, and practical experiences from the Republic of the Philippines, an ASEAN Member State, and the Republic of Korea and the United Arab Emirates, both recognized as global leaders in e-Government, and Australia, which despite its geographical distance, has successfully implemented an e-Government system with significant achievements.

7.1 The Philippines

7.1.1 Emerging a new e-Government Ecosystem

As the Philippines embraces digital transformation, it is seeking to accelerate the development of the initiatives of The ASEAN ICT Masterplan (AIM) 2020, moving towards a digital economy. The Philippines believe that the use of information and communications technologies (ICT) in government processes is seen as an enabler for nations to achieve digital transformation in the delivery of basic services.

In 2016, new institutions, the Department of Information and Communications Technology (DICT) together with its three attached agencies, the National Privacy Commission (NPC), the National Telecommunications Commission (NTC) and the

Cybercrime Investigation and Coordination Center (CICC), in place with the passage of the Department of Information and Communications Technology Act of 2015, to be responsible for establishing government policies, planning, coordination, implementation and management functions.

E-Government Master Plan 2022 was crafted and built upon previous Government Master Plan 2013-2016, in which the transformation of building blocks from infrastructure to infostructure in marks a significant transition. In Addition, DITC Identified in the Philippine Development Plan (PDP) 2022 is the strategy to continue to enhance the country's e-government system as a vital tool for good governance. With this, the DICT aspires for the Philippines to develop and flourish through innovation and sustainable development of ICT in the pursuit of a progressive, safe, secured, contented and happy Filipino nation.

7.1.2. Role of ICTs in Philippines Government

(1) Government Measures: the rapid advancements in the field of ICT further amplify its role in nation-building and governance, as previous administrations have strived to incorporate ICTs in its strategic plans. These strategic plans are:

(a) The Philippines' 1987 Constitution states that "communications and information -ICT- plays a vital role in nation building".

(b) The government aligned its projects and programs with the National Information Technology Plan for the 21st Century.

(c) The Information Technology and Electronic Commerce Council (ITECC) was established as a policy-making body of the Philippines providing direction in achieving the vision of an

"electronically enabled Philippines, capable of participating in and contributing to the global new economy."

(d) The Government Information Systems Plan (2000) with the vision of "Improvement of the quality of living through ICTs."

(e) The Philippine Strategic ICT Roadmap (2006-2011) and the Philippine Digital Strategy (PDS) (2011-2016).

(f) The Information and Communications Technology Office (ICTO) came up with the e-Government Masterplan (EGMP) 2013-2016 which envisioned "a digitally empowered and integrated government that provides responsive and transparent online citizen-centered services for a globally competitive Filipino nation."

(2) e-Government Master Plan (EGMP) 2013-2016: EGMP 2013-2016 was developed aiming at maximizing the use of ICT resources through shared ICT infrastructure and services for government agencies. It adopted an approach that supported the Philippine Development Plan (PDP) 2022 and was operationalized through the Medium-Term ICT Harmonization Initiative (MITHI) for government interoperability, collaboration and shared services. These measures leveraged ICTs in the more efficient delivery of public services and pushed for the greater diffusion of ICTs through the development of better integration. In addition, it encouraged to enhance infrastructure for cyber-services, to promote human capital, to institutionalize e-Government funding of projects, and to establish an agency focused

on providing leadership in promoting the national ICT development agenda.

7.1.3 State of e-Governance

(1) **Performance in e-Government Development Index (EGDI) and e-Participation Index (EPI):** The notable accomplishment of The Philippine with respect to the impact of ICTs. The Philippines exhibited digital transformation as evidenced by its performance in the UN's E-Government Development Index (EGDI), online presence, and availability of more government data. The Philippines positively transitioned from medium-EGDI to high-EGDI in 2016 due to the comprehensive efforts of the government aimed at improving the provision of online services. On the other hand, The Philippines advanced 48 positions in terms of e-Participation Index (EPI) ranking from 67th in 2016 to 19th in 2018 out of 193 countries.

(2) **Online Services:** Websites were originally seen as the primary e-Government channel for providing information and services to citizens. In 2013, the Philippines established a fund to support e-Government systems, prioritizing the use of ICT in establishing web presences and automating government processes that can enhance e-Government services.

(3) **Open Government and Government Data Online:** Since 2014, the Open Data Portal (www.data.gov.ph) has hosted more than 3,300 government data files and information on public expenditure, agriculture, transportation, education, and others. Relative to this, in 2017, the Philippine Statistics Authority (PSA) launched the OpenStat

(http://openstat.psa.gov.ph), an online platform that makes available to the public different statistical data collected and compiled by the government. Also, with the several digital governance initiatives in budget transparency, the Philippines scored 64/100 in the 2015 Open Budget Index (OBI), a global comparative budget transparency, participation, and accountability measure among 115 countries. In 2017, the country improved by three points, rating 67/100, landing the country at 19th spot.

7.1.4 e-Government Master Plan (2013-2016)

The e-Government Masterplan (2013-2016) provided a blueprint for the integration of Information and Communications Technologies (ICTs) for the whole of government.

(1) **e-Government Building Blocks:** The building blocks highlight the importance of establishing a stable governance structure for e-Government. This involves strengthening institutions for facilitating e-Government implementation and serve as the basis for coordination, communication, interaction, and harmonization of actions between key players.

(2) **Achievements:** Strategies were laid out consisting of three components needed for its implementation including MITHI, iGovPhil Project, and agency specific applications. Increased web presence and enhanced use of social media in government were apparent. Also, the "DICT Act of 2015" was finally signed into law in 2016.

(3) Challenges: The key challenges and monitoring key progress in evaluating projects and programs of the e-Government Masterplan are as following:

(a) More difficult to benchmark as the availability of information is limited to the project outcomes instead of impact.

(b) Future demands were less prioritized.

(4) Digital Governance: With digital governance initiatives at the onset of ICT use in public administration, the government of the Philippines carries with it forward programs, projects, and policies.

7.1.5. e-Government Master Plan (EGMP) 2022

The E-Government Masterplan (EGMP) 2022 was crafted in line with the DICT's mission of establishing a One Digitized Government for the nation. In so doing, the government shall harmonize and coordinate all ICT initiatives to optimize available government ICT resources, encourage information and resource-sharing and database-building.

(1) Vision and Objectives: This plan outlines the vision for developing the country's e-Government systems through the digital transformation of basic services which cuts across the whole-of-government.

(a) Optimize Government Operations

(b) Transform Services

(c) Engage Citizens

(d) Empower Government Employees

(2) Expected Outcomes from the EGMP 2022: With government digital transformation on its way, the EGMP 2022 is expected to:

(a) Bring cohesion to the ICT programs of the government;

(b) Rationalize all ICT development initiatives across government to converge into a standards-based framework; and

(c) Promote collaboration and information-sharing, while also protecting and securing the rights and privacy of citizens.

(3) e-Government Building Blocks: EGMP 2022 refines the building blocks of its predecessor plan and framework, as an Infostructure Framework. This framework composed of the Government Common Platform, Software Standards and Registries. The following measures are included in Building Block.

(a) Infostructure

The ICT infrastructure is a foundational element for e-Government. The National Broadband Plan, Government Network, National Government Data Center (NGDC), and the GovCloud are built through the Integrated Government Philippines Project.

(i) National Broadband Plan: The quality of services and ability of citizens, other government agencies to access online services is also highly dependent on the broadband infrastructure they require to get online. Therefore, the Department of Information and Communications Technology (DICT) has been developed its The National

Broadband Plan (NBP), the government's strategic plan to improve internet access and speed in the country.

(ii) Government Networks (GovNets): It is comprised of three layers. One layer is the international layer that is characterized by Internet Exchanges that involves the Philippine government. it serves as the physical foundation and platform for providing basic e-government services, such as cloud computing and collocation, The Government Network has been established to addresses the need for sufficient bandwidth in order to achieve interconnectivity and interoperability among government agencies. The second layer is the central or core layer. It comprises the middle infrastructure where all internet traffic converges. The last layer is the lower layer for regional networks. In particular, the EGMP aims to establish Regional Government Networks (GovNets) with the intention of:

- interconnecting government agencies to improve access to online government services
- providing high speed connection going to the government data centers
- complement the Free Wi-Fi Project infrastructure

(iii) The National Government Data Center (NGDC): The NGDC provides unified servers and storage facilities for government agencies. One of the objectives of the

previous EGMP, through MITHI, was to rationalize the provision of data centers and encourage more units of government to migrate to the NGDC. Back-up data centers has to be set-up in different secure locations of the country to assure the resiliency of the systems. Back-up facilities are needed in case one data center is damaged or interconnection problems to it occurs. The redundancies are assurances that services are not disrupted and can be re-established should unforeseen disasters occur.

(iv) Government Cloud: The Government Cloud (GovCloud) uses a hybrid cloud strategy that integrates both private and public clouds. GovCloud can also serve as a platform to enable access to data and services of agencies to the national government portal (NGP).

(b) National Government Portal: the strategy for the development of a national government portal (NGP) must be premised on a more collaborative framework. This will be operationalized through the following strategies:

(i) Whole-of-Government Approach

(ii) Government Common Platform

(iii) Software Standards: An Open Innovations Model

(iv) Government Solutions Center

(v) Resource Pooling Strategy

(c) Security and e-Resilience: The Philippine's Cybersecurity Management Program already provides guidelines with respect to the Protection of Critical Infostructure, Protection of Government Agencies, and Protection of Individuals. The establishment of trust, security, and privacy, in the whole of government's e-governance system can be established through the following measures:

(i) adoption of a harmonized set of laws

(ii) integration of adequate technical capabilities in detecting and responding to cyber-attacks, and

(iii) establishing minimum security criteria

(d) Analog Components: For the information system to function properly, it depends on analog components such as organization development and system of governance, and complementing policies/protocols and implementing rules. Therefore, The National ICT Competency Standard, Priority Electronic Services, Interoperability Framework, The Public Key Infrastructure (PKI), Cloud First Policy, e-Government Act, Philippine Identification System Act, National Feeding Program were adopted to improve ICT and e-Government related capacities in the entire governance mechanism.

(e) Philippines Digital Governance Transformation: The digital transformation of the Philippine governance builds on the successes in the application of e-government programs. It focuses on the next stage of digital transformation. It aims to

transform the government into a digital platform providing transparent and accountable governance, efficient operations, direct citizen engagement, and innovation.

By implementing the EGMP 2022, the Republic of the Philippines has achieved several positive outcomes, including enhanced coordination between communities and government agencies, improved operational efficiency. The adoption of ICT in public service delivery has contributed to effectively addressing challenges related to human resources and capacity, supporting businesses in enhancing their operations.

7.2 The Republic of Korea

These findings are derived from the case study of e-Government implementation and the transition to Digital Government in the Republic of Korea, a global leader in e-Government development.

7.2.1 Digital Government

In 1955, Republic of Korea is one of the least development countries in the world. Korea have more than 20 million people of less than 0.2 percent of population have telephone and Gross National Income (GNI) per Capita was 65 USD. As of 2019, Korea have 56m millions mobile phone and GNI per Capita is more than 30,000 Dollars. Digital Government has certainly contributed to this rapid growth. It has been more than 50 years since the beginning of digital government in Korea when Korea government introduced its first computer for census. Computerization and Informatization of public administration were planned and executed at the pan-government level in 1980 and 1990s.

In 2001, the enhancement of e-Government law triggered the nation-wide scale e-Government projects with top political priority. The Government Data Center constructed in 2005 was another important of Korean digital government. The integrated data center shared by all ministries enabled system integration and remodeling which led to higher efficiency and security.

In 2010, Korea applied cloud computing technology to the government data center, enhanced their service delivery with mobile applications, and integrated web portals such as GOV.KR. Open data is another key policy. Korea government shared a large number of public datasets with private sector to facilitate digital economy. Now Korea is developing the vision of Intelligent digital government with the help of emerging technologies such as Artificial Intelligence.

7.2.2 Achievements

Various services are implemented on the basis of Government data center. These services make Korea government more effective, efficient and transparent. Some services such as e-Document System, Digital Government Service Portal (Single window), Online Tax Service, e-People, e-Customs and e-Procurement are notable.

7.2.3 Key Success Factors

The following are key success factors from a macroscopic view:

(1) Innovative and early adapting culture

(2) Decisive and sustained investment rapid growth of ICT industry

(3) World top-class internet speed

(4) Strong and Systematic Leadership

(5) Visionary mid/ long term plans

The Successful Technical Factor are:

(1) Integrated Infrastructure and Platform

(2) Unified Application

(3) Standardized Data

The Successful Factors from an administrative view are:

(1) Early adoption of civil registration

(2) Dedicated project funding in prioritizing essential services

7.2.4 Korea Government's Future Strategies

The Korea government first created The Digital Government Innovation Plan in 2019. However, in the face of COVID 19 pandemic, the government had to revise the plan better suited to the new normal after the COVID 19. Digital Government innovation can be the door to a better world, using digital technology to their fullest potential. Korea is going to expand Non-contact Digital Service and innovate government service delivery through creating collaborative digital ecosystem and enhancing digital infrastructure.

Due to COVID 19, citizens need for non-contact services has greatly increased. Io meet the needs, it is essential to use Accumulated Public Data to its fullest potential. And the public-private partnership should be expanded to create collaborated and inclusive digital ecosystems. At the same time, better infrastructure is required to be prepared for unexpected emergencies in the post-covid-19 era.

To implement effective and convenient non-contact services, it is essential to reengineer the government administration process. Mobile Digital ID and MyData projects will be catalyst for the whole work process reengineering. All the process

based on paper forms will be redesigned based on datasets and online transactions. In the ideal future, almost could be applied and delivered without physical contact.

With the association between Human-friendly frontend Interfaces using natural language such as Chatbots and Voice Assistants and Integrated, Customizable and Seamless Backend services, true digital innovation partnership with private sector and connectivity and accessibility would be more important due to expansion of non-contact digital services, cybersecurity, and digital inclusion should be considered to leave no citizen behind. Digital infrastructure should be enhanced to resolve these issues and government officials should be trained to fully utilize the infrastructure and digital services.

In summary, since Korea needs a comprehensive approach for successful digital innovation, the government of Korea is developing a Digital Government Roadmap. Data, cloud, and AI are indisputable key elements of this roadmap and government services should be innovated from the from ground up.

Digital ecosystem should be nurtured with open government and private-private collaboration. Also need to secure core talent to construct and operate platforms and services, and improve digital skills of public officials. During these changes, it is need to refine the government structure and functions. The journey of Korean government to an Intelligent Digital Government has just begun.

7.3 United Arab Emirates (UAE)

7.3.1 Dimensions of the UAE Digital Government Strategy 2025

The dimensions were aimed to leverage the OECD Digital Government Policy Framework and were tailored to fit the UAE's developmental plan in the post pandemic era. The eight dimensions are:

(1) Leaving no one behind

(2) Resilient

(3) Fit for the digital age

(4) User-driven

(5) Digital by design

(6) Data-driven

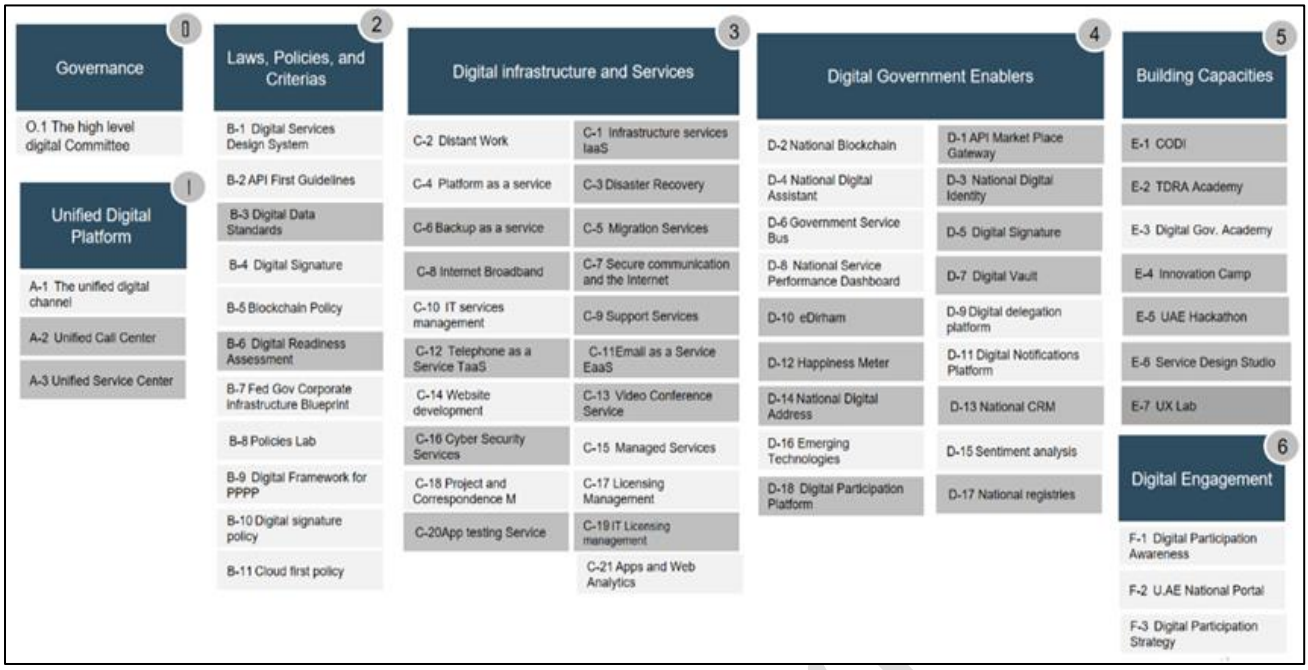
(7) Open by default

(8) Proactiveness

7.3.2 UAE Digital Government Roadmap

The UAE Digital Government Roadmap has been developed in alignment with the Dimensions of the UAE Digital Government Strategy 2025. The roadmap outlines the formation of the High-Level Digital Committee to supervise and guide the digitization of government services, with the responsibility of implementing six key pillars under its leadership. The UAE Digital Government roadmap comprises six key pillars that encompass 64 national digital enablers. Refer to the figure below for details.

FIGURE 1: THE NATIONAL DIGITAL ENABLERS OF UAE DIGITAL GOVERNMENT ROADMAP



(1) Pillar 1: Unified Digital Platform

(a) Unified Digital Channel

(b) Unified Call Center

(c) Unified Service Center

(2) Pillar 2: Laws, Policies and Standard/ Criteria

(a) Digital Services Design System

(b) API First Guideline

(c) Digital Data Standard

(d) Digital Signature

(e) Blockchain Policy

(f) Digital Readiness Assessment

(g) Fed Government Cooperate Infrastructure

(h) Policy Lab

(i) Digital Framework for PPPP

(j) Digital Signature Policy

(k) Cloud First Policy

(3) Pillar 3: Digital Infrastructure and Services

(a) Infrastructure as a Services

(b) Distant Work

(c) Disaster Recovery

(d) Platform as a Services

(e) Mitigation Services

(f) Backup as a Services

(g) Secure Communication and the Internet

(h) Internet Broadband

(i) Support Services

(j) IT Services Management

(k) e-Mail as a Services

(l) Telephone as a Services

(m) Video Conference Services

(n) Website Development

(o) Management Services

(p) Cyber Security Services

(q) Licensing Management

(r) Project and Correspondence Management

(s) IT Licensing Management

(t) Application Testing Services

(u) Applications and Web Analytics

(4) Pillar 4: Digital Government Enablers

(a) API Market Place Gateway

(b) National Blockchain

(c) National Digital Identity

(d) National Digital Assistant

(e) Digital Signature

(f) Government Service Bus

(g) Digital Vault

(h) National Service Performance Dashboard

(i) Digital Delegation Platform

(j) eDirham

(k) Digital Notifications Platform

(l) Happiness Meter

(m) National CRM

(n) National Digital Address

(o) Sentiment Analysis

(p) Emerging Technologies

(q) National Registries

(r) Digital Participation Platform

(5) Pillar 5: Building Capacities

(a) COD

(b) TDRA Academy

(c) Digital Gov. Academy

(d) Innovation Camp

(e) UAE Hackathon

(f) Service Design Studio

(g) UX Lab

(6) Pillar 6: Digital Engagement

(a) Digital Participation Awareness

(b) UAE National Portal

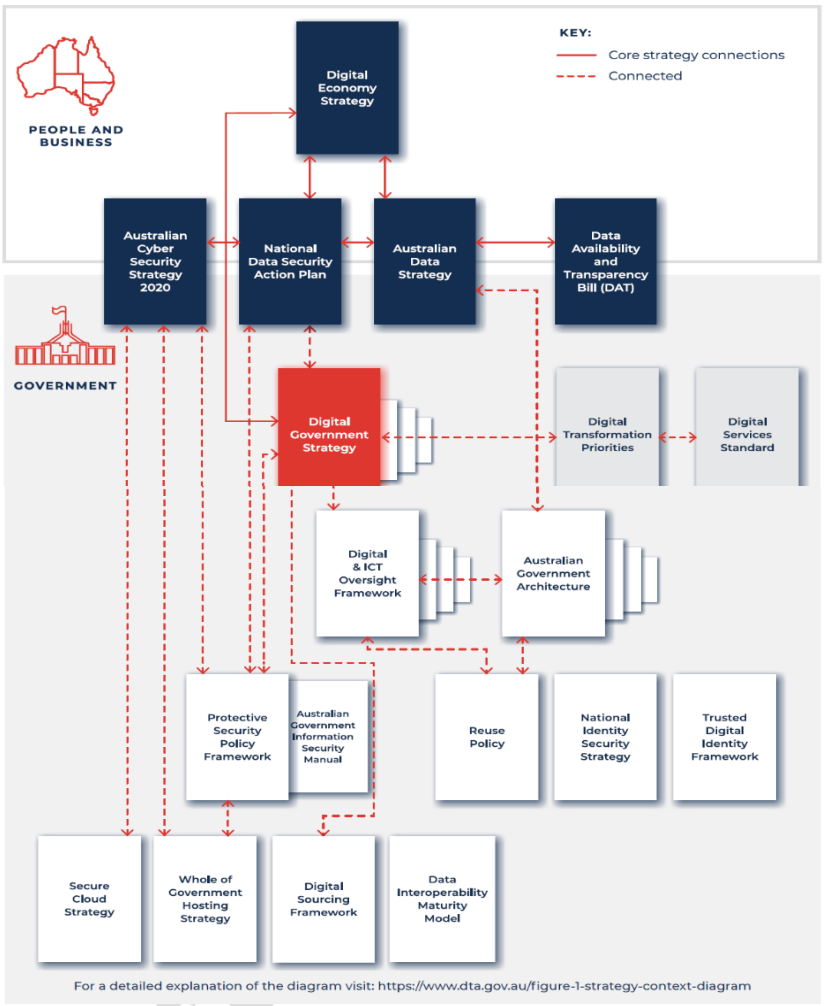
(c) Digital Participation Strategies

7.4 Australia

7.4.1 Strategy Context

Australia has prioritized digital government for resilience and development, and continues to invest significantly in enhancing digital capabilities. The Australian Government is clear on its ambition and strategies for Australia's digital future. The Strategy Context Diagram demonstrates the connectivity between each of the strategies which advance Australia's economy and digital capability.

FIGURE 2: STRATEGY CONTEXT DIAGRAM



The original Digital Transformation Strategy was first launched in November 2018 with updates published in 2019 and 2020. Since then, the Strategy has delivered significant, tangible benefits. It is underpinning the public service response to the COVID-19 pandemic and the drive to deliver digital-first government. The pandemic has presented unprecedented changes in our communities and how we use technology. The impact on government was great and accelerated the digitalization of government services for the long term and Australians expectations of Government has changed. The Strategy will drive change that impacts how people interact with government by ensuring all services are online, easy to access and designed for the user. Moreover, Implementation of the Strategy

will ensure the public service adopts a digital-first mindset leveraging digital technologies to rethink government processes and simplify procedures.

(1) **Digital Government Strategy:** The Digital Government Strategy sets out how the Australian Government will achieve its goal of becoming one of the world's leading digital governments by 2025. That accelerates digital transformation for Australia and Each day, digital continues to be embedded in everything that Australians do.

(2) **Digital Economy Strategy:** which focuses on the broader Australian Economy and the delivery of secure and trusted digital government services.

(3) **Australian Data Strategy:** which sets out a clear vision for Australia's data capability to maximize value from data to grow the economy.

(4) **Secure Cloud Strategy:** which is a strategic framework developed to guide Australian government agencies in transitioning to cloud-based solutions that enhance government operations and service delivery.

(5) **Hosting Strategy:** Whole-of-Government Hosting Strategy comprises policies, directions, and principles related to the Hosting ecosystem, ensuring commitments to personal data protection and resilience.

7.4.2. The Vision

(1) **Delivering benefits for all Australians:** Digital government goes beyond simply having online services, it puts the needs of people and business first. It uses cutting-edge technology to provide a personalized experience that is stable, secure, and reliable and ultimately anticipates the needs of each user.

(2) **World leading digital government:** By 2025, Australia will be one of the top three digital government in the world, for the benefit of all Australians and will have foundations to retain this position into the future. It is also a notable movement to leverage the transition to a digital government.

7.4.3 Strategy on A Page

In order to achieve the vision, the principles, outcomes, and public services are divided into three areas such as people and business, government, and critical enablers. For people and businesses, principles for delivering simple, helpful, respectful and transparent services to all users have been established. The anticipated outcomes are all government services available digitally, easy to access and people and business centric. For government, principles must be digitalized, connected, skilled and adaptable. The anticipated outcomes are reuse and invest, digital workforce, and architecture alignment. The critical enablers are the building blocks essential to achieving the strategy outcomes, including the following enablers.

(1) **Security** to protect and secure Australian interests while building trust

(2) **Privacy** to ensure personal data is safe, secure and used ethically across our digital landscape

(3) **Data** captured, analyzed and used safely to inform service design and policy

(4) **Governance** to provide accountability and ensure consistent and timely implementation of the strategy. The Secretaries Digital Committee will provide leadership and governance, the Digital

Leadership Committee will provide oversight of tactical work to ensure delivery of the strategy outcomes, and the Chief Information Officer Forum will be a key consultative group to be established.

7.4.4 Strategic Activities

The immediate focus is to establish a government approach to digital transformation including:

(1) Aligning government leaders on the Strategy, its key priorities, and high-level plan for execution.

(2) Implementing governance and monitoring mechanisms to track progress against the Strategy.

(3) Developing an integrated investment approach that promotes re-use of existing technologies and systems, and aligns to a single architecture.

(4) Growing strategic alliance partnerships at a whole of government level.

In the future, the focus will remain on maturing the digital capabilities. This will involve:

(1) Mobilizing an integrated investment plan to address significant gaps or limitations in digital capabilities.

(2) Exploiting opportunities to share capabilities across all levels of government and with our partner ecosystem.

(3) Investing in expansion of the digital ecosystem

(4) Maintaining a proactive, forward-looking view of emerging needs and evolving the Strategy accordingly.

Australia, a global leader in the successful development of e-Government, has been adopting “Success is dependent on the entire Australia Public Services”, and is currently progressing with its successful transition to Digital Government.

8. ASSESSMENT OF THE CURRENT STATUS OF MYANMAR'S DIGITAL MATURITY

Digital Government plays a crucial role in accelerating digital transformation by creating an enabling environment that fosters the country's digital economic development. It also ensures the harmonization of whole-of government strategies in delivering public services.

To advance Myanmar's digital economy and achieve digital transformation, a comprehensive approach is required to transition from e-Government to Digital Government. Therefore, in November 2022, a survey was conducted to assess Myanmar's current digital maturity status. The assessment was divided into four key areas:

a) ICT Technology Maturity

b) Government's Readiness to Change

c) Governance and Organizational Maturity

d) ICT Skills Availability Maturity

8.1 ICT Technology Maturity

ICT Technology Maturity has been categorized into four levels as follows:

8.1.1 Technology Infrastructure

A deep study on the current deployment and utilization of hard ICT infrastructure in Myanmar's government organizations revealed the following findings:

(1) Computer Usage for Operations: Only about 60% of the required computer usage for operations is met, indicating insufficient coverage.

(2) Internet Accessibility: Although internet accessibility has improved to over 70%, it still falls short of meeting actual needs.

(3) Network Infrastructure Development: Over 70% of government departments have established and are using network infrastructure, showing progress in this area. However, the current network capacity does not fully meet operational demands. Plans are being developed to expand and address these gaps.

(4) Network Technologies: Optical fiber and wireless networks are predominantly used, while satellite communication systems are rarely utilized.

(5) Data Centers: Some ministries and state/regional governments have built and are using their own data centers or server rooms. The use of in-house servers is more prevalent than colocation services.

(6) Government Cloud Services: Government cloud (web hosting) services have begun to be offered in Myanmar, with increasing adoption of rental services. However, some government departments still rely on cloud services provided by overseas organizations.

(7) National Data Center Initiative: A national-level project to establish the National Data Center (e-GIDC) is underway to provide colocation and cloud services for all government departments.

(8) Cybersecurity Measures: Approximately 60% of government departments are now using cybersecurity systems such as firewalls, VPNs, email security, and antivirus software. Cybersecurity measures

are improving, and processes are being developed to further enhance these efforts.

In building and implementing e-Government, the most fundamental and essential requirement is the systematic development and utilization of ICT infrastructure. Therefore, significant investments must be made in critical infrastructure such as data centers, networks, internet access, and cybersecurity, as well as foundational soft and hard infrastructure like hardware, software, applications, operating systems, and data storage (databases). These investments must be effective and efficient to ensure sustainable and resilient ICT infrastructure, which can also protect against cyberattacks.

Studies indicate that while the development of hard technology infrastructure supporting public value has progressed rapidly in a short time, it still falls short of meeting all requirements. Therefore, continued efforts and sufficient investment are necessary to further develop and enhance these infrastructures to meet the growing demands.

The Core ICT infrastructures that should be built first are as follows:

(1) Myanmar Cloud Infrastructure for e-Government

(2) Cluster of National Data Centers for Hosting e-Government Applications and Disaster Recovery

(3) Quick Win Service Infrastructure Platform

(4) Cyber Security

(5) e-Government Backbone Network

In building core ICT infrastructure, it is essential to anticipate future growth in operations and evolving conditions.

Technologies that allow for easy scalability and expansion should be selected and implemented to ensure long-term adaptability and efficiency are as follows:

(1) Cloud Computing

(2) Virtualization

(3) Infrastructure as a Service (IaaS)

(4) Software as a Service (SaaS)

(5) Platform as a Service (PaaS)

(6) Security as a Service (SEaaS)

(7) Application Performance Management (APM)

(8) Pay-as-you grow model with transaction/ outcome-based pay-out

(9) Chargeback model for ministries using the infrastructure

8.1.2 ICT Laws, Strategies, Policies, Regulations, Directives, and Standards, etc.

A specialized study on the development and implementation of ICT/e-Government-related laws, regulations, strategies, policies, directives, and standards in Myanmar revealed the following findings:

(1) Laws

(a) Existing ICT-related laws are not comprehensive.

(b) Specific laws for cybersecurity, e-Government, ICT development, data privacy, intellectual property, e-commerce, and digital transformation have not been enacted. Draft laws are being prepared, and plans are in place.

(c) A legal framework for digital transformation has not yet been established or implemented.

(2) Strategies

(a) The development of strategies in ICT-related fields has strengthened.

(b) Strategies for e-Governance, cybersecurity, e-commerce, and digital economy are being drafted.

(3) Policies

(a) Policy development in ICT-related areas has improved.

(b) Policies for e-Government, e-commerce, information security, cybersecurity, networks, internet usage, and data center utilization are being drafted.

(c) Policies for open data, cloud computing, and data centers are being planned.

(4) Directives

(a) Directives in ICT and e-Government fields are being issued.

(b) Directives related to social media usage, electronic transformation of office operations, and service delivery need to be issued.

(5) Standards

(a) Standards for ICT and digital technologies are underdeveloped.

(b) Standards for building networks, data centers, and other infrastructure need to be established.

(c) Understanding of cybersecurity guidelines and standards remains limited.

(6) Roadmaps

(a) Roadmaps for ICT and digital technologies are underdeveloped.

(7) Guidelines

(a) Guidelines for ICT and cybersecurity technology usage, CIO roles, and task force formation have improved.

(b) Guidelines for ICT resources, IT, human capital, applications, and e-commerce are being developed.

Amending and enacting new ICT-related laws, formulating effective strategies and policies for e-Government implementation, issuing necessary directives, and developing standards can be defined as soft infrastructures which is critical foundations for advancing ICT technologies and infrastructure.

These efforts support the nation's long-term vision of transitioning from Electronic Governance to Digital Government, creating an enabling environment that fosters this transformation. It is essential to enact and adhere to laws, policies, and guidelines related to the proper use of digital technologies and data, data security and information protection.

In Myanmar, the existing laws related to Information and Communications Technology are as follows:

(1) The Telecommunications Law (2013);

(2) The Computer Science Development Law (1996);

(3) The Electronic Transactions Law (2004)

Existing laws include the development of ICT, the use of computer technology in the government administration mechanism, but it was found that they do not include the basic components that can contribute to the development of the e-Government system.

e-Government involves a wide range of characteristics and processes, including:

(1) Electronic Services: Development and delivery of electronic services to the public.

(2) ICT Integration: Integration of ICT (Information and Communication Technology) to streamline government operations.

(3) Standardization: Establishing and defining standards for ICT systems and processes to ensure consistency and interoperability.

(4) Comprehensive ICT Infrastructure Development: Building a robust and complete ICT infrastructure to support e-Government initiatives.

(5) Streamlining Government Processes: Reviewing and simplifying complex government workflows and procedures to improve efficiency.

(6) Organizational Restructuring and Reform: Establishing and reorganizing necessary institutions to support e-Government, Revising and transforming operational procedures to align with digital governance.

(7) Budget Allocation and Investment: Allocating budgets and securing investments for e-Government projects.

(8) Procurement and Implementation: Conducting tendering processes and procuring necessary resources, Executing and implementing e-Government projects effectively.

(9) Quality Assurance: Ensuring quality assurance throughout the implementation process to meet standards and deliver reliable services.

To ensure the continuous use and effective implementation of the e-Government system, it is essential to align with the rapidly evolving modern systems and digital technologies. This requires the establishment of strong legal and regulatory frameworks that provide the necessary support and impetus. These frameworks should comprehensively address the characteristics of e-Government, and clearly describe the definition for measures, in amending existing laws or enacting new laws. by doing so, it will enhance the efficiency, effectiveness of the country's governance processes.

A robust organizational structure with clear authority, responsibilities and accountability of the implementing department is needed to established in order to ensure the successful execution of the action plan outlined in the e-Governance Master Plan, foster inter-departmental collaboration within the government, support the growth of digital technologies in collaboration with the private sector and education sector. To ensure the successful implementation and sustainability of e-Government, the following perspectives should be addressed in the legal and regulatory frameworks:

(1) Electronic Signatures and Cryptographic Usage for Dispute Resolution

(2) Intellectual Property Rights (IPR)

(3) Protection of Critical Infrastructure

(4) Cybersecurity

(5) Cybercrime

(6) Ethical and Legal Standards for Social Media Usage

(7) e-Commerce Activities (e.g., Electronic Payments)

(8) Privacy and Personal Information Protection

(9) Consumer Protection

(10) Interoperability

To successfully implement e-Government, the following ICT-related areas must be strategically prioritized and managed:

(1) Software Development

(2) Core ICT Infrastructure

(3) Design and Implementation

(4) Intellectual Property and Innovation

(5) Methodologies

(6) Policies

(7) Technologies

(8) ICT Applications

(9) Digital Literacy and Skills

(10) Implementation and Management Tools

In the area of standardization, it has been observed that Myanmar's efforts to align with internationally accepted standards and best practices are currently insufficient. To address this, it is essential to study and incorporate international ICT standards and best practices, and then define and enact standards that are

suitable for Myanmar's context. Additionally, it is necessary to adopt policies and guidelines to ensure compliance with these standards.

To ensure that e-Government systems can integrate and interoperate, seamlessly, upgrade in line with technological advancements, and adapt to procedural changes, it is essential to define standards for the technologies and equipment used in their implementation. These standards should align with international standards while also addressing domestic needs through the establishment of domestic standards. When adopting these standards, the focus should not be limited to restricting technologies but should also ensure that systems can interconnect smoothly and securely. The following areas should be prioritized for standardization:

(1) Information Security;

(2) e-Services;

(3) Technology and Architecture;

(4) Workflow and Document Management;

(5) Application Software Development; and

(6) Supporting activities Quality assurance.

In the development and enforcement of standards should be a collaborative effort led by the National Standards Council (NSC) of Myanmar. This process should involve other relevant government ministries and international partner organizations. The standards should be adopted with reference to discussions between Myanmar and international bodies, ensuring alignment with international acceptable standard while addressing domestic needs.

To ensure that all citizens can access and understand government electronic services, e-Government applications should be developed in both English and Myanmar languages. In the standardization technical standards, international standards are to be taken into consideration, as well as in the standardization of language, linguistic conventions, established rules, shifts in perspective, ascending and descending order, and other related principles are should be adhered to.

To enable such description in the Myanmar language, the Myanmar script Unicode system has been standardized in accordance with international standards and the guidelines for Myanmar language orthography. Additional standards should be set for Myanmar keyboard layouts to ensure consistency and ease of use. Furthermore, it is essential for the state to take the lead in facilitating the use of ethnic languages, and taking into account effective use of internationally recognized Unicode code points.

8.1.3 Electronic Services

In a deep study examining the status of the government's electronic service delivery, the utilization of e-Government applications, and the collaborative integration among ministries, the following findings were observed:

(1) There has been significant progress in the provision of electronic services government-to-government (G2G), government-to-citizens (G2C), and government- to-businesses (G2B);

(2) The delivery of fully online services has become more robust and effective;

(3) Efforts to enable online payment systems have shown considerable improvement; and

(4) (i) Electronic service delivery has notably advanced in the areas of government-to-government (G2G) and government-to-citizen (G2C) interactions; (ii) Progress has also been observed in business-to-business (B2B) and business-to-citizen (B2C) sectors; and (iii) Moderate improvements have been made in government-to-business (G2B) and government-to-employee (G2E) interactions.

Although it has been observed that the development and utilization of application programs facilitating the seamless flow of information between the government and the public have significantly enhanced the delivery of public electronic services, this is essential to further expand and extend electronic services that are accessible to all, including remote and rural areas, without geographical limitations, to fulfill the needs of the public. By widely utilizing application programs, the efficiency of electronic services can be enhanced in quality, and strategic directions to promote the adoption of digital technologies can be identified and established. Additionally, in the delivery of services, certain weaknesses have been identified, necessitating the implementation of measures to address and overcome them. These weaknesses include:

(1) Outdated Technologies: The implementation of ICT application programs often relies on outdated and diverse technologies lacking modernization;

(2) Lack of Interoperability: Most ICT application programs used by government departments are not integrated, hindering seamless interaction and collaboration;

(3) Limited Evaluation Capability: There is a lack of awareness and capability to assess whether ICT application programs effectively support government processes;

(4) Inadequate Systematic Design: Departments have not systematically designed and implemented ICT application programs;

(5) Weak Policy and Guidance: There is insufficient provision of policies and guidelines by technical experts and authorized organizations;

(6) Low Adoption of ICT: Government departments have minimally transformed their processes using ICT, often continuing with traditional methods; and

(7) Underutilization of Common Platforms: There is limited use of shared Common Application Technology Platforms that could enhance the efficiency and agility of government operations.

The success of the e-Government system is primarily measured by its ability to deliver electronic services to the public. Therefore, it is essential to prioritize the widespread adoption of application software across the nation and ensure its sustainable use in the long term.

8.1.4 Digital Media Presence

Based on the analysis of survey results, it has been observed that the development of web portals and websites has progressed significantly. However, some static websites still remain. When evaluating the development of e-Government online presence among government organizations using the United Nations' Five-stage Model for e-Government, the findings indicate that there has been notable progress in providing services where all operations can be completed online, including

online payment systems. As a result, the number of departments reaching the Transactional Presence stage has increased.

To systematically develop and enhance the national online payment systems, the State has established the National Payment System Oversight Committee and formed the e-Commerce Online Payment Working Group. Efforts are being intensified to enable citizens to complete all transactions in one place seamlessly. Moving forward, the focus will be on ensuring that citizens can fully utilize electronic services and access all services through One-stop Portals, aiming to achieve a Seamless or Fully Integrated Web Presence.

8.2 Government's Readiness to Change

In assessing the readiness of the Myanmar government to transform its administration model, the deep study was divided into three parts, revealing the following findings:

(1) Simplify and Streamline Governance Processes using ICT;

(2) Leadership Support and Appreciation; and

(3) Ability to Sustain Projects in long term.

The transition from e-Government to Digital Government represents one of the most significant governance challenges. To overcome these challenges, it is essential to establish a robust governance system and utilize ICT technologies effectively and efficiently. By leveraging ICT, government mechanisms and procedures—such as operational processes—will become simpler, more streamlined, and efficient. Additionally, operational activities will become faster, more agile, and responsive. Therefore, it is crucial to use ICT to transform and simplify government operations, ensuring they are more efficient and seamless.

However, in the course of implementing reforms and transformations within government management systems, it has been noted that many initiatives have fallen short of success due to various factors. These include Dwell on, lack of clear leadership and dedicated organizations, Ambiguity in objectives, insufficient top-level leadership support, Resistance to changes in processes and policies, corruptions, deep-entrenched convictions, entrenched and traditional mindsets, fear that they will lose their jobs, power and "turf", Fear that technology will mean more work for them, preference for maintaining conventional processes and reluctance to embrace new methodologies, discrepancies in procedures between government entities and external organizations, hindering the acceptance of external recommendations, and Inadequate financial resources to support reform efforts.

For the successful implementation of e-Government in Myanmar, the support, recognition, and understanding of top leaders are indispensable. Building e-Government systems requires significant investment of resources. However, e-Government systems inherently bring about tangible long-term benefits. Unlike business ventures, where substantial investments can yield visible returns in a short period, e-Government systems do not provide immediate, noticeable profits. Therefore, without the encouragement and support of leaders, it will be challenging to utilize financial, human, natural, and state resources effectively.

Furthermore, the implementation of e-Government involves transforming government operations and processes through the use of ICT technologies. Without the support and encouragement of top leaders, it would be impossible to carry out government reform initiatives. Therefore, the support and recognition of

leaders for ICT-related projects and initiatives play a crucial and indispensable role in this process.

8.3. Governance and Organizational Maturity

This section was divided into three parts for assessment:

(1) Sustainable Availability of Funding Resources;

(2) Facilitating Private Participation; and

(3) Organizational Structure for Facilitating ICT.

8.3.1 Availability of Funding Resources

In the specialized study on the availability of funding for e-Government initiatives, it was found that there is a lack of sufficient funding. Many developing countries still face challenges in implementing e-Government, including ineffective financial management or limited budget allocation. To successfully implement e-Government projects, it is essential to allocate adequate funding and manage these financial resources effectively. By doing so, redundant or excessive efforts can be avoided, ensuring efficient and streamlined operations.

ICT (or) e-Government initiatives differ in nature from other types of projects. Therefore, it is necessary to develop and establish separate guidelines, policies, financial regulations, procurement rules, and budget allocation and utilization frameworks tailored specifically for these initiatives.

8.3.2 Facilitating Private Sector Participation

Collaboration between government departments and the private sector in ICT-related projects and initiatives has shown only slight progress.

It is crucial to prioritize public-private partnerships (PPPs) in areas related to ICT and e-Government. In implementing e-Government projects, government departments face challenges such as insufficient ICT-skilled staff and limited ICT capacity among employees. Therefore, the participation of domestic and international private sector stakeholders plays a vital role.

According to the Strategy 3.2 of the Myanmar Sustainable Development Plan (2018-2030), promoting transparent and competitive public-private partnerships will significantly support the rapid development of ICT infrastructure projects as well as it will enhance the quality of public services through advanced and skilled operations.

Thus, it is essential to focus on infrastructure development by leveraging financial resources, including private sector funding and collaboration. For infrastructure projects with assured economic returns, a public-private partnership model with private investment should be adopted. For priority projects that impact socio-economic development, strategic use of government funds, official development assistance (ODA), and development funds is recommended.

8.3.3 Organizational Structure for Facilitating ICT

In examining the organizational structures responsible for implementing large-scale e-Government projects and initiatives, it has been observed that the current authorized organizational frameworks within government departments are insufficient.

In countries where e-Government has been successfully implemented, strong and well-structured organizations have been established to effectively plan, manage, and execute projects. These countries have systematically developed robust organizational frameworks to ensure the success of their e-Government initiatives.

In Myanmar, however, the existing organizational structures and processes for implementing e-Government projects still exhibit significant weaknesses.

Therefore, it is necessary to strengthen and expand the organizations and structures responsible for implementing e-Government as needed. According to the previous Myanmar e-Governance Master Plan (2016-2020), e-Government leading organization at the national level and e-Government departments in government ministries were established. However, the current organizational structure of government agencies who responsible for implementing large-scale e-Government initiatives is insufficient. Therefore, it is necessary to expand e-Government division within Government departments and enterprises, as well as at the regional and state levels, and to appoint skilled personnel to ensure effective execution.

8.4 ICT Skills Availability Maturity

This chapter was divided and evaluated into 4 parts such as Availability of e-Governance Champions in each Department.

8.4.1 Availability of e-Governance Champions in each Department

The availability of e-Governance champions within government departments has shown some improvement, but significant gaps remain.

It is essential for government institutions to recognize e-Government/ICT initiatives as critical priorities and to drive digital transformation efforts. To achieve this, the training and development of skilled ICT/e-Government professionals with both quality and quantity is paramount. Therefore, it is necessary to emphasize the cultivation of high-quality, digitally proficient, and highly skilled staff and experts to meet these demands.

The experience, expertise, and capabilities of leaders responsible for e-Government initiatives within government departments will be a key driving force in accelerating Myanmar's digital transformation journey. These leaders need specialized training in areas such as process management, quality assurance, project planning and management, technical architecture and design, problem-solving, and improving management models to enhance their skill levels.

While some universities in Myanmar produce advanced ICT specialists and graduates, there is a lack of incentives to attract these professionals to serve in government departments. As a result, their expertise is underutilized in implementing e-Government initiatives. Therefore, it is crucial to develop and implement programs to attract technical experts (such as Program Managers, ICT Infrastructure Experts, Network, Application, Software, Database, System Architecture, and Cyber Security specialists) and talented individuals to serve in government roles. This will ensure the successful execution of e-Government projects and drive the nation's digital transformation forward.

8.4.2 Availability of ICT Literacy Skilled Civil Servants

A specialized study on the appointment of ICT/e-Government-skilled staff within government institutions revealed that the current appointment rate averages only 24%. While there has been slight progress, significant gaps remain.

It is crucial to prioritize the recruitment and appointment of ICT/e-Government-knowledgeable staff to effectively implement e-Government initiatives both at present and in the future. To ensure operational efficiency and the delivery of high-quality services, specific plans must be developed and implemented to address the shortage of technically proficient civil servants.

8.4.3 Availability of ICT Skilled Manpower

A deep study on the availability of ICT-skilled personnel within government departments and organizations, it was found that only 29% of the required ICT-skilled workforce is currently employed. While there has been some improvement, significant gaps remain.

The analysis also found that the current state of human resource availability in departments implementing e-Government projects in Myanmar is weak. There are notable shortcomings in the organizational structure and implementation of e-Government initiatives. Clear regulations, mandates, and authority need to be established to define organizational structures, staffing requirements, and the recruitment of skilled personnel. Additionally, there is a lack of consistent and focused efforts to achieve the main objectives.

Therefore, it is necessary to expand the organizational structures of departments responsible for e-Government/ICT initiatives within various government ministries as needed. This includes filling positions with qualified staff and clearly defining their responsibilities and authority. These steps are crucial to ensure the effective implementation of e-Government projects.

8.4.4 Capacity Building

In studying the development of human resources necessary for the advancement of ICT and e-Government in Myanmar, it has been observed that while there is a shortage of adequately appointed staff, training and capacity-building programs for existing employees are progressively improving.

For the successful implementation of e-Government in Myanmar, it is essential to ensure that government departments are equipped with a sufficient number of skilled employees and to prioritize enhancing the capabilities of existing staff.

e-Government processes encompass a wide range of ICT-related activities. However, government departments face challenges due to the insufficient number and qualifications of ICT-skilled employees. As a result, human resource development and capacity-building initiatives have become critical priorities.

To advance ICT development, Myanmar needs to collaborate with developed partner countries to establish frameworks for human resource training and development. Additionally, it is necessary to create institutions dedicated to providing training and education. Special emphasis must be placed on improving government employees' understanding and proficiency in ICT, ensuring they are well-prepared to support e-Government initiatives.

The following areas require focused efforts to significantly enhance the capabilities of employees:

(1) Planning, constructing, expanding, and maintaining technological infrastructure to ensure long-term sustainability and resilience;

(2) Designing, developing, deploying, and managing e-Government applications, as well as overseeing service delivery and project management;

(3) Implementing awareness programs to enhance public understanding of e-Government benefits in order to increase the widespread adoption of electronic services;

(4) Expertly managing and executing large-scale projects/initiatives to achieve desired outcomes; and

(5) Designing and managing economic and financial frameworks, including budgeting, Financial and technical accounting, Management of capital expenditures and revenue generation strategies, and Methods to increase revenue and reduce costs, and to ensure cost-effective and impactful implementation of e-Government initiatives.

To advance the development of human resources in ICT and e-Government, the following strategies should be prioritized and implemented:

(1) Expanding Institutions Focused on ICT Education;

(2) Training and Developing ICT Experts;

(3) Collaborating with International ICT Organizations;

(4) Integrating ICT subjects into Basic Education; and

(5) Adopting Modern Methods for Electronic Service Delivery.

The development of Myanmar's ICT sector and the advancement of e-Government are closely intertwined. To promote ICT-related activities and computer-based initiatives within government departments and among the public, the Myanmar Computer Development Council has been established. For the successful implementation of e-Government, it is essential for these organizations to collaborate closely with private sector entities, such as the Myanmar Computer Federation (MCF) and its subordinate associations, as well as ICT companies. These collaborations should focus on Jointly implementing projects and initiatives and enhancing public awareness and knowledge of ICT and e-Government benefits. The active support of ICT industry stakeholders, professionals, and enthusiasts is

crucial for the development of ICT human resources. For example: The Myanmar Computer Federation (MCF), along with its affiliated associations such as the Myanmar Computer Professionals Association, Myanmar Computer Industry Association, and Myanmar Computer Enthusiasts Association, has been organizing ICT training programs in collaboration with international organizations. These initiatives significantly contribute to the development of the ICT human resources needed for the country's growth.

In implementing e-Government in Myanmar according to the roadmap, the role of government employees is crucial. They are responsible for managing, executing, and maintaining projects and processes to ensure their success and sustainability. Therefore, it is essential to further strengthen and enhance ICT human resource development initiatives to improve the skills and capabilities of government employees who play a central role in these efforts.

Additionally, promoting the widespread use of electronic services and application software among citizens and businesses, as well as increasing awareness and understanding of the benefits of e-Government, are critical factors for its successful implementation. By enabling citizens and businesses to access desired information through Information Infrastructure, their technological knowledge will grow, and the digital divide will narrow. To achieve this, it is necessary to implement educational programs using various communication channels, with a focus on disseminating knowledge widely among citizens and businesses. These programs should be conducted in Myanmar language and ethnic languages to ensure inclusivity and accessibility. The following Communication Channels should be utilized for Promoting e-Government Awareness:

(1) Mass Media and Digital Platforms: Radio and Television, Newspapers and Magazines, Posters and Leaflets, Social Media, Short Message Service (SMS);

(2) Traditional Cultural Programs;

(3) Non-Governmental Organizations (NGOs);

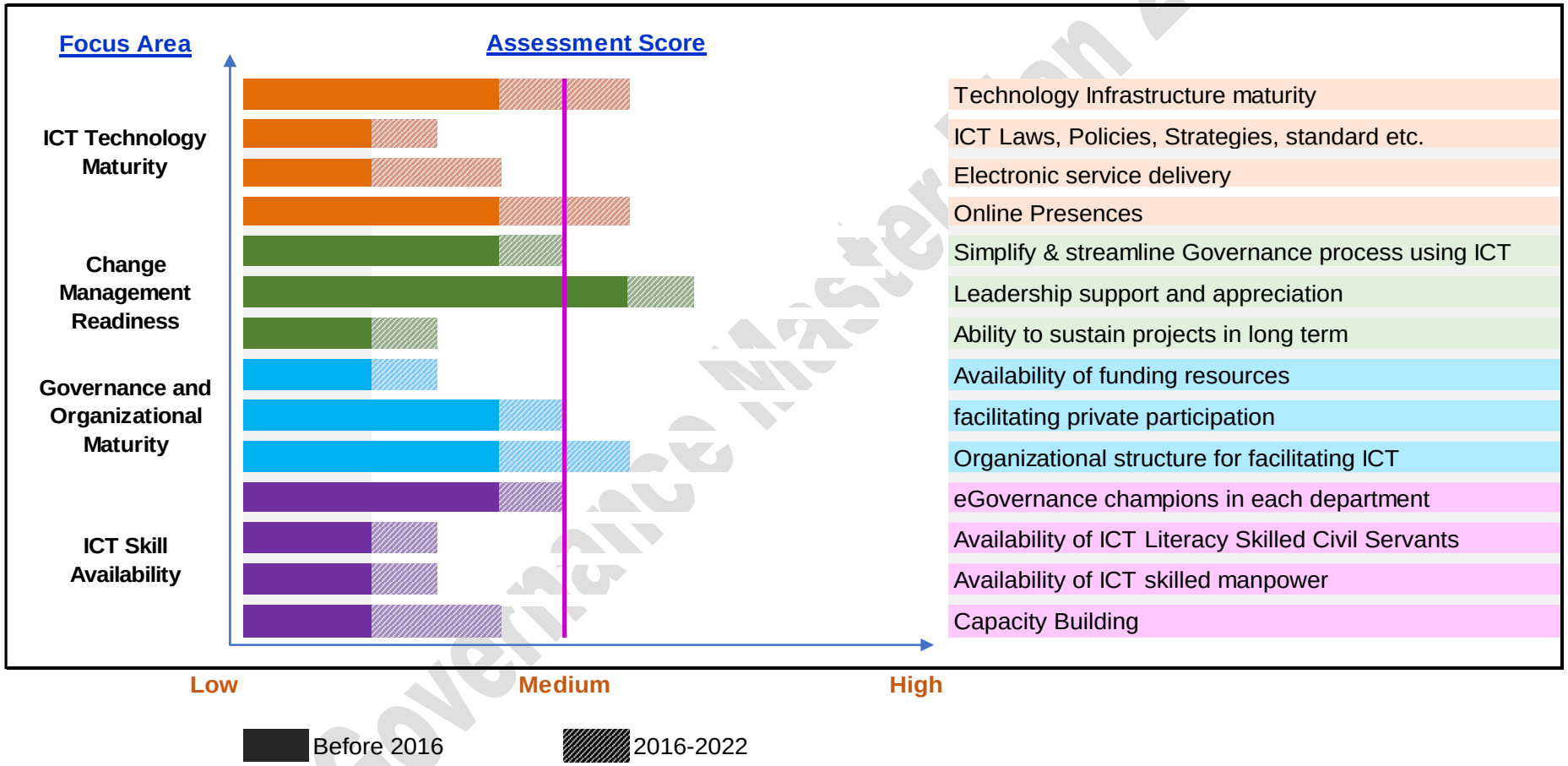
(4) Educational Institutions;

(5) Government Departments Interacting with Citizens;

(6) Telecommunication Services; and

(7) Service Centers and Portals: Citizen Service Centers, Call Centers, e-Government Portals, Post Offices;

FIGURE 3: ASSESSMENT SCORE OF THE CURRENT STATUS OF MYANMAR'S DIGITAL MATURITY



8.5 Performance in the e-Government Development Index (EGDI) and e-Participation Index (EPI)

The e-Government Development Index (EGDI) and the e-Participation Index (EPI) are indicators established by the United Nations. The EGDI is measured based on three key components: Online Services, Telecommunication Infrastructure, and Human Capital. The EPI, on the other hand, evaluates public participation through e-Information, e-Consultation, and e-Decision-Making.

In terms of the EGDI, Myanmar has demonstrated progress in delivering online information and services to the public more effectively. Additionally, the country has begun to establish a governance model that fosters collaboration between the government and the public. This model ensures that the needs, expectations, opinions, and recommendations of the public are incorporated into the government's decision-making processes.

As a result, among the 193-member states of the United Nations, Myanmar has transitioned from a low ranking in the EGDI to a medium level starting in 2018. Specifically:

(1) In 2016, Myanmar was ranked 169th.

(2) By 2018, it improved to 157th.

(3) In 2020, it climbed to 146th.

(4) In 2022, it further advanced to 134th.

Similarly, in the e-Participation Index (EPI), Myanmar has shown significant improvement:

(1) In 2016, it was ranked 170th.

(2) By 2022, it rose to 117th.

9. E-GOVERNMENT TO DIGITAL GOVERNMENT

Nowadays, societies and economies have transformed dramatically due to the rapid advancements in digital technologies. Digital technologies such as cloud computing, mobile technologies (e.g., 5G), machine learning (ML) algorithms, artificial intelligence (AI), the internet of things (IoT) have all become significant technologies during the digital revolution (OECD, 2022).

As a result of such new technologies, governments are also able to provide better services at a lower cost, including services to remote areas through mobile applications. In spite of these technological advances, substantial governance and strategic challenges remain. Therefore, in fulfilling government objectives, the development of new reforms should carry some consideration of technological trends, potential impacts, and the role of digital technologies (OECD, 2022). Low-and middle-income countries are struggling to gain a foothold in the global digital economy in the face of limited digital capacity, skills, and fragmented global and regional rules. Political stability, democracy, human rights and equality also risk being undermined by weak governance and the abuse of digital technology.

9.1 The Role of Technology

Digital technologies such as cloud computing, mobile technologies, machine learning (ML) algorithms, artificial intelligence (AI), the internet of things (IoT) have all become significant technologies during the digital revolution (OECD, 2022). As a result of such new technologies, the government will have a significant impact on the distribution and use of digital services in various sectors, such as health, education, social, economic, transportation, communications, agriculture, job creation, judiciary, etc. For example: Providing services to remote areas through

mobile applications and AI at a lower cost can improve results.

Despite advancements in technology, on the other hand, significant challenges remain in government administration and strategic planning. Therefore, it is imperative to prioritize and consider future digital trends, their roles, and potential impacts in order to foster innovation and drive new developments, thereby effectively advancing the implementation of the government's objectives. To promote political stability, inclusivity, socio-economic development, and equality, the principles of good governance and the effective utilization of digital technology are indispensable.

9.2 The Role of Government

Digital Government reflects the efforts made in past decades to implement e-Government, aiming to advance the digital transformation of the public sector while progressing toward digital competence and digital maturity.

For the successful implementation of the Government’s digital transformation, it is imperative to put in place robust ICT governance arrangements, as sustainability and coherence are essential prerequisites. On the other hand, concerns persist regarding the distribution of benefits arising from digital transformation. Therefore, to ensure the effective deployment of technology during the digital transformation, particularly in the public sector, it is essential to adopt new operational approaches.

Additionally, the adoption of new technical skills will be essential, and public sector leaders must embrace greater openness, knowledge sharing, and collaboration as part of a cultural shift.

According to OECD (2022), a transition from e-government to digital government

presents the biggest governance challenge. Additionally, as new technological innovations continue to emerge before the full utilization of existing technologies, there are challenges in the adoption phase that remain unaddressed. If government operations are not transformed to meet the expectations of digital societies, they run the risk of poor service quality, inefficient spending, inadequate policymaking and lost economic opportunities.

Thus, governments have a significant role to play in ensuring an inclusive digital transformation that benefits individuals.

Therefore, government entities must undertake the transition to a Digital Government as a national duty. Every ministry should not only implement their policies, objectives, and processes but also integrate digital government into their operations to ensure transparency, accountable management, and the transformation into an effective and innovative digital platform that enables direct engagement with the public. This approach should be adopted by every ministry to achieve a modern and efficient digital governance system.

9.3 The Role of the Public

The role of the public is also important in the transition from e-government to digital government. The use of digital systems can save time and reduce costs, and it is essential for the public to actively engage in studying and learning digital technologies. In particular, it is necessary to familiarize themselves with internet systems, mobile applications, and the use of artificial intelligence (AI) technologies. To effectively utilize these technologies, attending training programs and participating in awareness-building initiatives are crucial. By gaining knowledge of these technologies, the public will be more receptive to new systems and adaptable to changes. Understanding advanced technologies such as Big Data,

Digital Platforms, Cloud Computing, AI, and the Internet of Things (IoT) will enable citizens to actively participate in the government's digital transformation efforts. Additionally, the public must also be aware of issues related to personal information protection and cybersecurity. The active involvement of the public will significantly contribute to the effective management and success of the government's digital initiatives.

9.4 Challenges

However, the implementation of e-government is still challenging in many developing countries. Examples of such challenges include:

(1) Lack of ICT infrastructure;

(2) Lack of security and privacy of information;

(3) Lack of proper planning;

(4) Lack of public awareness;

(5) Cultural resistance;

(6) Institutional and political barriers; and

(7) Poor financial planning or lack of budgeting (Pangaribuan, 2019).

The implementation of e-government initiatives is a complicated process and not an easy task as usual. Various problems have been encountered during the implementation of e-government initiatives in developing countries, which has caused them to be not fully implemented.

9.5 Definitions

9.5.1 Analogue Government

Analogue Government is often used in situations where a physical quantity directly reflects the information being measured, essentially, it's a process that handles data in a continuous, proportional manner.

9.5.2 E- Government

E-Government refers to the use by the governments of information and communication technologies (ICTs), and particularly the Internet, as a tool to achieve better government. (OECD)

9.5.3 Digital Government

Digital Government refers to the use of digital technologies, as an integrated part of governments' modernization strategies, to create public value. It relies on a digital government ecosystem comprised of government actors, non-governmental organizations, businesses, citizens' associations and individuals which supports the production of and access to data, services and content through interactions with the government. (OECD)

9.5.4 Digital Technologies

Digital technologies refer to ICTs, including the Internet, mobile technologies and devices, as well as data analytics used to improve the generation, collection, exchange, aggregation, combination, analysis, access, searchability and presentation of digital content, including for the development of services and apps. (OECD)

9.5.5 Public Value

Public value refers to various benefits for society that may vary according to the perspective or the actors, including the following:

(1) Goods or services that satisfy the desires of citizens and clients;

(2) Production choices that meet citizen expectations of justice, fairness, efficiency and effectiveness;

(3) Properly ordered and productive public institutions that reflect citizens' desires and preferences;

(4) Fairness and efficiency of distribution;

(5) Legitimate use of resource to accomplish public purposes; and

(6) Innovation and adaptability to changing preferences and demands. (OECD)

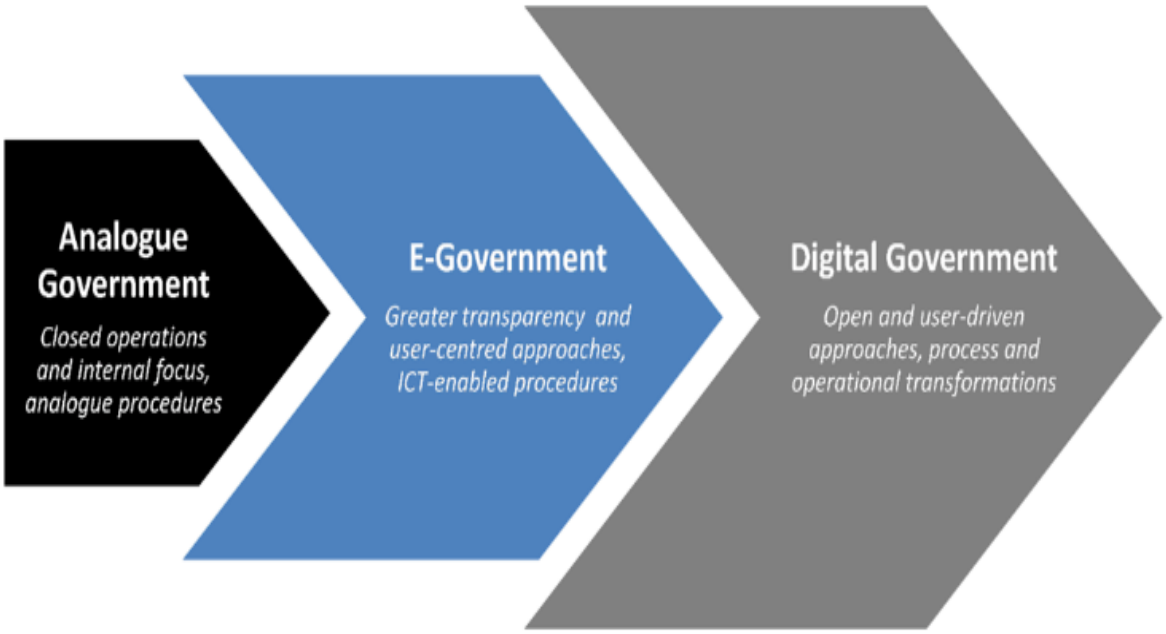
9.6 Progressing towards digital transformation

The shift from an Analogue Government, often characterized by physical processes and traditional analogue procedures, to an e-Government has enhanced transparency and fostered a user-centric approach in service delivery.

Going beyond e-government, full-fledged digital government aims to enable the public sector to sustainably operate in the digital environment. The concept of digital government means taking strategic decisions about and using digital technologies and data to rethink how policies and public services are designed and implemented to meet the changing needs and expectations of citizens. Digital Government relies on a digital ecosystem that supports the production and access to information, services, and content through interactions with the government,

and involves government organizations, non-governmental organizations, business sectors, civil societies, and individuals.

FIGURE 4: FROM ANALOGUE TO DIGITAL GOVERNMENT (OECD, 2014, CITED IN OECD, 2022, P. 1)



9.7 Six Essential Characteristics of a Digital Government

9.7.1 Digital by design

A government is digital by design when it establishes clear organizational leadership, paired with effective co-ordination and enforcement mechanisms where "digital" is considered not only as a technical topic, but as a mandatory transformative element to be embedded throughout policy processes.

9.7.2 Data-driven public sector

A data-driven public sector recognizes and takes steps to govern data as a key strategic asset in generating public value through their application in the planning, delivering and monitoring of public policies, and adopts rules and ethical principles for their trustworthy and safe reuse.

9.7.3 Government as a platform

A government acts as a platform when it provides clear and transparent guidelines, data, tools, and software that equip teams to deliver services that are user-driven and integrated, consistent, reliable and fair, as well as seamless and proactive.

9.7.4 Open by default

A government is open by default when it makes government data and policy-making processes (including algorithms) available for the public to engage with, within the limits of existing legislation and in balance with the national and public interest.

9.7.5 User-driven

A government becomes user-driven by awarding a central role to people' needs and convenience in the shaping of processes, services and policies; and by adopting inclusive mechanisms for this to happen.

9.7.6 Proactiveness

Proactiveness represents the ability of governments and civil servants to anticipate people's needs and respond to them rapidly without people having to request for services, often around their life events.

10. NEW DIGITAL TRENDS

To successfully advance Myanmar's digital transformation journey, the desired goal can only be achieved by establishing and implementing digital relationships that leverage technology effectively, facilitate communication through digital frameworks without physical contact, and ensure the seamless distribution of information and services that meet people's need. A country's success in achieving positive outcomes through digitalization depends on its ability to undergo an effective transformation, with digital technology playing a key role in the process.

Therefore, to foster the long-term growth of Myanmar's digital economy, it is essential to effectively adopt modern digital trends that are being applied globally and promote Digital Government as a key tool for good governance.

Some technology trends will have a significant impact on the delivery of digital services in various countries over the coming decade. The ASEAN Digital Master Plan 2025 highlights technologies currently in use, such as the Internet, Connectivity, Virtual Reality (VR), Augmented Reality (AR), Robotics, and the Internet of Things (IoT), which will continue to be utilized in the future. Additionally, it identifies Artificial Intelligence (AI), Big Data, Robotics, Autonomous Vehicles, and 3D Printing as future technology trends that will shape the digital landscape. These advancements are expected to drive innovation and transformation in digital services across nations.

10.1 The Fifth Generation (5G)

The first generation (1G) of the Commercial Mobile Cellular System was introduced in Japan in 1979, with a maximum speed of 2.4 Kbps (Kilobits per second). Due to poor sound quality and limited coverage, calls were not encrypted, and roaming

was not supported between different operators because different systems used dissimilar frequency ranges. As a result, 1G was superseded by the second generation (2G) cellular networks. The 2G cellular systems featured a digital circuit-switching core network, which provided a significant advantage over 1G by enabling roaming services between 2G networks of different operators (Hill, 2007). In addition to international roaming, 2G introduced essential services such as SMS (Short Message Service), call holding, conference calls, and real-time and long-distance billing services (Net-information, 2022).

Then, 2.5G, or the second-and-a-half generation, introduced packet-switched networks and could achieve a maximum speed of 1 Mbps (Megabit per second) with Enhanced Data Rates for GSM Evolution (EDGE). Next, 3G, or the third-generation mobile broadband system, utilized Multiple-Input Multiple-Output (MIMO) wireless technology and packet switching to enable rapid data transmission with High-Speed Packet Access (HSPA/HSPA+). Consequently, 3G provided users with a faster system and improved download speeds, allowing for seamless video calls (Dangi, Lalwani, Choudhary, You, & Pau, 2022).

The fourth generation (4G) was first introduced in Sweden and Norway in 2009 (Saghezchi et al., 2015). 4G is a purely mobile broadband standard that operates on Long-Term Evolution (LTE) and Worldwide Interoperability for Microwave Access (WiMAX) technologies, offering a maximum speed of 100 Mbps for mobile users (Dangi et al., 2022). It provides a secure and coherent IP-based solution capable of delivering simultaneous voice, data, and multimedia services to users worldwide, ensuring faster communication. 4.5G, an advanced version of LTE-A, utilizes MIMO technology and offers speeds up to three times faster than 4G.

The fifth-generation (5G) broadband cellular service was first commercially launched in South Korea in 2019. Studies suggest that 5G speeds could be 10 to 100 times faster than 4G. As an advancement in mobile communications, 5G is designed to provide reliable and scalable solutions for a variety of devices operating in a fully heterogeneous environment. Ericsson, a Swedish company, forecasted that 65% of the world's population will be covered by superfast 5G internet by 2025 (Taylor, 2019).

10.1.1 Advantages of 5G or the future mobile network

Some of the key advantages of 5G include:

(1) Faster data rates

(2) Lower latency

(3) Reduced energy consumption

(4) Greater bandwidth and faster broadband access

(5) Higher connection density

(6) Improved overall wireless coverage

(7) Real-time communication

10.1.2 Applications of 5G

5G can be utilized in the following areas:

(1) Remote computing and autonomous technology, along with device-to-device (D2D), machine-to-machine (M2M), and human-type communication in the Internet of Things (IoT), which require robust mobile links and high availability.

(2) Audio and video streaming, interactive video, high mobile internet connectivity, and cloud services.

(3) Applications ranging from the necessities of daily life (e.g. banking, health-care, public safety) to multi-user applications such as smart cities, smart homes, smart offices, smart ports, smart factories, intelligent parking, smart traffic lights, smart grids and wireless industrial control systems.

(4) Healthcare services, including medical image transmission, tele-medicine, emergency response services, and real-time bio-connectivity through wearable devices.

(5) Smart transportation systems, such as traffic management, reality and entertainment dashboards, driver assistance systems, and future vehicles.

10.2 Big Data

The storage of information began on clay tablets in Mesopotamia about 4,000 years ago (Clegg, 2017). Over the centuries, the abacus and other devices were developed to transform information into valuable knowledge. These tools could process data faster than humans and perform complex calculations.

By the late 19th century, electro-mechanical devices were introduced to accelerate calculations and address challenges arising from census taking. Since the 1940s, computers and programs have been used not only for calculations but also for retrieving and accessing information. In the 20th and 21st centuries, increasingly complex global interactions created a need to process and analyze ever-growing

amounts of data. Big Data has been utilized to manage and interpret this information.

However, in Big Data systems, the data alone does not generate insights; rather, algorithms and computer programs analyze vast amount of input to make decisions and discoveries.

10.2.1 Applications and Advantages of Big Data

(1) Banking: Through millions of transactions and transfers, banks generate vast amounts of Big Data daily. By utilizing this data, banking users can connect with companies, research products, make purchases, and conduct banking activities. This provides numerous benefits, as outlined below.

(a) Ability to maintain banking information systematically;

(b) Reducing the risk of fraudulent behavior;

(c) Gaining a complete view of customers by recording and analyzing the psychological and behavioral characteristics of each individual (Customer Segmentation);

(d) Providing services tailored to the specific needs of each individual user (Personalized Service); and

(e) Identify opportunities for upselling and cross-selling.

(2) Transportation: With the help of Big Data and analytics, companies or organizations in transportation can precisely enhance and plan for pricing, cost, capacity, demand, customer sentiments. Hence, Big Data can provide several potential benefits to the transportation sector.

Some of the benefits of Big Data in the transportation industry are as follows.

(a) Enhancing passengers' knowledge

(b) Improving tourism/travel services

(c) Enhancing operation efficiency

(d) Improving Security

(3) **Finance:** Big data in finance is a huge and complicated sets of data (including structured and unstructured data) and that can be applied to present answers to long-standing business challenges. In addition to being used to make decisions on investments, Big Data can assist financial service providers to analyze data related to user behavior to reduce operational risks and effectively combat frauds. By using Big Data, financial service providers can also achieve the following benefits.

(a) Gaining real-time market insights

(b) Be able to estimate the return on investment

(c) Effectively mitigate financial trading risks

(d) Providing better service to the user

(4) **Healthcare:** Big Data is generated from various sources, including electronic health records, biomedical imaging, genetic sequencing, wearable devices, medical instruments, and pharmaceutical research. Leveraging this data for disease diagnosis, prevention, treatment, and medical research offers several benefits, including:

(a) Minimizing the side effects of medications,

(b) Enhancing the speed and efficiency of diagnostic processes,

(c) Enabling real-time monitoring of patients' health information,

(d) Providing patients with health status updates and medical care advice,

(e) Equipping physicians with more effective insights and understanding, and

(f) Reducing medical expenses for patients.

On the other hand, the use of Big Data technology also presents challenges, including ensuring data integrity and aggregation, navigating diverse policies and processes, managing operations effectively, and addressing the demand for skilled professionals.

(5) Education: The use of Big Data in education is driving transformation through new technologies and innovations. Universities and colleges are leveraging Big Data to shape future strategies, optimize operational models, enhance student learning outcomes, improve institutional and teacher performance, and upgrade technology-based infrastructure. By doing so, they can achieve the following benefits.

(a) More effective evaluation of lessons and courses

(b) Deeper understanding of individual student needs and the creation of improved learning environments

(c) Enhanced student outcomes, experiences, and peer interactions

(d) Seamless integration of teaching systems, applications, and platforms to boost performance and reduce costs

(6) Labour: In the labor sector, collecting and utilizing Big Data on workers' skills, qualifications, education, work experience, tenure, salaries, and other employment-related information can provide the following benefits.

(a) Reducing the time required for career counseling and job consultations

(b) Automatically identifying and recommending suitable jobs, training programs, and necessary skills based on salary expectations

(c) Accelerating job searches and employment opportunities by helping workers quickly find positions that align with their qualifications and career goals

(7) Electric Power: In the electric power sector, some of the significant benefits of using Big Data are as follows.

(a) Big Data can enhance automated and significantly improve efficiency, thereby reducing maintenance costs. By leveraging Smart Networks, service providers can automatically detect system faults, which helps lower maintenance costs and increases user trust and reliability.

(b) By utilizing data from sensors and other data sources, it is possible to detect abnormal situations such as electricity consumption surges or power transmission spikes in advance.

This allows for the avoidance of potential accidents and enables real-time responses to ensure safety.

(c) Critical information, such as financial data, can be shared in real-time among stakeholders, facilitating seamless information exchange and enabling more effective communication and collaboration.

The challenges associated with using Big Data across various sectors include its misuse in many modern application programs and the reliance on sampling, where a small subset of the population is expected to represent the whole.

10.3 Artificial Intelligence (AI)

AI is a future technology trend that replicates human abilities to solve problems and make decisions by using computers and machines. AI programs primarily focus on three cognitive skills: learning, reasoning, and self-correction. AI systems typically collect large amounts of data, analyze it to uncover correlations and patterns, and predict future events based on those patterns. For example, by using AI, chatbots can collect and analyze chat records to provide human-like, intelligent responses. They can quickly recognize, analyze, and interpret written or spoken language, enabling fast and accurate interactions.

10.3.1 Advantages and Disadvantages of AI

(1) Advantages

(a) Easily identifies trends and patterns: For example, Amazon leverages AI and Machine Learning (ML) to understand customers' browsing and purchasing behaviors, enabling the promotion of relevant products and services based on those insights.

(b) No-human intervention needed (automation): Antivirus solutions utilize AI and ML to automatically recognize new threats and attacks, eliminating the need of human intervention.

(c) Continuous improvement: AL and ML algorithms continuously learn from historical weather data to predict future events.

(d) Handling multi-dimensional and multi-variety data: Digital platforms harness AI and ML to process a variety of Big Data and perform advanced analytics, aiding in informed decision-making.

(e) Wide applications: AI and ML technologies are applied across various industries, driving innovation and improvements in diverse sectors.

(2) Disadvantages

(a) Data acquisition: AI and ML require large amounts of quality data to work effectively.

(b) Time and resources: For AI and ML algorithms to mature and function properly, sufficient time and computational power are required for training.

(c) Interpretation of results: Choosing the right AI or ML algorithms is critical for obtaining accurate interpretations of the results from the information they process.

(d) High error-susceptibility: The likelihood of errors in AI and ML algorithms increases when the sample size is small.

10.3.2 Applications of AI

(1) **Healthcare:** AI can diagnose diseases more accurately and quickly than human efforts, reducing costs and improving patient outcomes. Similarly, virtual assistants and chatbots assist patients by providing health-related information and scheduling appointments.

(2) **Businesses:** In the business sector, AI is used to create better customer experiences. Chatbots are integrated into websites to provide quick and efficient customer support.

(3) **Education:** AI is used to grade students' work, provide support through AI tutors, and assist teachers by suggesting effective teaching methods and resources.

(4) **Legal Sector:** Judicial organizations use AI to predict case outcomes, categorize documents, retrieve and present information, and translate languages.

(5) **Workshops and Factories:** Robots capable of working alongside humans and performing multiple tasks are utilized in these environments

(6) **Finance:** AI is used to analyze personal data and provide financial recommendations. Notable AI-driven applications include Turbo Tax, Intuit Mint, and AI-powered trading systems on Wall Street.

(7) **Banking:** Banks leverage AI-powered chatbots to assist customers, automate transactions, and minimize human interactions, reducing both time and costs. Additionally, AI is also utilized for loan decision-making, setting credit limits, and identifying investment opportunities

(8) **Transportation:** AI is used not only in self-driving vehicles but also for predicting flight delays, optimizing traffic routes, and enhancing the safety and efficiency of maritime shipping.

(9) **Cybersecurity:** Security vendors today leverage AI and ML to enhance their products and services. AI-powered Security Information and Event Management (SIEM) solutions use ML to detect and identify anomalies and suspicious activities while providing real-time alerts to users about potential cyber threats.

(10) **Manufacturing:** AI helps manufacturers predict maintenance needs, minimize downtime, and accelerate their competitiveness in the growing e-commerce markets.

(11) **Job Search:** Job seekers' websites and applications use AI to learn and analyze job search activities and employment records to offer personalized job recommendations and career advice.

(12) **Tourism:** The benefits of AI are being leveraged to effectively and systematically manage tourism operations and passenger services. Technologies such as chatbots, robots, and voice-based digital assistants provide real-time responses to travelers' inquiries, understand their preferences and interests, predict travel conditions in advance, and streamline luggage management. These AI-driven innovations are enhancing the overall travel experience.

10.4 Digital Platforms

A digital platform is a space where producers, consumers, and other interacting groups exchange information, goods, and services.

As a result of competitive operations among digital platforms, organizations can develop their own digital platforms to offer specialized niche services to both existing and potential customers. This enables them to reap the benefits of keeping pace with digital transformation. Depending on an organization's operational models and objectives, a digital platform can function in various forms. Examples of such platforms include the following:

(1) Social media platforms - Facebook, Twitter, Instagram, LinkedIn

(2) Knowledge platforms - StackOverflow, Quora, Yahoo! Answers

(3) Media sharing platforms - YouTube, Spotify, Vimeo

(4) Service-oriented platforms - Uber, Airbnb, GrubHub

(5) Educational platforms - Udemy, edX, Coursera, iQualify, Moodle, Blackboard

10.4.1 Key Aspects of a Digital Platform

In order to successfully design and implement a digital platform, certain key requirements must be met. These include:

(1) The platform should be user-friendly and visually appealing.

(2) It should be trustworthy and secure, providing clear terms and conditions regarding privacy protection and data ownership.

(3) It should support connectivity through Application Programming Interfaces (APIs), enabling access from various devices such as smartphones, laptops, tablets, and workstations, regardless of the underlying operating system.

(4) It should allow all platform users to securely exchange information and interact.

(5) It should be scalable with little to no service interruption.

10.4.2 Applications and Benefits of Digital Platforms

Digital platforms play a crucial role in enhancing jobs, living conditions, and overall well-being. While their use—particularly in social media—comes with certain drawbacks, the benefits far outweigh these limitations. These advantages are especially evident in sectors such as education, healthcare, e-commerce, and digital payments. For instance, online shopping platforms like Alibaba and Amazon have transformed the shopping experience, making it more convenient and accessible. Likewise, digital platforms in education and healthcare have broadened access to knowledge and medical services, while digital payment systems have streamlined financial transactions, improving efficiency and security. Despite some challenges, the positive impact of digital platforms across various industries remains undeniable.

(1) **Healthcare:** Digital platforms are increasingly being used in areas such as digital phenotyping (recording and maintaining patient data), remote management and monitoring, enabling more effective preventive care and timely consultations for patients.

(2) **Supply Chain:** Digital platforms are utilized in alert monitoring and planning, just-in-time production, and order-to-cash processes. These platforms enable companies to monitor the status of goods in real-time, allowing for more efficient management and control of delivery

lead times. As a result, businesses can reduce costs, enhance services, and increase revenue.

(3) **Payment:** As e-commerce businesses continue to grow in popularity, digital payment systems have become essential in modern transactions. These systems enable payments to be made anytime and anywhere, facilitating seamless transfers between different banks and mobile money service providers using QR codes. This reduces reliance on cash transactions and enhance cross-border payments. Furthermore, payments using local currencies can be more widely adopted, contributing to the stability of the financial system.

(4) **Education:** Students can use digital platforms, such as Learning Management Systems, as learning support tools to attend lessons, take exams, submit assignments, and collaborate with others anytime, anywhere.

10.4.3 Disadvantages of Digital Platform

Data harvesting (extracting valuable information from various sources) and data profiling (analyzing and summarizing data into useful insights) are commonly used in surveillance advertising by platforms like Facebook. Its algorithm amplifies misleading and divisive content, thereby increasing advertising revenue. Similarly, experts have highlighted the misuse of digital platforms through various examples.

Facebook and Twitter have been criticized for spreading misinformation, enabling interference, engaging in censorship, inciting violence against activists, and amplifying divisive and polarizing voices, turning them into more powerful narratives. They have been accused of prioritizing unethical profits (or political

gains) over accountability. As a result, these digital platforms have been banned or restricted in some countries.

10.5 Cloud Computing

The term “Cloud Computing (CC) is derived from the cloud-shaped symbol often used to represent the Internet. It enables rapid management and development of resources, allowing users to access computing resources such as virtual servers, storage, processing power, tools, and networks from a Cloud Service Provider (CSP) anytime, anywhere, conveniently, and cost-effectively. Therefore, Cloud Computing offers significant benefits and transforms traditional “On-Premises IT infrastructure”, which is privately built and maintained, into publicly accessible service-based operations.

10.5.1 Characteristics of Cloud Computing

(1) **On-demand self-service:** There is no longer a need to build and maintain your own data centers, configure networks, purchase and install physical servers, or perform similar tasks. Cloud Service Providers can automatically deliver computing resources based on your requirements without delays.

(2) **Broad network access:** Users can access services anytime and anywhere using the Internet.

(3) **Resource pooling:** Computing resources, including processors, memory, and storage, are pooled using a multi-tenant model, ensuring services can be delivered at any time.

(4) **Rapid elasticity or scalability:** The ability to quickly increase or decrease resource capacity in response to user needs.

(5) **Measured service:** Users only pay for the services they use, following a "pay-as-you-go" model.

(6) **Self-patching infrastructure:** The system can automatically patch and resolve network issues without manual intervention.

(7) **Adaptive intelligent security:** By taking advantage of Artificial Intelligence (AI) technology, built-in or incorporated security defense systems provided by CSPs are more flexible, adaptive, and intelligent.

(8) **Cross-platform:** Cloud services can be accessed on a variety of devices, including smartphones, tablets, and laptops, regardless of the operating system (e.g., iOS, Windows, Linux, Android).

(9) **High availability:** Users can have seamless service with guaranteed uninterrupted uptime, as specified in the Service Level Agreement (SLA) by CSPs and ensuring responsiveness access to cloud resources.

10.5.2 Types or Deployment Models of Cloud

(1) **Private Cloud:** A private cloud is an enterprise or internal cloud hosted on hardware resources within an organization's on-premises network or data center for its exclusive use.

(2) **Public Cloud:** It is built for public use. Unlike Private Cloud, the hardware resources of Public Cloud are managed solely by the CSP.

(3) **Hybrid Cloud:** It is a combination of public and private cloud features. Sensitive data is maintained in the private cloud, while the public cloud is used for shared resources.

(4) **Community Cloud:** A community cloud is a cloud shared by groups of people or organizations with common goals. It is designed exclusively

for a specific community of organizations that share similar concerns, such as policy, compliance, and security requirements. The community cloud can be owned, managed, and operated by either an organization or a third party, and it may be hosted on or off premises.

(5) **Multi-Cloud:** It involves using cloud services from two or more CSPs simultaneously. While organizations or businesses rely on using a single CSP such as Amazon's AWS, Microsoft's Azure, or Google's Cloud Platform (GCP), some choose to leverage multiple CSPs concurrently to enhance flexibility, redundancy, and performance.

10.5.3 Service Models of Cloud Computing

(1) **Software as a Service (SaaS):** Cloud-based applications that users can access via the internet without needing installation or maintenance. Examples: Salesforce, WebEx, Gmail, Google Docs, Microsoft Office 365.

(2) **Platform as a Service (PaaS):** A cloud computing model that provides a development environment, allowing users to build, test, and deploy applications without managing the underlying infrastructure. Examples: Google App Engine, AWS Elastic Beanstalk, Adobe Commerce.

(3) **Infrastructure as a Service (IaaS):** It provides virtualized computing resources, including servers, storage, and networking, offering scalable and flexible infrastructure on demand. Examples: Google Compute Engine (GCE), AWS Elastic Compute Cloud (EC2), Microsoft Azure.

10.6 Augmented Reality (AR) and Virtual Reality (VR)

AR and VR create immersive experiences that make people feel as if they are in the same location, even when they are not physically present in the same geographical area. AR is a technology that overlays virtual objects onto the real world, enabling humans to interact with digital elements objects in their physical environment.

On the other hand, VR creates a fully simulated 3D environment where users can interact through their senses, providing the closest possible representation of reality within a virtual setting. VR immerses users in an environment that feels different from their everyday surroundings, offering an immersive experience.

For industries to stay competitive, adopting new technologies is essential. AR and VR have become significant components of digital transformation. As part of the initial steps in this transformation, AR and VR applications can be used to meet the demands of modern business needs. These technologies are increasingly being integrated into various sectors, helping industries adapt to the evolving technological landscape.

10.6.1 Applications of VR

(1) **Healthcare:** VR has a significant influence on the healthcare sector. It is used in psychological therapies to reduce pain and its after-effects for patients. Additionally, VR is utilized as a safe environment for preparing and training for surgical procedures.

(2) **Automotive Industry:** VR enables automotive engineers and designers to experiment with concepts before committing to costly prototypes. It is practically used in designing and testing small-scale models.

(3) **Tourism:** VR allows users to explore and experience destinations virtually, providing a sense of being there without the need for physically travel.

10.6.2 Applications of AR

(1) **Healthcare:** AR is widely used to handle complex medical conditions. Medical imaging assists in diagnosing diseases and providing treatments. AR applications help visualize the structure, margins, and shapes of the conditions such as tumors or cancer, enabling medical experts to use this data to provide precise treatments for patients.

(2) **Tourism:** AR offers a modern travel experience to users through technology. There are several applications used by tourists when traveling. AR helps travelers in finding routes using various methods. Examples include the Google Maps Live View feature, City Tour, and the Florence Travel Guide.

(3) **Education:** AR enables students safely conduct experiments and tests in a virtual environment, especially for complex subjects. Various applications are used in classrooms, such as Catchy words, Metawords, World Brush, and Merge VR.

10.6.3 Challenges of using AR/VR

AR/VR has shown significant advancements in usage and application programs, but some challenges still remain. These include:

(1) **Aesthetic and Comfort:** Most AR and VR wearables are bulky and can sometimes cause motion sickness.

(2) **Limited User Experience:** Many smartphone users are either unfamiliar with how to use AR or VR on their devices, or their phones may not be compatible with this technology.

(3) **Promote of Anti-Socializing**: When users immerse themselves in VR, they disconnect from the real world, which can reduce interaction with others.

(4) **Data Privacy:** AR and VR applications require personal information to provide a customized experience, raising concerns about the safety of personal data.

(5) **Health and Safety:** If proper safety precautions are not followed, physical risks may increase during the use of AR and VR.

(6) **Cost of Manufacturing:** The cost of producing the equipment necessary for AR and VR simulations and setups is relatively high.

10.7 Internet of Things

The Internet of Things (IoT) is a network of connected smart devices or a system of interconnected devices. IoT includes millions of "smart things" that are connected to the internet. These smart devices can communicate with each other from anywhere in the world. They are capable of collecting information by connecting to the Internet and exchanging data with other devices.

In IoT, there are generally two common concepts: Internet of Everything (IoE) and Industrial IoT (IIoT). IoE refers to the compound impact of connecting people, processes, data, and objects or things. It enables Machine-to-Machine (M2M) communication, Machine-to-People (M2P) with technological assistance, and People-to-People (P2P) interactions are included. Similarly, IIoT is primarily used

by high-tech companies that leverage Big Data analytics and M2M communication to optimize their industrial processes.

10.7.1 Future of IoT – Internet of Behaviour (IoB)

The Internet of Behaviour (IoB) is an extension of the IoT that incorporates patterns produced by users as part of data collection. Application programs process the data and then recommend things that align with the users' needs. For example, Google uses behavioral patterns to provide users with advertisements that match their requirements. As a result, businesses can benefit from IoB by enhancing their sales performance.

10.7.2 Advantages of IoT

Some of the advantages of IoT are as follows.

(1) **Increased responsiveness:** IoT devices are always connected and communicating, therefore more responsive.

(2) **Automation and control:** Since no human intervention is required in IoT operations, data can be collected at the speed of the network.

(3) **Better quality of life:** IoT-based applications provide real-time access to high-quality products and services.

(4) **New business opportunities:** IoT create new opportunities and job prospects for businesses.

(5) **Better environment:** IoT can support the management of natural resources and contribute to build a more sustainable planet.

10.7.3 Disadvantages of IoT

Some of the key disadvantages of IoT include the following.

(1) **Compatibility:** There is no universally agreed-upon international standard covering all aspects of IoT. Since devices from various manufacturers may be interconnected, compatibility issues can arise.

(2) **Complexity:** The diversity of IoT devices can lead to increased network complexity, making management and integration more challenging.

(3) **Privacy and security:** Many IoT devices are intelligent consumer devices that store personal information and are connected to global networks, making users' data vulnerable to cyberattacks and theft.

(4) **Employment impact:** With increased automation, machines are replacing human workers to improve efficiency in business operations, potentially leading to fewer job opportunities.

10.7.4 Applications and Benefits of IoT

(1) **Healthcare:** It is one of the industries where IoT is most applicable. IoT can enhance patient quality of life, improve safety and security, reduces healthcare costs, and provide medical support at the right time. An example is a health monitoring system for elderly patients.

(2) **Agriculture:** IoT has numerous applications in agriculture, such as collecting data on rain fall, pest infestations, temperature and humidity monitoring, soil conditions, and more. It can also be used in automating farming and agriculture technologies. IoT plays a key role in increasing agricultural productivity and reducing products cost, which is very crucial for future food production.

(3) **Transportation:** Some IoT applications in transportation include inter- and intra-vehicular communication, smart traffic control, smart

parking, electronic toll collection systems, logistics and fleet management, vehicle control, and roadside assistance.

(4) **Energy sector:** IoT can monitor equipment used for energy production, helping to assess the durability, performance, efficiency, and maintenance status of machinery. It also reduces energy waste and enhances workplace safety.

(5) **Electricity sector**

(a) Smart energy meters: These IoT devices enable direct communication between consumers and distribution centers, reducing downtime and optimizing performance. IoT smart meters can detect faulty power lines and isolate them without affecting the overall power distribution system.

(b) Smart buildings: IoT devices can manage electricity consumption, lighting, heating, and humidity, promoting efficient energy use.

(c) Smart energy grids: Integrating IoT meters into a single network creates smart energy grids. In case of power outages, smart grids can automatically adjust to reduce downtime and improve reliability.

(d) Smart cities: A smart city is entirely covered by an IoT network. Many cities worldwide are already using IoT applications for services. For example, in Auckland, New Zealand, IoT applications provide real-time maps to track bus routes and schedules.

(e) IIoT in industrial sector: Factories using IIoT can monitor and analyze every production process through the IIoT network, improving operational efficiency and productivity. A smart factory includes sensors, actuators, and other devices connected via secure networks for real-time data exchange. Application software ensures smooth operations through real-time monitoring. The data generated from sensors is collected and used for monitoring and analysis. This analysis helps identify anomalous conditions. For example, if the temperature of a piece of equipment exceeds its specified limit, a sensor can detect this condition, and the monitoring software can issue a signal to the operations team, helping to prevent a breakdown before it occurs.

11. CYBERSECURITY

Cybersecurity is an essential component of any Information and Communications Technology (ICT) system, whether wired or wireless. Cybersecurity protects electronic services and applications provided by government and business organizations from various cyber-attacks, ensuring their security and reliability. In other words, cybersecurity refers to the techniques and practices used to safeguard digital information (or data) and digital assets within ICT systems from unauthorized access, theft, leakage, loss, and misuse. It involves defending against cyber threats while ensuring the confidentiality, integrity, availability, and safety of digital resources.

In the post-pandemic era of digital transformation, the volume of digital information has surged significantly. Ensuring its secure management has become a critical challenge, placing a significant responsibility on leaders to address these issues. Therefore, it is crucial to consider internationally accepted laws, policies, guidelines, and standards, and to develop tailored measures aligned with national contexts. Additionally, capacity-building and training in these areas are vital. This approach helps mitigate cyber threats and enhance organizational performance.

11.1 Fundamental Guiding Principles

In cybersecurity, there are three critical goals or fundamental guiding principles that must be thoroughly understood and comprehended.

11.1.1 Confidentiality

Confidentiality refers to securing data (or information) against unauthorized access or misuse, such as through the implementation of policies and procedures to control access to the data. According to section 3542 of the title 44 United States

Code, confidentiality is defined as "*preserving authorized restrictions on access and disclosure, including means for protecting personal privacy and proprietary information*".

To achieve this, a range of security measures including multiple access controls and protections are must be implemented along with continuous testing, monitoring, and training. Data confidentiality is ensured using different encryption algorithms, including symmetric (private-key) and asymmetric (public-key) cryptography. Thus, an important standard practice for maintain confidentiality is the use of user identities (IDs) and passwords. Moreover, additional security options include biometric verification, hardware security tokens, software-based soft tokens, and key fobs. However, a comprehensive approach is necessary to meet security requirements or objectives.

11.1.2 Integrity

The integrity of data is determined by reliable, accurate, and trustworthy it remains throughout its lifecycle. It generally ensures that the original data is modified, changed, or deleted by only authorized parties.

Cryptographic checking mechanisms, such as message authentication codes and hashes, should be used to authenticate data and protect it from modification by unauthorized parties.

11.1.3 Availability

Availability ensures that network assets, including data and services, remain accessible to authorized parties in a reliable and timely manner.

In the era of digital transformation, it is critical that information, data, and programs be accessible anytime, from anywhere, by authorized users. To achieve

this, backing up and storing data in a remote location is an efficient and useful method to prevent data loss. Similarly, proxy servers and firewalls can help protect data and programs from malicious activities, such as Denial-of-Service (DoS) attacks, which can cause downtime and unavailability.

11.2 Enterprise Risk Management Frameworks/Standards

The internationally accepted frameworks and standards for risk management are presented as follows.

(1) AS/NZS ISO 31000:2009 Risk Management: Principles and Guidelines

(2) ISO/IEC 27001 Information Security Management Standard & ISO/IEC 27002:2013 Information Technology – Security Techniques – Code of Practice for Information Security Controls

(3) The Committee of Sponsoring Organisations of the Treadway Commission (COSO) Enterprise Risk Management (ERM) Framework

(4) Federation of European Risk Management Associations (FERMA) Risk Management Standard

(5) National Institute of Standards and Technology (NIST) Cybersecurity Framework

(6) Health Insurance Portability and Accountability Act 1996 (HIPAA)

(7) Health Information Trust Alliance (HITRUST) Common Security Framework or Risk Management Framework

(8) Payment Card Industry – Data Security Standard (PCI-DSS)

(9) Health Information Technology for Economic and Clinical Health Act (HITECH)

(10) ISO/IEC 20000-1:2018 Information Technology Service Management and Information Technology Infrastructure Library 4 (ITIL-V4)

(11) GUID 5100 - Guidance on Audit of Information Systems

(12) Control Objectives for Information and Related Technology (COBIT)

(13) ISO/IEC 27005:2018 (Edition 3, withdrawn) and ISO/IEC 27005:2022 (Edition 4, 2022) Information Security, Cybersecurity and Privacy Protection – Guidance on Managing Information Security Risks

(14) ISO/IEC 27031:2011 Information Technology – Security Techniques – Guidelines for Information and Communication Technology Readiness for Business Continuity

(15) ISO/IEC 27032:2012 (Edition 1, withdrawn) and ISO/IEC 27032:2023 (Edition 2, 2023) Guidelines for Internet Security

(16) ISO/IEC 27033-1:2015 (Edition 2, 2015) Information Technology – Security Techniques – Network Security

(17) ISO/IEC 27035-1:2016 (Edition 1, withdrawn) and ISO/IEC 27035-1:2023 Information (Edition 2, 2023) Information Technology – Information Security Incident Management – Part 1: Principles and process

(18) ISO/IEC 27035-2:2016 (Edition 1, withdrawn) and ISO/IEC 27035-2:2023 (Edition 2, 2023) Information Technology – Information Security Incident Management – Part 2: Guidelines to plan and prepare for incident response

11.3 Security Policies

Cyberspace has evolved into a highly complex and diverse domain across various sectors, driven by advancements in virtual technologies. It serves as a platform for online interaction and connectivity, and has become an integral part of people's daily lives. Secure information is crucial for the functioning of organizations, as any lapses in security can lead to significant consequences. Therefore, it is vital to establish and follow cybersecurity guidelines and policies. The following policies are internationally accepted cybersecurity policies.

(1) Access Control Policy

For example: Controlling access to ICT resources such as file, folder, and application,

(2) Backup Policy

For example: Recovering lost data,

(3) Antivirus Policy

For example: Preventing devices that do not have the latest antivirus installed from connecting to the network,

(4) Network Access Policy

For example: Restricting access to network devices by guests or visitors,

(5) User Accounts Policy

For example: Using strong and complex passwords, and setting expiration dates for user accounts,

(6) Removable Media Usage Policy

For example: Setting restrictions on the use of removable media, as removable media may contain malware that could potentially harm the network,

(7) Log Monitoring and Logging

For example: Effectively monitoring the usage of computer and networked devices and securely storing logs,

(8) e-Mail Policy

For example: Automatically monitoring of e-mails for detecting and removal of malware, viruses, spam and other inappropriate content, and using private domains,

(9) Patch Management Policy

For example: Applying the latest updates and security patches to devices connected to the network

11.4 The Role of the Government

If government organizations rely on outdated, vulnerable, or easily exploitable ICT infrastructure and insecure technological systems, they may face cyberattacks such as data breaches, DDoS attacks and ransomware. Additionally, insufficient cybersecurity training for employees has made most government organizations prime targets for hackers.

In an environment where cyberattacks like ransomware are increasingly prevalent; if the government fails to improve their ICT infrastructure, the risk of facing dangers will significantly increase. As a consequence, damages may occur, the cost of addressing breaches may rise, and critical information may be lost.

Therefore, to protect against cyberattacks and strengthen cybersecurity standards, government organizations should implement the following measures.

11.4.1 Using the Cloud Platform

Servers in on-premises data centers are more vulnerable to attacks from both internal and external sources. Cloud platforms, on the other hand, can easily facilitate scheduled updates for software, packages, plugins, and servers, ensuring security and reliability. Additionally, modern technologies and best practices can be utilized when developing applications. Therefore, hosting certain applications, servers, and IT equipment on the government data center's cloud platform can reduce the risk of hacker interference while also lowering costs.

11.4.2 Transitioning to Government Domain

Nowadays, many government organizations worldwide are still using .com or .org domains for their websites. Using such domains is less secure compared to using .gov and increases the likelihood of being targeted by attacks. Therefore, it is advisable to transition to the government domain, .gov.

11.4.3 Encryption

Encrypting data is considered as one of the most effective methods of cybersecurity. Hence, all sensitive data or information should be encrypted.

11.4.4 Using Secure Passwords

Governments should encourage employees to use strong passwords by enforcing the complexity requirements. These passwords should be long and intricate, combining lower-case and upper-case letters, numbers, and special characters. Additionally, passwords should be changed frequently and should not be auto-saved in browsers.

11.4.5 Using Endpoint Security Software

Endpoint security software, such as antivirus programs, should be installed on all ICT devices, with regular updates performed.

11.4.6 Using Multi-factor or Two-factor Authentication

For websites or electronic service platforms, when a user attempts to access a service, a verification code should be sent to their email or mobile phone, in addition to their User ID and password, to confirm authenticity before granting access. This multi-factor or two-factor authentication system should be implemented.

11.4.7 Using Virtual Private Network (VPN)

When accessing and using data within the network from an external source, a secure connection such as a Virtual Private Network (VPN) should be used.

11.4.8 Using Licensed Versions

Government departments should use licensed versions of operating systems, software, and related tools.

11.4.9 Training

Most cyberattacks are likely to originate from phishing emails. By conducting cybersecurity awareness training programs, employees can learn to identify potentially dangerous links and emails, avoiding the temptation to open or access them. This will enhance cybersecurity knowledge and reduce the likelihood of government organizations being targeted by cyberattacks.

11.5 Myanmar and Cybersecurity

During the digital revolution, the rapid advancement of technology has led to a significant rise in cybercrimes. As a result, government organizations have become more vulnerable and are facing greater risks. Government organizations have not been able to implement basic cybersecurity measures effectively, increasing the likelihood of cybercrimes and exposing sensitive information. To protect against such cybercrimes, it is essential to establish comprehensive legal frameworks related to cybersecurity in Myanmar. In 2023, Myanmar released a cybersecurity policy. However, continued efforts are needed to draft, enact, and implement the necessary laws, policies, and procedures to ensure adequacy and compliance.

Due to the intense competition in modern industrial operations, cyberattacks have become a defining challenge of 21st-century industrial landscapes. These attacks are growing in frequency, scale, sophistication, and speed. As cyber threats evolve, the complexity of implementing diverse defense mechanisms has also increased significantly. The key cybersecurity challenges faced in Myanmar are as follows.

(1) Lack of awareness and understanding of cybersecurity

(2) Protection of personal and private information

(3) Absence of comprehensive legal frameworks and procedures

(4) Availability and implementation of advanced technology and solutions

(5) Shortage of skilled human resources

(6) Development of a robust and reliable ICT infrastructure

To address these challenges, Myanmar can enhance its cybersecurity by adopting international standards and legal frameworks. This includes reviewing and updating existing ICT-related laws, promoting cybersecurity awareness through

television, radio, and both private and public organizations, and ensuring a sufficient supply of skilled professionals. By implementing these measures, the country can significantly strengthen its cybersecurity capabilities.

12. PRINCIPAL DIRECTIONS

The majority of countries around the world are actively participating along the journey of digital transformation. The transition from e-Government to Digital Government has emerged as a critical trend in this digital transformation process.

e-Government, as a significant domain of information system innovation and ICT, has led governments to integrate their ongoing processes with ICT application programs in efforts to shape e-Government. The development of e-Government capabilities not only accelerates the transformation of how governments provide information, deliver electronic services, and interact with citizens, but it also becomes a crucial component of government strategies.

Although many developing countries have adopted e-Government, they have not yet achieved the anticipated momentum or significant results in terms of effective and widespread utilization. Therefore, governments need to incorporate new ideas, concepts, and innovations in information systems when formulating their strategies, policies, guidelines, direction, approaches, and processes. This is essential to provide better e-Government services to the public and to advance toward Digital Government.

In this chapter, the analysis and studies related to e-Government for Myanmar's digital future are described, based on theoretical considerations, case studies, empirical research, and recommendations from international organizations. Afterward, the chapter outlines key guiding principles that should be adopted and implemented to reflect the nation's realities, by taking into account innovations in information technology.

12.1 Basic Principles

The basic principles that should be established and implemented for the development of e-Government in Myanmar are as follows:

12.1.1 Develop policies and provide support from top leadership

The commitment of the top leadership is indispensable for the success of e-Government in Myanmar. Since the establishment of e-Government needs a significant amount of resources but shows little visible returns to the investment in a short-term, it is hard to justify the spending of the resources without the support of the leadership.

Also, the establishment of e-Government means not only the computerization of the government functions but also the reengineering of exiting tasks and functions. It is impossible to execute the government reengineering process without the support of the top leadership.

12.1.2 Select priority projects

Considering the limited resources, it is not practical or impossible to computerize the whole government at the same time. The Myanmar government should select important projects with high probability of success and focus on them.

12.1.3 Utilize the experiences of benchmarked countries:

In order to acquire and utilize the experiences of countries that implemented e-Government early on, it is necessary to conduct a comparative analysis of those countries and select some countries among them as benchmarked countries. Subsequently, lessons can be drawn from the experiences of these countries and applied accordingly. This opportunity represents the advantage gained by latecomers.

It is the benefit of being a latecomer to learn from the lesson from the early starters. Especially when the situation of the early starters is similar to Myanmar, the benefit will be more valuable. Therefore, careful attention should be paid to the experiences of benchmarked countries.

12.1.4 Manage with a specific target for each stage

It takes time to finish e-Government projects with tangible outcomes. Also, it is not easy to measure the outcomes from the success because, in most cases, it is very hard to convert the outcomes into monetary terms. Therefore, to ensure that e-Government projects stay on the right track and are implemented with focus, it is crucial to define clear objectives at each stage and manage them systematically.

Therefore, it is required to define precise Key Performance Indicators (KPIs) for the projects, and verifying whether it was met with KPI at every stage. A team comprising representatives from the Focal Ministry and relevant government organizations should be formed to conduct evaluations and take responsive actions based on the findings. Additionally, to ensure that the services meet the expectations and satisfaction of users, it is essential to collect feedback and continuously review and refine the services.

12.1.5 Utilize e-Government projects as leverage to foster ICT deployment and ICT industry

e-Government projects would provide the local ICT industry and workers with a huge market to develop their potentials and have them trained. Also, they can learn from business model and practice of foreign businesses while they are participating in the projects. Hence, The Government of Myanmar should approach by formulating and adopting relevant policies and guidelines to promote ICT industries.

12.2 Strategic Directions

To effectively implement the desired goals and objectives and to address deeper challenges, the Government of Myanmar should establish and adopt the following strategic directions:

12.2.1 Build up Fundamental Infrastructure

The most basic and essential perquisite in building e-Government is systematic investment in ICT infrastructure. It is indispensable for the success of e-Government. The Government of Myanmar should continue investing in fundamental infrastructure such as Hardware, Software, Network, Operating System, Component, Applications, and Data Storages.

12.2.2 Reuse and expand existing resources

By reusing existing resources in appropriate areas, the following significant benefits can be achieved.

(1) Environmental Impact Reduction:

Reusing existing resources helps reduce resource consumption, minimize toxic waste and carbon emissions, and lower the carbon footprint. This approach mitigates the negative environmental impacts caused by the design, production, operation, and disposal of ICT products. It also fosters good practices that prioritize Green ICT, contributing to environmental sustainability.

(2) Cost and Time Savings:

Maximizing the reuse and augmentation of existing resources in business operations significantly reduces the loss of valuable time, financial expenses, research efforts, and human resources.

(3) Resource Sustainability:

Cultivating sustainable resource practices enables organizations to avoid duplication or excess in their operations, leading to more effective performance and long-term resource sustainability.

12.2.3 Make Success Stories

Early adopters of e-Government learned the best practices through trial and error. In implementing e-Government in Myanmar, studying the leadership roles, criteria for selecting priority projects, and the impact of management technologies from the successful early adopters, will lead to avoid trial-and-error and save precious time and resources.

12.2.4 Share best practice and experience

Myanmar needs to create initial successes in implementing e-Government projects and then expand them across the entire government. If priority projects are successfully executed in the initial phase, the best practices and experiences gained can be shared and applied to other e-Government projects. Therefore, it is essential to select certain service-oriented projects as priority initiatives and ensure their successful completion with visible and tangible results.

These initial successes will ensure continued support from the public and leaders for e-Government initiatives. Additionally, they will open up new opportunities for

increased investment and government processes reengineering, and a new promising face of the government will be opened.

12.3 e-Government to Digital Government

Government shapes the digital transformation of societies and economies via its role as a regulator by developing policies that align interests and influence incentives, and by transforming public governance using digital tools and data to build a more democratic, fair and sustainable public sector.

Digital government enables the public sector to operate efficiently and effectively in the digital environment, breaking down organizational silos to deliver seamless and user-driven public services, while mitigating the risks of digital technologies for individuals and societies.

The Organization for Economic Co-operation and Development (OECD) has published six aspects based on lessons from OECD countries' journey from e-government to digital government, developing countries can focus on these six aspects that support sustainable and human-centric digital government. By referencing these aspects, the following guidelines should be established and implemented to ensure the successful continuation of Myanmar's journey toward Digital Government:

12.3.1 Build governance competencies for sustainable delivery

Countries can foster leadership and co-ordination mechanisms to legitimize and promote their digital transformation agenda within and outside the public sector. Broad buy in will help navigate the uncertainty of changing political systems while promoting a coherent, whole-of-government and systemic transformation. Such

governance approaches proved effective in OECD countries for making strategic decisions and investments in adopting and using digital technologies.

12.3.2 Focus on people and their needs

Digital government is about putting people first and driving decisions, investments and processes to meet their needs. This requires continuous and inclusive dialogue with users to capture their expectations, and to reflect them in the design and delivery of services, offered through different but integrated channels. Such as e-Government Portal, e-Government Gateway. Understanding user needs means distinguishing informational from transactional needs, and addressing each one accordingly. Similarly, it requires fostering talent and training that empower civil servants to unlock the benefits and address the challenges of digital government.

12.3.3 Strengthen the Promotion of Capacity Building

It is essential to strengthen and conduct programs aimed at enhancing the capabilities of public servants, including initiatives to develop their innate talents and training. Additionally, it is crucial to create opportunities for individuals to begin learning technology from the basic education level, in response to the emergence of digital natives who have grown up in the digital era as well as familiar with computers and the internet from a young age.

12.3.4 Invest in reliable, reusable and interoperable digital public good

Outcomes of e-government reforms show that countries now face siloed and fragmented systems and tools, leading to high integration and alignment costs and constraining a whole-of-government transformation.

Developing countries can avoid these challenges by prioritizing reusable and interoperable digital tools and infrastructure from the outset. Among OECD

countries, 70% have frameworks to promote open-source solutions, which can be effective in achieving interoperability, but require local capacity to adapt, deploy and maintain digital tools, and avoid the vendor lock-in of proprietary solutions.

Similarly, countries can prioritize the most impactful and transformative digital tools, such as digital identity systems, that enable citizens to interact with the public sector.

12.3.5 Treat data as a strategic asset and openness as an advantage

Digitalization of the public sector creates unprecedented amounts of data that can help govern and transform policies and services.

Many benefits of the digital age rely on timely, trustworthy and high-quality data. Developing countries can prioritize efforts towards creating and safeguarding data infrastructures that capture the equal representation of society and contribute to public value while respecting individual interests.

Data can also be effective for creating new channels of interaction, transparency, and collaboration with communities and the private sector, such as open government data initiatives.

12.3.6 Assess digital government investments in terms of value

Limited financial resources mean prioritizing the most impactful and scalable digital technologies while maintaining legacy systems. Developing countries can develop their capacity to plan, prioritize, fund and monitor digital technologies to ensure that benefits are realized.

This includes multifaceted cost/benefit analysis to define the value proposition of digital government projects; funding for shared digital systems; and adaptable

standards and practices to assess the impact, feasibility and scalability of digital transformation projects.

12.3.7 Foster digital co-operation on challenges that defy boundaries

Promoting policy dialogue and collaboration between governments proves effective for addressing the challenges posed by the digital age.

There is growing interest in promoting cross-border services and access to and sharing of data, demanding standardized digital public goods such as digital identity. Multilateral co-operation can help identify common bottlenecks, policy levers and interoperable digital tools to address present and future challenges.

13. E-GOVERNMENT STRATEGIC FRAMEWORK

The e-Government strategic framework provides the holistic view of e-Government initiatives and the complete picture of a Conceptual Architecture Framework to simplify the e-Government strategies. The strategic framework is essential as it clearly defines the fundamental components and directions required for the government's focus and actions in implementing e-Government. Most governments have formulated detailed strategies to implement their e-Government programs. Although the goals of these strategies differ by country, there are many commonalities derived from the application of best practices gained by sharing among countries.

This e-Government Strategic Framework is a revised and upgraded version of the "Conceptual Architecture Framework", which is recommended in the previous Myanmar e-Governance Master Plan (2016-2020). It has been developed by taking into account future technology trends and international best practices, insights from a comprehensive study of the strategic frameworks of e-Government leading countries, the Myanmar e-Governance Master Plan (2016-2020), as well as the findings of the digital maturity survey of government organizations in Myanmar. This framework will help reflect Myanmar's current situation and enhance its future prospects. Furthermore, this framework will significantly support leaders and stakeholders in deeper understanding and successfully implementing e-Government in Myanmar.

The framework describes in figures is not only recapitulate the fundamental components of strategy and the interconnection of the components will also be clearly visible. It consists of the following fundamental components.

(1) Governance: Organization, Regulation, Policies and Skills

(2) Shared Infrastructure

(3) Shared Applications and Open Data

(4) Ministry Specific Applications/ Services

(5) Focus Areas

(6) Integrated Services

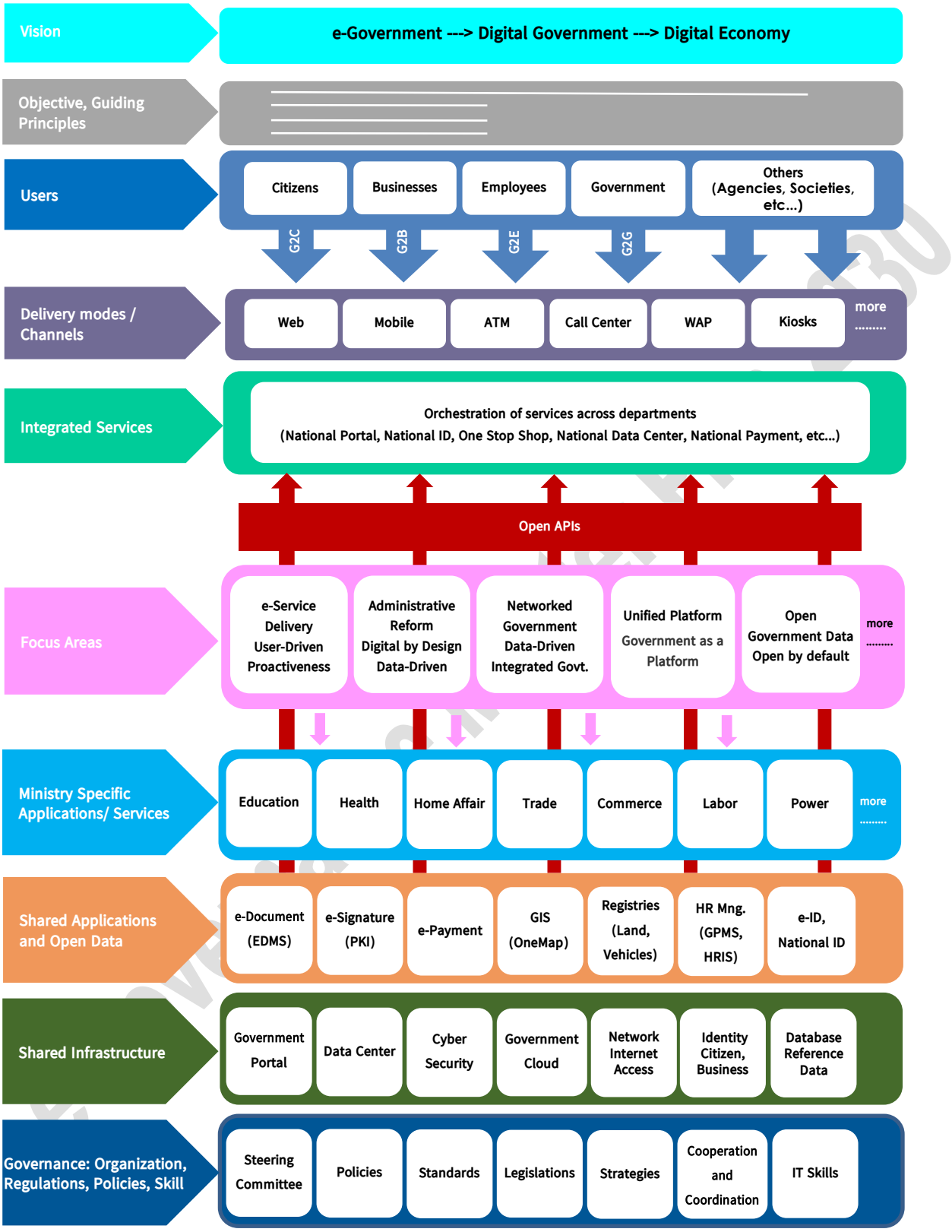
(7) Delivery Modes/ Channels

(8) Users

(9) Objectives, Guiding Principles

(10) Vision

FIGURE 5: E-GOVERNMENT STRATEGIC FRAMEWORK



13.1 Governance: Organization, Regulations, Policies and Skills

Initially, the e-Government Steering Committee, which has been established at the national level in Myanmar, is to effectively coordinate, and oversee efforts to strengthen the implementation of the recommendations and action plans outlined in this e-Governance Master Plan. Subsequently, the committee is responsible to take the leading role in adopting and enforcement of digital governance models, laws, policies, standards, and strategies that will enhance the government mechanisms and processes. Besides, this Steering Committee is responsible to coordinate among government agencies that is the key success factors of e-Government and develop programs that will improve people's ICT awareness and skills.

The Steering Committee shall deal with the stakeholders involved in e-Government processes such as Government to Government (G2G), Government to Business (G2B) and Government to Citizens (G2C) and Government to Employees (G2E). In addition, the Steering Committee should be accountable to the Government of Myanmar and be granted the necessary rights and authority, in accordance with existing laws, to effectively and successfully implement the transition to the expected level of Digital Government.

13.2 Shared Infrastructure

It is necessary to adopt the policy of effectively and efficiently utilizes shared hard and soft Infrastructures, which require large investments, such as Data Centers, Network Equipment, Cloud Infrastructure, Storage, Portal, Cybersecurity, Identity, and Open Data. The focal ministry, the Ministry of Transport and Communications, is responsible for implementation, building, maintaining, and operating these networks and infrastructures, which will then be upgraded and expanded as

necessary to ensure interoperability among shared applications/services and specific applications /services that will be used more widely by government organizations in the future.

For example: Government Cloud

13.3 Shared Applications and Open Data

In order for the government to provide seamless public electronic services to citizens, it is important to enhance accessibility of sharing data among government agencies, which should be accessed at open and fast. While delivering public services to citizens, the nation-wide impact of e-Government activities in the same nature should not be fragmented by using different technologies. It should be implemented in the initial stage as shared applications by the line ministry by the types of services and the relevant sectors.

The government should establish a people-centered, transparent, and efficient administration. In order to establish this administration, it is imperative that Open Data should be initiated in accordance with the existing laws, policies, and regulations. Therefore, instead of using the data as organizational silos, it is essential to implement open data in accordance with the needs of other government departments. Additionally, it is important to ensure that open data for widely accessible government data to the public. To share such information, it is, initially, necessary to establish systematic control and security measures, and standardize use of Application Programming Interfaces (APIs) during this stage.

By doing so, it can enhance cooperation among government organizations through a proper flow of information, while also improving cost-effectiveness by avoiding duplicate projects. Furthermore, it will be able to establish the ICT foundations for the emergence of interoperable e-Governance systems and achieve quick wins.

For examples: Geographic Information System (GIS), Government Personnel Management System (GPMS), Electronic Document Management System (EDMS), e-Procurement.

13.4 Ministry Specific Applications

Some e-services should be implemented as Ministry Specific Applications by particular government departments, due to the nature of business. These projects should be executed through Unifying Government Platform. In doing so, initially, government departments should define and adhere to specific policies, guidelines, Open-Integration standards and APIs standards. Furthermore, it is required to use of shared networks and infrastructure is essential.

In addition, it is necessary to prioritize the widespread use of application software among departments in the delivery of electronic services.

For examples: e-Health, Corruption Complaint Management System, e-Passport

13.5 Focus Areas

The e-Government Strategic Framework should be systematically followed and implemented by government organizations. Key stakeholders from government organizations can apply this framework to prioritize focus areas in implementing their e-Government processes. Additionally, Critical Success Factors can be taken into account in priority while identifying these focus areas.

The key areas to focus for implementing e-Government projects are as follows:

(1) e-Service Delivery

(2) Administrative Reform

(3) Networked Government

(4) Unified Platform

(5) Open Government Data

These focus areas will provide a comprehensive approach to Digital Government, shaping the complete picture of Myanmar's digital future.

13.6 Integrated Services

In the post-pandemic era, the rapid development of e-Government has led to a significant increase in public electronic services. Accordingly, it is necessary to upgrade ever growing e-Government processes from the stage of being implemented fragmentedly by ministries and by services to national level of integrated services delivery through harmonious cooperation among ministries to provide better online services for citizens.

In dealing with e-Government processes, it is crucial for people interacting with government services to have access to all departments through a single window, rather than having to go through each department individually. Hence, the e-Government system should be implemented with the goal of simplifying and making it easy to use, while also ensuring it is widely accessible to the public by providing integrated services.

Therefore, in order to provide easy, fast, and better public services, efforts must be made to integrate the websites and online services implemented by respective government agencies, into a single system. By doing so, it will be able to transform from the traditional government-centered service to the user-centered service.

On the other hand, it is recommended to deploy a government network and use systems like Groupware, in order to coordinate among the government agencies in planning projects or solving problems.

For examples: Myanmar National Web Portal, Open Data Portal

13.7 Delivery Modes / Channels

To facilitate easy and fast delivery of public services to people, it is intended to build channels by respective ministries such as Citizens Service Centre, Call Center, Interactive Voice Response Systems (IVRs), Self-Help Kiosks, Mobile Gateway, Wireless Access Points (WAPs) and Automated Teller Machines (ATMs)

As a result, key stakeholders—including the government, businesses, individuals, and employees—can access public electronic services through various channels via the National Government Portal, which serves as the primary gateway. In doing so, government organizations should adhere to specific policies, guidelines, and standards such as open-integration, APIs.

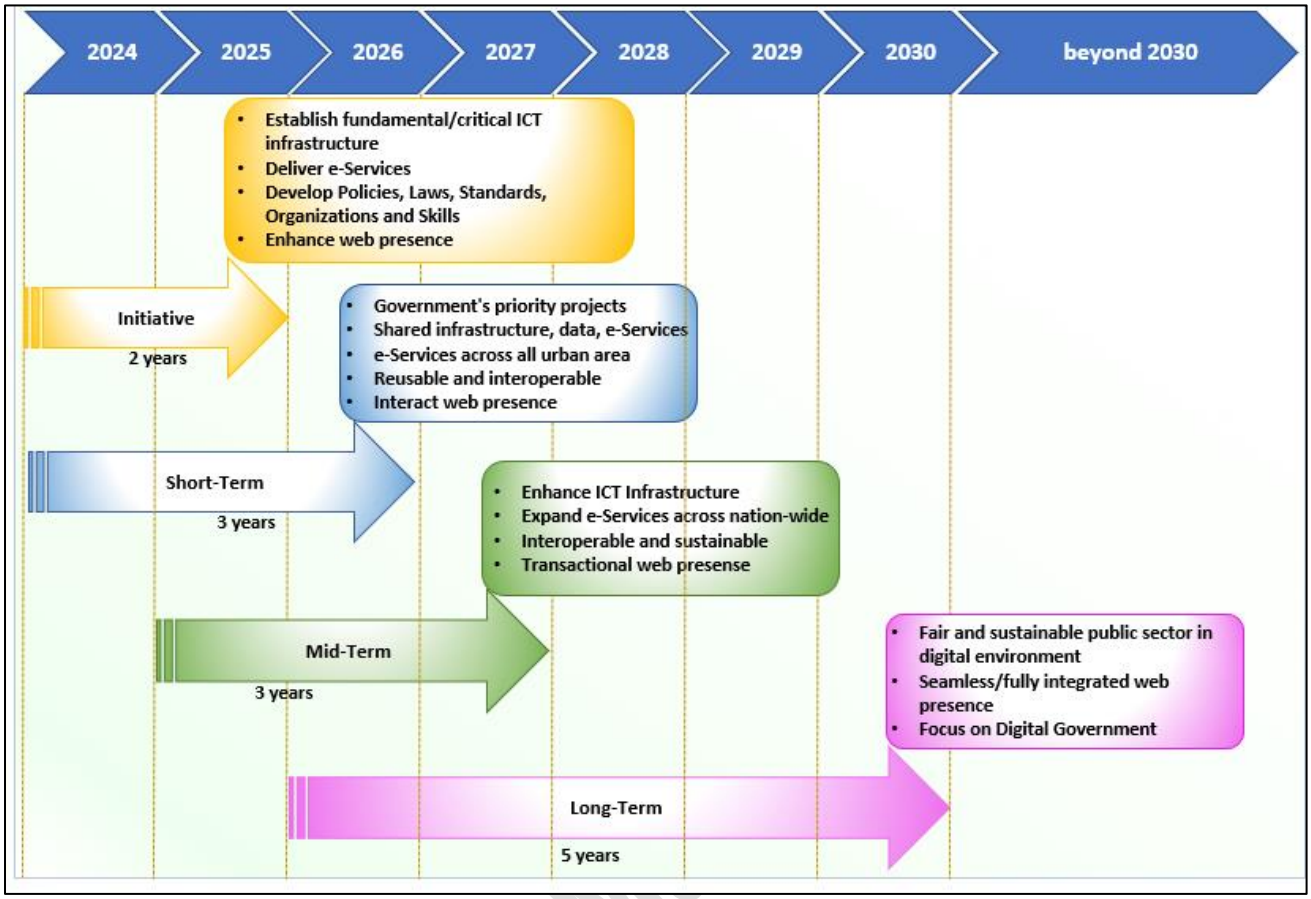
14. ROADMAP 2030

This roadmap describes the action plans to be implemented, along with the guidelines, policies, and timelines to be followed in transforming government procedures, processes, and services through the use of digital technology, aiming to create more efficient processes and deliver better services, ensuring the effective functioning of an equitable and sustainable public sector in the digital environment.

The roadmap of the e-Governance Master Plan (2016-2020) focused on reforming government administration, system integration and sustainable e-government, to establish a unified digital platform during this period. Subsequently, the roadmap 2030 is designed to reflect the vision of Myanmar's e-Government by 2030. The roadmap 2030 also offers adaptable guidelines for implementing the processes outlined in the e-Government Strategic Framework.

In this road map, initiatives, short-term projects, mid-term projects and long-term projects are described to be carried out as per the respective timeframes.

FIGURE 6: MYANMAR DIGITAL GOVERNMENT ROADMAP 2030



14.1 Initial Tasks

It is the work plan to be initiated fast. During this period, it is very important for government organizations to coordinate and cooperate with each other under the guidance of the e-Government Steering Committee. It is essential to adopt laws, strategies, policies, and standards as soon as possible to facilitate public access to the government's digital services across various sectors including health, education, social services, economy, communication, agriculture, transportation, finance, and more.

The establishment and expansion of ICT infrastructure such as Internet access networks, data centers, government cloud services, and portals need to be initiated, as they are fundamental and essential prerequisites for e-government

processes. It will also be necessary to initiate cybersecurity, digital identity, and database systems.

Additionally, to enhance the capabilities of civil servants, digital skill development programs such as talent enhancement initiatives and human resource development measures are to be conducted on an ongoing basis. At the same time, to address the challenges posed by a shortage of digital skilled employees and to conduct business effectively and efficiently, organizational structures should be reformed or expanded as needed.

The Web Presence of government organizations in Myanmar is to reach stage 2 – Enhanced: Here the effort is increased to make more dynamic and frequently updated websites – of the UN's Five-Stage Model for e-Government.

14.2 Short-Term Projects

In short-term period, government's first priority tasks are to be implemented. Indeed, it involves sharing existing ICT infrastructure, sustainable maintenance and expansion as necessary.

Digital Authentication, Databases, and Cybersecurity measures should also be systematically shared to ensure that relevant organizations can access and utilize them effectively.

While it is necessary to review the electronic services and application software which are being implemented or already implemented by government organizations, it is also required to follow the existing policies, guidelines and standards, covering the tasks such as integration of these applications for common service in government organizations, providing integrated services and upgrading services.

The use of silos, diverse technologies, and a variety of tools and systems leads to high integration and adjustment costs, emerging significant challenges to the digital transformation of the entire government. Therefore, prioritizing establishment and utilization of reusable and interoperable infrastructure, services and digital tools in the implementation of e-Government projects needs to be emphasized.

During this period, the government's electronic services should be made accessible across all urban areas in Myanmar. The Web Presence of government organizations in Myanmar is to reach stage 3 - Interactive: At this stage, the user will be able to can provide feedback, contact officials download forms, apply for services and even request for appointments - of the UN's Five-Stage Model for e-Government.

14.3 Mid-Term Projects

In mid-term period, it is intended to upgrade and extend existing ICT infrastructures as necessary. In fact, it is to extend and upgrade shared data, shared applications, and services implemented in the short-term for extensive accessibility among government organizations, citizens and businesses.

In doing so, it is essential to emphasize the interoperability and sustainability of infrastructure, services, and digital tools.

During this period, by extending government electronic services to rural and far-flung areas, it can be accessed nationwide, bridging the digital divide between urban and rural areas.

The web presence of government organizations in Myanmar is to reach stage 4 - Transactional: This stage is where projects financial transactions are made

available online, enabling users to pay for services they obtain - of the UN's Five-Stage Model for e-Government.

14.4 Long-Term Projects

This period aims to catalyse a smooth transition from e-Government to Digital Government through delivering seamless and user-driven public services by transforming public administration using digital tools and data, and ensuring the effective and efficient operation of an equitable and sustainable public sector in the digital environment.

In this period, it is intended to endeavor delivering Government's digital services will be carried out to cover across the country through Portals, Public Access Points, One-Stop Shops, Mobile Applications, Smartphones, Self-Help Kiosks, and Internet Pages. The Web Presence of government organizations in Myanmar is to reach stage 5 – Seamless: This stage assimilates all processes within a department boundary to an integrated electronic service providing administrative function - of the UN's Five-Stage Model for e-Government.

TABLE 1: CLARIFICATION OF ROADMAP 2030

Terms	Major Task	Focus Area	Target Web Presence
Initiative	• Establish Fundamental/ Critical ICT Infrastructure • Deliver e-Services • Develop Policies, Laws, Standards, Organization and Skills	Infrastructure Development	Enhanced

Short Term (Priority)	• Government's Priority Project • Shared Digital Enablers • Focus Digital Infrastructure, Services and Capacity • Unified Digital Platform	Reusable and Interoperable	Interaction
Mid-Term (Expansion)	• Expand e-Services for all Government Agencies, Business and Citizens based on Common Application and Shared Data Services already developed • Focus Digital Engagement	Interoperable and Sustainable	Transactional
Long Term (towards Digital Government)	One-Stop Portal in which users can access all kinds of available services	• Sustainable • Data-Driven • Open by Default • User-Driven Administration • Government as a Platform • Proactiveness	Seamless or Fully Integrated

15. ACTION PLANS

In order to accelerate and effectively implement the ongoing e-Government initiatives in Myanmar, this Action Plan has been developed based on several key factors. These include previous Master Plans, international Digital Government processes, recommendations from both local and international experts, as well as the findings and suggestions derived from surveys conducted on the current state of e-Government implementation within government organizations in Myanmar.

This Action Plan has been formulated based on the e-Government projects and processes currently being implemented or under development in Myanmar, as well as the ICT-related laws and policies that are being drafted. As such, this Action Plan is interconnected with existing processes and integrates seamlessly with them. It outlines the necessary steps to be taken in alignment with the national e-Government strategic framework and roadmap, serving as a comprehensive digital development plan for the entire government of Myanmar. It provides recommendations and guidance to ensure the continued advancement and implementation of e-Government initiatives in the country.

15.1 Technological Infrastructure should be established

TABLE 2: TECHNOLOGICAL INFRASTRUCTURE SHOULD BE ESTABLISHED

No	Action Plans	Execution Agency (Focal)	Period
1	Cloud Infrastructure	Ministry of Transport and Communications	Short-Term
2	Digital Channels	Ministry of Transport and Communications	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
3	Digital Identity	Ministry of Immigration and Population	Mid-Term
4	Digital Innovation and Research Center	Ministry of Defence, Ministry of Education, Ministry of Science and Technology	Short-Term
5	Digital Participation Platform	Ministry of Transport and Communications	Long-Term
6	Digital Payment Infrastructure	Ministry of Planning and Finance, Central Bank of Myanmar	Short-Term
7	e-Governance IT Operations and Management Unit	Ministry of Transport and Communications	Short-Term
8	e-Government Backbone Network	Ministry of Transport and Communications, Ministry of Defence	Short-Term
9	e-Government Call Center	Ministry of Transport and Communications	Mid-Term
10	e-Government Service Center	Ministry of Transport and Communications	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
11	Government Artificial Intelligence Platform	Ministry of Transport and Communications, Ministry of Defence	Long-Term
12	Government Social Media Platform	Ministry of Defence, Ministry of Information	Mid-Term
13	ICT Procurement Unit	Ministry of Planning and finance	Long-Term
14	National Blockchain	Ministry of Transport and Communications, Ministry of Defence, Central Bank of Myanmar	Long-Term
15	National Data Center	Ministry of Transport and Communications, Ministry of Defence	Short-Term
16	One Stop Digital Service Center	Relevant government organizations	Mid-Term
17	Public Health Emergency Operation Center	Ministry of Health	Short-Term
18	Public Key Infrastructure (PKI)	Ministry of Transport and Communications, Ministry of Defence	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
19	Science and Technology and Innovation (STI) Digital Platform	Ministry of Science and Technology	Long-Term
20	Security Operation Center	Ministry of Transport and Communications, Ministry of Defence	Short-Term
21	Student Services Digital Platform	Ministry of Science and Technology	Long-Term

15.2 ICT-Related Laws should be enacted

TABLE 3: ICT-RELATED LAWS SHOULD BE ENACTED

No	Action Plans	Execution Agency (Focal)	Period
1	Cyber Security Law	Ministry of Transport and Communications	Mid-Term
2	Data Privacy Law	Ministry of Transport and Communications, Ministry of Science and Technology	Mid-Term
3	e-Commerce Law	Ministry of Commerce	Long-Term
4	e-Government Law	Ministry of Transport and Communications	Mid-Term

5	e-Procurement Law	Ministry of Transport and Communications, Ministry of Planning and Finance, Ministry of Commerce, Central Bank of Myanmar	Short-Term
6	National Digital Identity Law	Ministry of Immigration and Population	Mid-Term
7	Online Consumer Protection Law	Ministry of Commerce	Long-Term
8	Payment Law	Central Bank of Myanmar	Mid-Term
9	Personal Data/Information Protection Law	Ministry of Transport and Communications	Mid-Term
10	Security and Trust in Open System Law	Ministry of Education	Short-Term

15.3 ICT-Related Strategies should be developed

TABLE 4: ICT-RELATED STRATEGIES SHOULD BE DEVELOPED

No	Action Plans	Execution Agency (Focal)	Period
1	Common Database Strategy	Ministry of Transport and Communications, Ministry of Defence, Ministry of Immigration and Population, Ministry of Science and Technology	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
2	Critical Information Infrastructure Strategy	Ministry of Transport and Communications, Ministry of Defence, Ministry of Immigration and Population, Ministry of Science and Technology	Mid-Term
3	Digital Economy Strategy	Ministry of Commerce	Mid-Term
4	Digital Government Strategy	Ministry of Transport and Communications	Short-Term
5	Digital Participation Strategy	Ministry of Transport and Communications	Mid-Term

15.4 ICT-Related Policies should be developed

TABLE 5: ICT-RELATED POLICIES SHOULD BE DEVELOPED

No	Action Plans	Execution Agency (Focal)	Period
1	AI Usage Policy	Ministry of Transport and Communications, Ministry of Defence, Ministry of Science and Technology	Mid-Term
2	Antivirus Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
3	Application Programming Interface (API) Policy	Ministry of Transport and Communications, Ministry of Defence	Short-Term
4	Backup Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
5	Billing Policy	Ministry of Electric Power	Short-Term
6	Blockchain Policy	Ministry of Transport and Communications	Mid-Term
7	Cloud First Policy	Ministry of Transport and Communications	Short-Term
8	Data Center Policy	Ministry of Transport and Communications, Ministry of Defence, Ministry of Science and Technology	Short-Term
9	Data Classification Policy	Ministry of Transport and Communications, Ministry of Planning and Finance, Ministry of Science and Technology	Short-Term
10	Data Protection Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
11	Data Sharing Policy	Ministry of Transport and Communications, Ministry of Planning and Finance, Ministry of Science and Technology	Mid-Term
12	Digital Documentation and Standardization Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
13	Digital First Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
14	e-Learning and Online Learning Policy	Ministry of Education, Ministry of Science and Technology	Short-Term
15	e-Mail Policy	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
16	e-Payment Policy	Ministry of Transport and Communications, Central Bank of Myanmar	Short-Term
17	Geospatial Data Policy	Relevant government organizations	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
18	Green IT Policy	Ministry of Transport and Communications, Ministry of Energy, Ministry of Industry	Mid-Term
19	Internet Protocol Version 6 (IPv6) Policy	Ministry of Transport and Communications	Mid-Term
20	Interoperability Policy	Ministry of Transport and Communications	Mid-Term
21	IT Infrastructure Sharing Policy	Ministry of Transport and Communications	Short-Term
22	National Broadband Policy	Ministry of Transport and Communications	Short-Term
23	Network Access Policy	Ministry of Transport and Communications, Ministry of Defence, Ministry of Science and Technology	Short-Term
24	Open Government Data Policy	Ministry of Transport and Communications, Ministry of Planning and Finance, Union Civil Service Board	Mid-Term
25	Open-Source Policy	Ministry of Transport and Communications	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
26	Policy for Capacity Building	Ministry of Science and Technology	Short-Term
27	Policy for the Use of New/ Emerging Technologies	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
28	Public Key Infrastructure (PKI) Policy	Ministry of Transport and Communications, Central Bank of Myanmar	Short-Term
29	Quality Assurance Policy for ICT	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
30	SME Promotion Policy	Ministry of Planning and Finance, Ministry of Investment and Foreign Economic Relations, Ministry of Cooperatives and Rural Development, Ministry of Electric Power, Ministry of Industry	Short-Term
31	Social Media Usage Policy	Ministry of Transport and Communications	Short-Term

15.5 ICT-Related Frameworks should be developed

TABLE 6: ICT-RELATED FRAMEWORKS SHOULD BE DEVELOPED

No	Action Plans	Implementation Agency (Focal)	Period
1	Cyber Legal Framework	Ministry of Transport and Communications	Mid-Term
2	Digital Framework for Public Private People Partnership (PPPP)	Ministry of Planning and Finance	Mid-Term
3	e-Governance Integration Policy Framework	Ministry of Transport and Communications	Long-Term
4	e-Government Enterprise Architecture Framework	Ministry of Transport and Communications	Mid-Term

15.6 ICT-Related Standards should be developed

TABLE 7: ICT-RELATED STANDARDS SHOULD BE DEVELOPED

No	Action Plans	Execution Agency (Focal)	Period
1	Digital Data Standards	Ministry of Transport and Communications, Ministry of Education, Ministry of Science and Technology	Mid-Term

2	Encoding Standards	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
3	Font and Keyboard Standards	Ministry of Transport and Communications, Ministry of Education, Ministry of Science and Technology	Short-Term
4	Information Access & Transfer Protocols Standards	Ministry of Transport and Communications	Short-Term
5	Information Security Standards	Ministry of Transport and Communications	Short-Term
6	Interoperability & Integration Standards	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
7	IT System Testing Standards	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
8	ICT-Related Standards for Myanmar National Building Code	Ministry of Construction	Mid-Term
9	National ICT Competency Standards	Ministry of Transport and Communications	Short-Term

10	Open Standards	Ministry of Transport and Communications	Short-Term
11	Public Records Management Standards	Ministry of Transport and Communications	Short-Term
12	Software Development Standards	Ministry of Transport and Communications, Ministry of Science and Technology	Short-Term
13	Toll Collection Management Standard	Ministry of Construction	Short-Term
14	Unified Interface Standard (APIs)	Ministry of Transport and Communications	Short-Term
15	Workflow and Electronic Document Management Standard	Ministry of Transport and Communications	Short-Term

15.7 ICT-Related Roadmap and Master Plans should be developed

TABLE 8: ICT-RELATED ROADMAP AND MASTER PLANS SHOULD BE DEVELOPED

No	Action Plans	Execution Agency (Focal)	Period
1	Digital Economy Roadmap	Ministry of Commerce	Short-Term
2	Digital Government Roadmap	Ministry of Transport and Communications	Mid-Term

3	Integrated Insurance Solution Master Plan	Ministry of Planning and Finance	Short-Term

15.8 Electronic Services and Web Presences should be implemented

TABLE 9: ELECTRONIC SERVICES AND WEB PRESENCES SHOULD BE IMPLEMENTED

No	Action Plans	Execution Agency (Focal)	Period
1	191 Report Mobile Application (Android and iOS Mobile Application)	Ministry of Home Affairs	Short-Term
2	Accounting System (EBS)	Relevant government organizations	Mid-Term
3	Advanced Metering Infrastructure (AMI) and Automatic Billing System	Ministry of Electric Power	Short-Term
4	Aid Data Management System (ADMS)	Ministry of Investment and Foreign Economic Relations	Short-Term
5	Asset Management System	Relevant government organizations	Mid-Term
6	Audit Management System	Office of the Auditor General of the Union	Mid-Term
7	Automatic Data Logging System	Ministry of Electric Power, Ministry of Energy	Long-Term

No	Action Plans	Execution Agency (Focal)	Period
8	Border Control System	Ministry of Immigration and Population	Mid-Term
9	Candidate Nomination and Election Result System	Union Election Commission	Mid-Term
10	Case Management System	Relevant government organizations	Short-Term
11	Cash Flow Management System	Central Bank of Myanmar	Mid-Term
12	Census Data Management System	Ministry of Immigration and Population	Mid-Term
13	Centralized Civil Service Identity Management System	Ministry of Transport and Communications, Union Civil Service Board	Mid-Term
14	Centralized Government E-Mail	Ministry of Transport and Communications	Short-Term
15	Centralized Human Resource Management System (HRMS)	Ministry of Transport and Communications, Union Civil Service Board	Short-Term
16	Consumer Services (Billing, Grievance Redressal)	Ministry of Electric Power, Ministry of Energy	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
17	Core Banking System (CBS)	Ministry of Planning and Finance	Long-Term
18	Corruption Complaint Management System	Anti-Corruption Commission	Short-Term
19	Crime Management System	Ministry of Home Affairs	Long-Term
20	Crop Damage Assessment and Insurance Settlement	Ministry of Agriculture, Livestock and Irrigation	Short-Term
21	Crop Pest Identification System	Ministry of Agriculture, Livestock and Irrigation	Short-Term
22	Currency Chest Reporting System	Central Bank of Myanmar	Mid-Term
23	Currency Management Application	Central Bank of Myanmar	Mid-Term
24	Digital Event Platform	Ministry of Commerce	Short-Term
25	Digital Export Import Licensing and Registration System	Ministry of Commerce	Short-Term
26	Digital Fund	Ministry of Education, Ministry of Science and Technology	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
27	Digital Library System	Relevant government organizations	Short-Term
28	Digital Museum	Ministry of Religious Affairs and Culture	Mid-Term
29	Digital Payment Switch (RTRP)	Central Bank of Myanmar	Mid-Term
30	Digitalization in Social Security	Ministry of Labour	Short-Term
31	Digitalized Maternal and Child Health Record System	Ministry of Health	Initiative
32	Disease Outbreak Alert	Ministry of Health	Initiative
33	Document Management System	Ministry of Transport and Communications	Short-Term
34	e-Bench System	Constitutional Tribunal of Myanmar	Short-Term
35	e-Challan Management System	City Development Committees	Short-Term
36	e-Commerce Online Shop Registration System	Ministry of Commerce	Short-Term
37	e-Customs	Ministry of Planning and	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
		Finance	
38	e-Government Accessibility for Disabilities	Ministry of Social Welfare, Relief and Resettlement	Short-Term
39	e-Learning Platform/System	Ministry of Science and Technology	Mid-Term
40	e-License System for Tourism	Ministry of Hotels and Tourism	Short-Term
41	e-Map	Ministry of Home Affairs, Ministry of Agriculture, Livestock and Irrigation, Ministry of Natural Resources and Environmental Conservation, Ministry of Construction, City Development Committees	Long-Term
42	e-Parliament	Pyidaungsu Hluttaw, Amyotha, Pyithu, State and Regional Hluttaws	Long-Term
43	e-Passport	Ministry of Home Affairs	Mid-Term
44	e-Payment	Central Bank of Myanmar	Mid-Term
45	e-Procurement	Ministry of Planning and	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
		Finance	
46	e-Recruitment and Integrated Civil Service System (e-RICSS)	Union Civil Service Board	Short-Term
47	e-Registration	Relevant government organizations	Short-Term
48	e-Submission System of Food, Drug, Medical Device and Cosmetic	Ministry of Health	Long-Term
49	e-Tender	Ministry of Planning and Finance	Short-Term
50	Education Management Information System (EMIS)	Ministry of Education, Ministry of Science and Technology	Short-Term
51	Electronic Hospital Information System	Ministry of Health	Mid-Term
52	Electronic Insurance System	Ministry of Planning and Finance	Short-Term
53	Electronic Logistic Management Information System for Public Health Commodities	Ministry of Health	Short-Term
54	Electronic Public Health Information System	Ministry of Health	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
55	Emergency Alert Monitoring Services (EAMS)	Ministry of Home Affairs	Short-Term
56	Employees Management System	Relevant government organizations	Long-Term
57	Energy Accounting and Auditing System	Ministry of Electric Power, Ministry of Energy	Mid-Term
58	Financial Management System	Relevant government organizations	Long-Term
59	FinTech Application	Ministry of Planning and Finance, Central Bank of Myanmar	Mid-Term
60	Fire Service Department Online System	Ministry of Home Affairs	Long-Term
61	Freight Operations Management System	Ministry of Transport and Communications	Long-Term
62	Games Management System	Ministry of Sports and Youth Affairs	Long-Term
63	Government Securities Auction	Ministry of Planning and Finance, Central Bank of Myanmar	Mid-Term
64	Guest List Management System (GLMS)	Ministry of Hotels and Tourism	Short-Term
65	Health and Safety Awareness	Ministry of Labour	Short-Term
66	Housing and Real Estate	Ministry of Construction	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
	Management System		
67	Housing Loan and Mortgage System	Ministry of Construction	Mid-Term
68	Integrated Geographic Information System (IGIS)	Relevant government organizations	Long-Term
69	Infrastructure / Project Management and Monitoring System	Ministry of Construction	Mid-Term
70	Insurance Online Payment	Ministry of Planning and Finance	Short-Term
71	Integrated Communication Management Platform	Ministry of Defence	Short-Term
72	Integrated Tax Administration System (ITAS)	Ministry of Planning and Finance	Long-Term
73	Integrated Toll Collection and Management System	Ministry of Construction	Short-Term
74	Intellectual Property Online Filing System	Ministry of Commerce	Long-Term
75	Intellectual Property Registration and	Ministry of Commerce	Long-Term

No	Action Plans	Execution Agency (Focal)	Period
	Management System		
76	Investment Monitoring System (IMS)	Ministry of Investment and Foreign Economic Relations	Short-Term
77	Judicial e-library System	The Supreme Court of the Union	Mid-Term
78	Labour Exchange Office Management System (LEO)	Ministry of Labour	Initiative
79	Labour Market Information System	Ministry of Labour	Long-Term
80	Labour Registration System	Ministry of Labour	Mid-Term
81	Land Acquisition Management System	Ministry of Home Affairs, Ministry of Agriculture, Livestock and Irrigation, Ministry of Natural Resources and Environmental Conservation, Ministry of Construction, Ministry of Ethnic Affairs, City Development Committees	Long-Term
82	Land Records Information and Management System	Ministry of Home Affairs, Ministry of Agriculture, Livestock and Irrigation,	Long-Term

No	Action Plans	Execution Agency (Focal)	Period
		Ministry of Natural Resources and Environmental Conservation, Ministry of Construction, City Development Committees	
83	Lawyer Database System	The Supreme Court of the Union	Short-Term
84	Maternal and Child Handbook App for Health Promotion	Ministry of Health	Initiative
85	Maternal Care	Ministry of Health	Initiative
86	mHealth Initiatives	Ministry of Health	Short-Term
87	Microfinance through Mobile Banking	Ministry of Planning and Finance, Central Bank of Myanmar	Mid-Term
88	Mobile Community Radio	Ministry of Information	Short-Term
89	Mobile Text Alerts for Vaccinations	Ministry of Health	Initiative
90	Multi-Modal Transport System	Ministry of Transport and Communications	Long-Term
91	Myanmar Tourism	Ministry of Hotels and	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
	Professionals Accreditation System (MTPAS)	Tourism	
92	National Biodiversity Database System	Ministry of Agriculture, Livestock and Irrigation, Ministry of Natural Resources and Environmental Conservation	Mid-Term
93	National Case Information System (NCIS)	The Supreme Court of the Union	Short-Term
94	National Database	Ministry of Immigration and Population	Long-Term
95	National Education Archive	Relevant government organizations	Mid-Term
96	National Education Monitoring System (NEMS)	Relevant government organizations	Short-Term
97	National Forest Monitoring System	Ministry of Natural Resources and Environmental Conservation	Mid-Term
98	National ID System	Ministry of Immigration and Population	Long-Term
99	National Public Investment	Ministry of Investment and Foreign Economic Relations,	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
	System	Ministry of Planning and finance	
100	National Skills Standards Authority (NSSA)'s Certificate Verification System	Ministry of Labour	Initiative
101	Petroleum Products Control Management System	Ministry of Energy	Short-Term
102	Post-Market Surveillance of Food, Drug, Medial Device and Cosmetic	Ministry of Health	Long-Term
103	One Map Myanmar	Relevant government organizations	Long-Term
104	Online Application for Electricity Meter/Transformer	Ministry of Electric Power	Short-Term
105	Online Application System	Relevant government organizations	Short-Term
106	Online Banking	Central Bank of Myanmar	Mid-Term
107	Online Collaboration of Farming Community	Ministry of Agriculture, Livestock and Irrigation	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
108	Online Industrial Registration and Boiler Registration and Information System	Ministry of Industry	Short-Term
109	Overseas Worker Community Mobile Application	Ministry of Labour	Long-Term
110	Passenger Reservation System	Ministry of Transport and Communications	Long-Term
111	Population Record, Skill Mapping and Crisis Management System	Ministry of Border Affairs	Mid-Term
112	Port Community System (PCS)	Ministry of Transport and Communications	Long-Term
113	Prisoners Management Information System (PMIS)	Ministry of Home Affairs	Mid-Term
114	Public Feedback Programme (PFP)	Relevant government organizations	Short-Term
115	Radio Frequency Identification System	Ministry of Transport and Communications	Long-Term
116	Real Time updates on Fare Changes, Route Changes and	Ministry of Transport and Communications	Long-Term

No	Action Plans	Execution Agency (Focal)	Period
	Scheduled Maintenance updates for Public Transport		
117	Ruling Content Management System (RCMS)	The Supreme Court of the Union	Short-Term
118	Smart Card Transport System	Ministry of Transport and Communications	Mid-Term
119	Smart Training System for Athletes	Ministry of Sports and Youth Affairs	Mid-Term
120	Social Management Information System (SMIS)	Ministry of Social Welfare, Relief and Resettlement	Mid-Term
121	Social Security Board Information System	Ministry of Labour	Short-Term
122	Soil Testing Information System	Ministry of Agriculture, Livestock and Irrigation	Initiative
123	Student Registration System	Relevant government organizations	Short-Term
124	Student Scholarship Management System	Relevant government organizations	Short-Term
125	Terminal Operating System	Ministry of Transport and Communications	Long-Term
126	Tourist Movement	Ministry of Hotels and	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
	Information System (TMIS) Phase I for Tour Packages	Tourism	
127	Tourist Movement Information System (TMIS) Phase II for Foreign Independent Traveler (FIT)	Ministry of Hotels and Tourism	Mid-Term
128	Track Maintenance System	Ministry of Transport and Communications	Mid-Term
129	Treatment Advice System	Ministry of Health	Initiative
130	Trucking/Congestion Management System	Ministry of Transport and Communications	Long-Term
131	Unique Identity (e-ID)	Ministry of Immigration and Population	Mid-Term
132	Vaccination Management Information System	Ministry of Health	Short-Term
133	Value Added Tax- VAT System	Ministry of Planning and Finance	Long-Term
134	Vehicle Information Management System	Ministry of Transport and Communications	Long-Term
135	Visa Management System	Ministry of Foreign Affairs,	Mid-Term

No	Action Plans	Execution Agency (Focal)	Period
		Ministry of Immigration and Population	
136	Voter List Management System	Union Election Commission	Short-Term
137	Warehouse Management System	Ministry of Transport and Communications	Short-Term
138	Waste Management System	City Development Committees	Mid-Term
139	Water Supply Management System	Ministry of Agriculture, Livestock and Irrigation, Ministry of Electric Power, Ministry of Construction, City Development Committees	Long-Term
140	Online Payment System for Road Transport Business License	Ministry of Transport and Communications	Long-Term
141	e-Participation (A system through which citizens can send information to parliamentary representatives via a website)	Pyidaungsu Hluttaw, Amyotha, Pyithu, State and Regional Hluttaws	Short-Term

No	Action Plans	Execution Agency (Focal)	Period
142	Online Electrical Inspection System	Ministry of Electric Power, Ministry of Industry	Short-Term
143	Online Registration System for Micro, Small and Medium Enterprises (MSMEs)	Ministry of Cooperatives and Rural Development, Ministry of Industry	Short-Term
144	Agriculture, Livestock and Irrigation Portal	Ministry of Agriculture, Livestock and Irrigation	Short-Term
145	Consumer Protection Portal	Ministry of Commerce	Long-Term
146	e-Commerce Platform for Businesses	Ministry of Commerce	Mid-Term
147	e-Market Place for Myanmar Product Platform	Ministry of Industry	Short-Term
148	Judicial Web Portal	The Supreme Court of the Union	Short-Term

16. DEVELOPING MYANMAR E-GOVERNANCE MASTER PLAN 2030

Aiming to align with the evolving administrative conditions of the nation and the rapid advancements in Information and Communications Technology, the development of this Myanmar e-Governance Master Plan 2030 commenced in September 2022 upon revising the previous Myanmar e-Governance Master Plan (2016-2020), and the draft was completed in May 2023. Subsequently, feedback and comments were collected from Chief Information Officers (CIOs) of government organizations, responsible officials, the private sector, non-governmental organizations, and the public, and revisions and additions were made accordingly. The draft was presented and explained at the e-Government Implementation Committee meeting (1/2024) held on January 22, 2024, and further revisions and additions were made based on the committee members' feedback. Following this, the draft was presented at the e-Government Steering Committee meeting (1/2024) held on July 26, 2024. During this meeting, the committee members' feedback was sought, and the draft was finalized after further revisions and additions. Subsequently, the finalized draft was submitted to the Patron of the e-Government Steering Committee for approval, and upon receiving approval, this e-Governance Master Plan 2030 was officially released.

The key supervisors and contributors/developers to the Myanmar e-Governance Master Plan 2030 are listed in the tables below.

16.1 Key Supervisors

TABLE 10: LIST OF KEY SUPERVISORS

No.	Name	Position/Department
1	U Lu Mon	Deputy Minister Ministry of Transport and Communications.
2	U Soe Thein	Permanent Secretary (Retired) Ministry of Transport and Communications.
3	U Sai Saw Lin Tun	Acting Director General (Retired) Information Technology and Cyber Security Department, Ministry of Transport and Communications.

16.2 Key Contributors/Developers

TABLE 11: LIST OF KEY CONTRIBUTORS/ DEVELOPERS

No.	Name	Position/ Department
1	Daw Nwe Ni Soe Yin	- Project Director Development of e-Governance Master Plan Projects - Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications

2	U Nay Lin Aung	Deputy Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications
3	U Soe Myint Naung	Deputy Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications
4	U Kyaw Kyaw Htun	Assistant Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications
5	U Nyi Nyi Nyein	Assistant Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications
6	U Aung Kaung Sat	Assistant Director e-Government Division, Information Technology and Cyber Security Department, Ministry of Transport and Communications
7	U Tun Tun Naing	- Permanent Secretary (Retired) Ministry of Planning and Finance

		- Local Expert, Myanmar ICT Development Master Plan 2005 Project
8	Dr Myint Myint Than	- Project Coordinator/ Project Director Myanmar ICT Development Master Plan Projects - Consultant Myanmar Computer Federation
9	Dr Ar Kar Kyaw	Senior IT Lecturer Wellington Institute of Technology, Te Pūkenga, New Zealand
10	Daw Lae Wai Ye Khine	Freelance Consultant
11	Daw Nwe Wady	Freelance Consultant

17. CONCLUSION

The primary prerequisite for the successful implementation of an e-Government process is the establishment of a clear and well-defined strategic vision. Every country that has achieved success in its e-Government initiatives has demonstrated a coherent and unambiguous strategic vision. This Master Plan includes directions, frameworks, and roadmap, aiming for strategic implementation in order to achieve the objectives of development impacts in the country's administration, economic and social sector in harmony. This Master Plan is designed to facilitate the strategic implementation of e-Government in Myanmar, encompass guiding directions, frameworks, and roadmaps, and aims to provide effective support for the ultimate goal of harmonious and integrated development of the nation's administrative, economic, and social sectors.

This master plan has been formulated with the objective of enabling national level implementation, advancing toward the establishment of a Digital Government through the ongoing execution of Myanmar's e-Government initiatives. Consequently, this Master Plan is designated as a "Living Document" to ensure its alignment with evolving administrative, social, and economic landscapes, as well as the rapid advancements in information technology.

If the implementation proceeds in accordance with the Myanmar e-Governance Master Plan, the e-Government process will experience significant development in Myanmar. Concurrently, the manufacturing and supply of ICT industry within the country's public and state-owned sectors will also be promoted. Supported by the enactment of relevant laws, bylaws, and regulations, the IT industry and ICT sector as a whole will soon assume a pivotal role in the deployment of the nation's digital economy.

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