WHITE PAPER

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UZBEKISTAN ICT AND E-GOVERNMENT CLOUD BUSINESS

E-government Center

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Uzbekistan ICT and
E-Government Cloud Business

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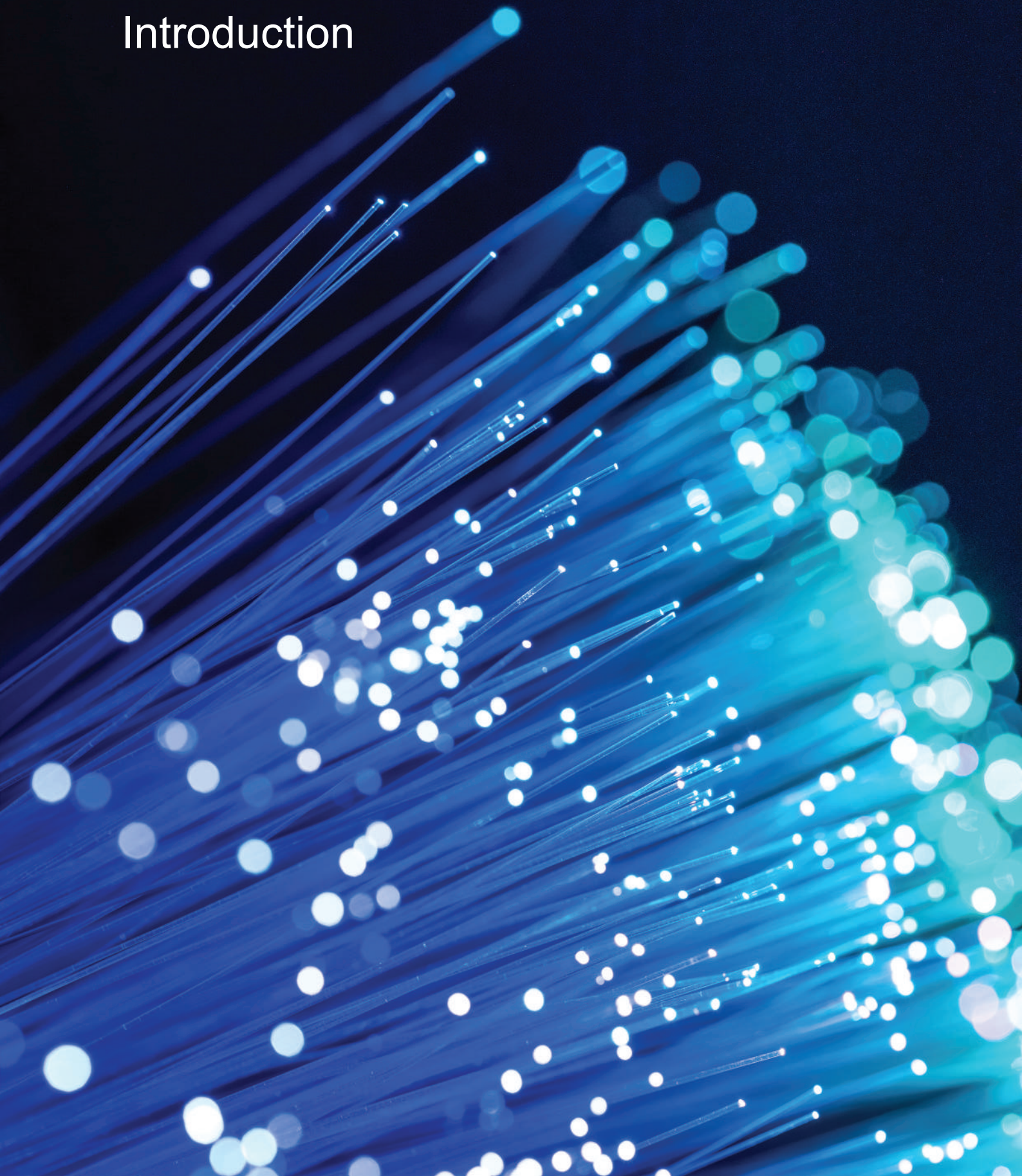in collaboration with Roland Berger

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CHAPTER

Introduction

1 Introduction

1.1 Executive Summary

Global digitization has conventionally been driven by private sector technology entrepreneurs; however, governments are increasingly playing a more prominent role in the digitalization agenda.

E-government offers citizens and businesses the convenience of digital access to government services, automating internal government processes, and harnessing data to improve policymaking.

The adoption of e-government brings efficiency gains via convenience to citizens and government cost savings, as well as wider economic benefits via reduced corruption and improved ease in doing business, promoting development of citizen talent and local industries competencies. Firstly, in terms of efficiency, citizens gain conveniences that allow them to spend time on more productive activities. Routine administrative activities in the civil service can be done in a shorter time and with less resource requirement, leading to overall financial and manpower efficiency.

Secondly, there are tangible benefits to the wider economy. E-government sets the foundation for a more transparent ecosystem, since it ensures that all transactions between citizens are government officials are digitally recorded and fully traceable. The transparency and trust enabled by digital services are particularly important to secure foreign direct investments. In addition, e-government makes it easier for businesses to cooperate with government, whether to register businesses or apply for various permits needed for operations. Furthermore, e-government creates significant opportunities to promote the development of local talent and local industry competencies, including education and training offerings, enhancement on digital infrastructure, and private sector collaborations.

National vision for e-government

While Uzbekistan's previous national ICT strategy for the period 2013-2020 focused on e-government and ICT infrastructure, Digital Uzbekistan 2030's strategic thrusts and key enablers will continue to build on these areas. Furthermore, the strategy will not only accelerate widespread adoption of digital government services across all segments of the economy and society, but also seek to enhance Cloud and Big Data infrastructure deployment and their relevant operation.

Digital Uzbekistan 2030 strategic thrusts and enablers
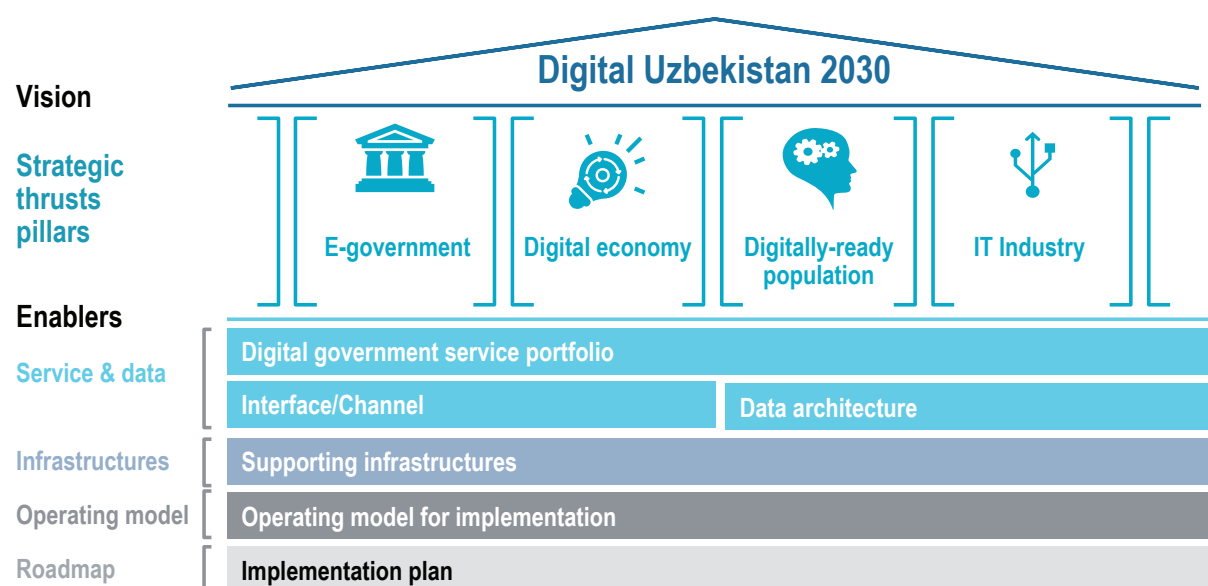

Figure 1:   Digital Uzbekistan 2030 strategic thrusts and enablers

In support of the "Digital Uzbekistan 2030" vision, this white paper seeks to develop the key concepts and strategic directions that will guide the subsequent development of Uzbekistan's e-government policy and downstream initiatives.

This will be done through analysis of five sections, namely the (I) current situation in Uzbekistan, (II) worldwide trends, as well as actions undertaken by global leaders and regional peer countries, (III) target e-government vision for Uzbekistan, (IV) implementation plan, and (V) roadmap for Uzbekistan e-government development strategy.

I. The state of past and ongoing digital initiatives on e-government and data strategy in Uzbekistan

E-government development in Uzbekistan began in 2013 with the adoption of Comprehensive Program for the Development of the National Information and Communication System for the period 2013-2020. Current national strategy, Digital Uzbekistan 2030, aims to further promote the all-rounded digital development of Uzbekistan, including a particular focus on E-government digital services.

1. E-government positioning

The electronic government of Uzbekistan is rapidly developing under the leadership of President Shavkat Mirziyoyev, the range of available services is constantly expanding. Thus, according to the UN E-Government Development Index, Uzbekistan has risen by 18 positions - from 87th in 2020 to 69th in 2022, entering the group with a high EGDI value.

In 2022, Uzbekistan showed a positive development trend in all three sub-indicators of the EGDI index:

• Online Services Index (55th)

• Index of telecommunications infrastructure (123rd place)

• Human capital index (90th place)

All three areas of development are identified and considered in the Digital Uzbekistan-2030 strategy.

2. Digital and data services portfolio and ministry focus

Uzbekistan has a wide portfolio of e-government services, including services of varying complexity to address a wide range of issues for individuals and legal entities. Currently 371 out of 774 services are available e-government, and the number of available services is constantly growing.

Digital service planning and implementation is done fully inhouse by the Uzbekistan government with no involvement from private contractors. The pipeline for services is planned on a yearly basis, with no established long-term roadmap for service digitization. Aforementioned issues may hinder the development of Uzbekistan e-government in the future.

3. Segments and interfaces/ channels prioritization

Uzbekistan e-government services are offered through 6 channels: (1) SPSI portal; (2) MyGov mobile application; (3) CPS - Center of Public Services; (4) government websites; (5) more than 800 post offices; (6) consulates. Also, through mobile applications and portals of state bodies and banks (my.soliq.uz, license.gov.uz, etc.), over 1000 electronic public services are provided to individuals and legal entities.

Channel offering is directly linked to the Digital Uzbekistan 2030 strategy and addresses current gaps in e-government services accessibility and adoption, while maintaining and developing perspective growth areas.

4. Infrastructure and prerequisites

ICT infrastructure and its development level are one of the key determinants for how well the envisioned e-government will function and to what extent it would be adopted by the population. In the past, Uzbekistan had made noticeable progress in infrastructure development, including both fixed and mobile broadband infrastructure. It is also worth noting that by the end of 2022, a project was implemented to build and launch a state unified data processing center.

5. Associated data architecture and prerequisites

Uzbekistan has come a long way in terms of government data governance, progressing from a divided manual data sharing in the past to developing a modern centralized integrated e-government architecture today.

While many government bodies have made significant progress in building and maintaining information systems to support Uzbekistan's e-government, some are still lagging. To drive the e-government forward in the future, Uzbekistan would need to harmonize its information systems development, promote integration with the central government platform, develop national technological champions to support government in e-government data management. This will in turn improve data governance and data sharing.

II. International benchmark and best practices

This chapter aims to demonstrate the progress and trends of e-government development and identify best practices which Uzbekistan can emulate to improve its e-government development.

To demonstrate global best practices with relevance for Uzbekistan, the scope of benchmarking countries covers leading countries in e-government development and infrastructure such as Denmark, Estonia, Korea, Singapore, UK, Germany, China, and Commonwealth of Independent States (CIS) countries such as Belarus, Kazakhstan, Russia.

1. Progress and trends of e-government development from a global perspective

Globally, there is a continued increase in the uptake of e-government development, with e-government service offerings and operations becoming more seamless and advanced with the rise of emerging technologies such as cloud computing, big data, artificial intelligence and Internet-of-Things (IoT).

Vision and strategy: Nowadays e-government development of various countries gets ever-increasing attention and support from the top leadership.

Service offering: Governments are increasingly growing the amount of digital services offered. Three observed trends in e-government service offering include: (i) the emergence of new technologies such as IoT and cloud computing that promote big data services, (ii) growth of mobile apps and one-stop portals incorporating services offered across agencies, (iii) iterative development of e-government services to ensure constant improvement of services.

Data architecture: Overall, there are two trends observed: (i) growing importance of secured data sharing and open data, (ii) increasing adoption of cloud computing to handle growing amounts of data.

Infrastructure: There are two key elements in ICT infrastructure: (i) widespread connectivity and (ii) cloud-based data center. Demand for international gateway is increasing as more data is involved, which requires more bandwidth. Similarly, with increasing data collection and usage, data center adoption has increased, as well as edge computing to support processing of vast amounts of data.

Operating model: Three main aspects to operate digital services include (i) understanding priorities, demand and preference of users, (ii) data quality and protection, (iii) maintenance of network and data centers.

To execute these operations smoothly, a dedicated team focusing on e-government development is required. To offer advanced services may require external partnerships with local IT ecosystem.

Resource utilization: Two key resources to enable e-government development are human and funding. Various countries encourage the development of digital skills to population and civil servants. Different funding models may be applied such as Public-Private-Partnership (PPP).

2. Global key learnings and practices on e-government strategy and digital & data services

Development of e-government should be driven by comprehensive strategies with clearly defined vision and strategies, key enablers, policies and an actionable roadmap. Laws and regulations must be supportive, rather than restrictive.

Advancement of e-government service offerings should be done through prioritization based on the user volume for the e-government to achieve high impact and adoption of its digital services.

Promotional campaigns can be run to increase awareness of digital services available and benefits to increase adoption.

3. Global key learnings and practices on infrastructure and enablers

Advancement of rural connectivity can be achieved through PPP and partnerships with technology players.

The government should consider adopting an integrated data center as it yields such benefits as security, operational and cost efficiency.

The e-government development may be improved by deploying cloud technology. Key technological challenges may include security, privacy, interoperability and data portability, identity and access management and auditing.

In terms of data security, the government should adopt as many measures as possible in terms of technology, regulations and governance to develop a high level of data security.

III. Uzbekistan e-government target and vision

The Uzbekistan e-government target and vision entails thoughtfully building the key enablers for the further development of e-government and in realizing the much broader and comprehensive vision for what digitalization means to Uzbekistan, as embedded in the Digital Uzbekistan 2030 strategy.

The Uzbekistan e-government target and vision discussed in this chapter covered 5 key components, namely the strategic vision for Uzbekistan e-government, target digital government service portfolio, target interface/ channel & data architecture, target infrastructures, as well as target operating models for implementation and operation.

1. Strategic vision for Uzbekistan e-government

The strategic vision must pursue

5 main goals: (I) accelerating the digitalization of public services; (II) a sharp increase in service penetration from the current level of 11.1% of active users; (III) development of supporting ICT infrastructure, namely cloud services and Big Data infrastructure; (IV) improving the international ranking as a comprehensive indicator of the current level of development; (V) development of the local ICT industry and improvement of the quality of life.

2. Target services portfolio

Target service portfolio should be improved through the following measures: (i) broaden the target services portfolio beyond Government-to-Citizen (G2C) services to drive higher usage in Government-to-Businesses (G2B) services on SPIPS, (ii) explore extending e-government offering to data services in the long term, and (iii) establish a structured approach to prioritize the list of services in the pipeline hence developing a phasing schedule for implementation.

3. Target segments and interfaces/ channels prioritization

Main objectives in terms channels and interfaces include (i) adopt mobile-first approach – continue service coverage expansion on MyGov mobile app, (ii) bring self-service e-government access to rural and remote areas, (iii) design interfaces/ channels targeting G2B and G2B2C services.

4. Target infrastructures

Following measures should be applied to develop corresponding infrastructure.

Connection. Phase infrastructures development plan according to the e-government services planned for rollout in the same period.

Data center & cloud. Design the data center to follow global data center standards and obtain certification policy. Plan the data center geographical distribution including conducting assessments on the distribution and competitiveness of potential locations for server rooms etc.

Data center offerings. Define scope of basic services and value-added services to offer, in the short, mid and long term.

Operations & maintenance model. Decide on the level of outsourcing for the less technical/ low level operations and maintenance.

International connectivity. Explore deeper interconnection and cooperation with neighboring countries, provision of diversified transit services, and the creation of a transport hub in Central Asia.

Security. Adopt shift-left security strategy. Implement data protection policies, including adoption of ISO 27001 standards on information security management and ISO 27701 on privacy information management. Adopt best practices in guiding government's interaction with citizens when collecting data.

Regulation and licensing. Review spectrum allocation to support e-government and digital economy development. Define policies, including grants and subsidies, to incentivize rural coverage. Plan for institutionalization of regulations and policies governing the licensed and unlicensed usage of IoT in e-government services and the broader digital economy activities.

5. Target operating model

Target operating model for implementation of new e-government service should consider following suggestions. (i) Plan for transitioning from current operating model to hybrid model for e-government digital service implementation and explore long term transition to ecosystem model. (ii) Define roles and responsibilities for the four layers of target e-government operating system architecture: basic infrastructure layer, data layer, system core layer, and application layer.

IV. Implementation plan for Uzbekistan

Development of an internationally acclaimed e-government and the broader digital economy to enable Digital Uzbekistan 2030 is a long-term endeavor involving significant resources and strong execution. An undeniable key determinant of success is implementation. One of the pitfalls seen in many countries failing to achieve their desired goals is an unimpressive implementation lacking in energy and conviction.

Chapter 5 aims to develop a clear and actionable implementation plan across the key enablers of e-government development, namely regulations and policies, governance structure, infrastructure development, human capital and financing to advance Uzbekistan e-government development to achieve its vision.

1. Regulations and policies

Regulations should be periodically reviewed and updated while policies supporting infrastructure, human capital and digital ecosystem development as well as policies promoting usage of e-government services should be considered.

2. Operating model

The existing operating model of Uzbekistan follows best practices with the development of

a Project Management Center and appointment of Chief Digitall Officers (CDOs). However, capabilities of the government can be enhanced through partnerships with the private sector, by first transitioning a hybrid model and exploring long term transition to an ecosystem model.

3. Infrastructure

Connectivity in Uzbekistan needs to be improved especially in public sector buildings, households and commercial buildings with overall development phased according to e-government services planned for rollout. Uzbekistan should also work towards developing of a "world-class" data center and obtain certification, as well as explore adoption of cloud platform for its various benefits. In terms of international connectivity, Uzbekistan should explore deeper interconnection and cooperation with neighboring countries, provision of diversified transit services, and the creation of a transport hub in Central Asia by growing the quantity and capacity as well as upgrade its international gateways (IGWs). Meanwhile to improve data security, technology and expertise need to be constantly upgraded, including adoption of international standards and a shift-left strategy. In terms of regulation and licensing, internet service providers and technology operators (e.g., IoT) should be regulated, and operators need to be assessed to ensure efficiency within the telecommunications market in Uzbekistan.

4. Human capital

According to the operating model, clear roles and responsibilities have been defined, each with specific skills requirements. Digital skills development can be done through training programs or partnership.

5. Financing

Various funding models are available for different purposes, but selection on which to adopt requires a case-by-case analysis.

V. Roadmap for Uzbekistan e-government and data strategy

Given the implementation rigor associated with the development of e-government and its broader digital economy, it is imperative that Uzbekistan ensures a measured execution of the implementation plan developed in Chapter

5.

Chapter 6 describes the roadmap for Uzbekistan e-government and data strategy. Chapter 6.1 lays out the implementation roadmap with indicative timelines clearly visualizing key milestones to be achieved in each phase. Chapter 6.2 will outline key attention points with regards to infrastructure, followed by Chapter 6.3 describing the key success factors for the implementation.

1. Implementation roadmap and timeline

Based on the implementation plan developed in Chapter 5, Chapter 6.1 describes implementation roadmap and timelines across the key areas of e-government development: (a). Regulations and policies, (b). Operating model, (c). Infrastructure, (d). Human capital, and (e). Financing.

(a)   In regulation, the timeline indicates which policies related to promotion of infrastructure development, usage of digital services and digital ecosystem development should be adopted by the end of 2022. It also describes the iterative process of regulations review and updates.

(b)   In operating model, the timeline describes timing for possible inclusion of private companies in the government service digitization process and the shift towards hybrid and ecosystem models, as well as regular meetings between stakeholders to address status of e-government projects.

(c)   In infrastructure, the timeline describes phased approach to broadband infrastructure rollout, data center, international connectivity gateway construction, timing for security maintenance and updates as well licensing of operators.

(d)   In human capital, the timeline describes timing for initial assessment and upskilling of public service employees through 2022, as well as future updates to policies related to human capital.

(e)   Financing timeline indicates timing for financing key initiatives of the implementation plan.

2. Key attention points with regards to infrastructure

Competition establishment. Establishing a policy of competition in the ICT market. Establishing policies that aim to ensure strong competition and thus maximize consumer welfare, innovation and investment.

Efficient assets allocation. Efficient allocation and use of assets owned and controlled by the state. The Government can rationally allocate and provide open access to public resources, such as spectrum, poles, and rights-of-way to encourage network modernization and market entry to increase competitiveness.

Incentives creation. Creating incentives for universal accessibility and broadband adoption. A universal service delivery mechanism is to support the introduction of broadband in areas with high costs; and to ensure that low-income citizens can afford broadband; and to support efforts to encourage the introduction and use of broadband.

Standards control. Updating, renewing, setting standards and aligning incentives to maximize use for national priorities. Reform laws, policies, standards and incentives to maximize the benefits of broadband in sectors heavily influenced by government, such as public education, health and government activities.

3. Key success factors

Clearly defined and actionable implementation strategy planned out in phases in alignment with various stakeholders.

Implementation strategy **led and overseen by the government.**

Necessary digital skills are put in place to support e-government development.

Local ICT and industry ecosystem to provide support and collaboration opportunities to develop e-government.

Financing support for infrastructure, human capital development and others.

1.2 Approach and Methodology

This White Paper is written by Roland Berger based on the methodology in Figure 3. The purpose of this White paper is to provide insights into e-government development of countries and how Uzbekistan can approach its development plans through understanding and learnings from other countries and global trends. The White Paper will explore a comprehensive set of topics ranging from current state, global trends, target vision, implementation plan and a roadmap to achieve the target vision.

The scope of this White Paper is focused on several strategic enablers (Chapter 4) and will look to provide view and recommendations on advancement of digital government in Uzbekistan.

1.2.1 White Paper development process

A comprehensive approach is developed to write this White Paper. Information and data are first gathered from the following:

Key sources of information and data

Sources of data and information on national digitalization agendas

Roland Berger's whitepapers and databases

External whitepapers, databases and country case studies

Stakeholder engagement with government officials and Huawei

Government sources

Figure 2: Key sources of information and data

Next, we develop the framework of the White Paper, which can be divided into four steps including current state assessment, global trends and benchmark analysis, recommendations for target and implementation, and stakeholder engagement and consensus building

1. Current state assessment

Uzbekistan's current state of digital government development was assessed with inputs from interviews with the government, key stakeholders, secondary research of data and reports. Challenges and gaps were identified and inputs from key government officials were

also sought on objectives, targets and current digitalization plans.

2. Global trends and benchmark analysis

Global trends in each topic were analyzed and best practices in how different countries approached digitalization of government was identified. We provide insights to latest trends in digitalization in each area and the impact on countries. To identify gaps and determine key challenges and opportunities for Uzbekistan, more than 20 case studies were detailed, with key learnings and benchmarks listed.

3. Uzbekistan digital government target and vision

Based on the vision and targets of digital government development for Uzbekistan, suggestions on the way forward were developed with insights from the current state and key learnings from global benchmarking.

With the insights from development of the White Paper and consensus from the stakeholders involved, recommendations were formulated and written for each strategic thrust.

4. Implementation plan and roadmap

Implementation plan of key pillars of digital government were identified with suggestions on implementation timeline. Key success factors were also identified to increase chances of successful implementation.

5. Stakeholder engagement and consensus building

This White Paper was developed with support and active participation of local government and industry stakeholders. More than 12 validation sessions, including 9 expert interviews were conducted and many more correspondence were carried out throughout the development and writing of the white Paper. Input and opinions were collected from government personnel, industry experts and academics. Extensive validation sessions with key stakeholders were conducted to gain input on current state, challenges and direction in e-government development for Uzbekistan. The insights and recommendations of the White Paper was also shared and validated with the stakeholders involved.

Overview of approach and methodology
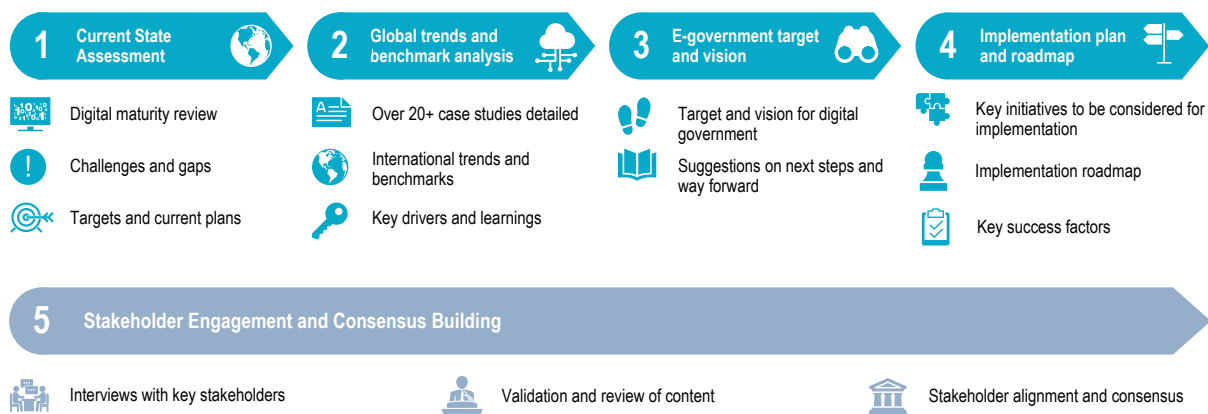
Figure 3: Overview of approach and methodology

1.2.2 Engagement with key stakeholders

In developing the White Paper, engagement with key stakeholders including calls and written correspondences provided valuable input.

More than 12 extensive calls and validation sessions with stakeholders, and many more exchanges such as written correspondences, government website interactions were conducted to gain context on current market situation, challenges, trends and existing digitalization initiatives.

Input from stakeholders such as Ministry of Digital Technologies, the E-Government Project Management office, the UZINFOCOM and different teams within Huawei, among others, were also considered. These provided key input regarding the existing nation development plans and goals and assisted to ensure the White Paper aligns with the overall digital direction of Uzbekistan. Recommendations were also validated.

1.2.3 Analysis of existing state programs

The current state programs and initiatives were analyzed to define the national priorities and to include existing projects in writing of this White paper. Input from key government frameworks, concepts and plans have been taken into account.

All relevant plans were reviewed in detail to ensure alignment with the national directions and priorities for each strategic thrust.

Overview of reviewed government plans

Document review of 50+ acts of legislation, presidential decrees, speeches etc, including the following …

Existing national plan	✓ Comprehensive Program for the Development of the National Information and Communication for the period 2013-2020 ✓ Digital Uzbekistan 2030 strategy
Most recent plans announced	✓ On measures to raise the sphere of information and communication technologies to a new level in 2022-2023 ✓ About e-commerce ✓ Measures for the widespread adoption of digital technologies in the city of Tashkent ✓ Measures for the widespread adoption of the digital economy and e-government

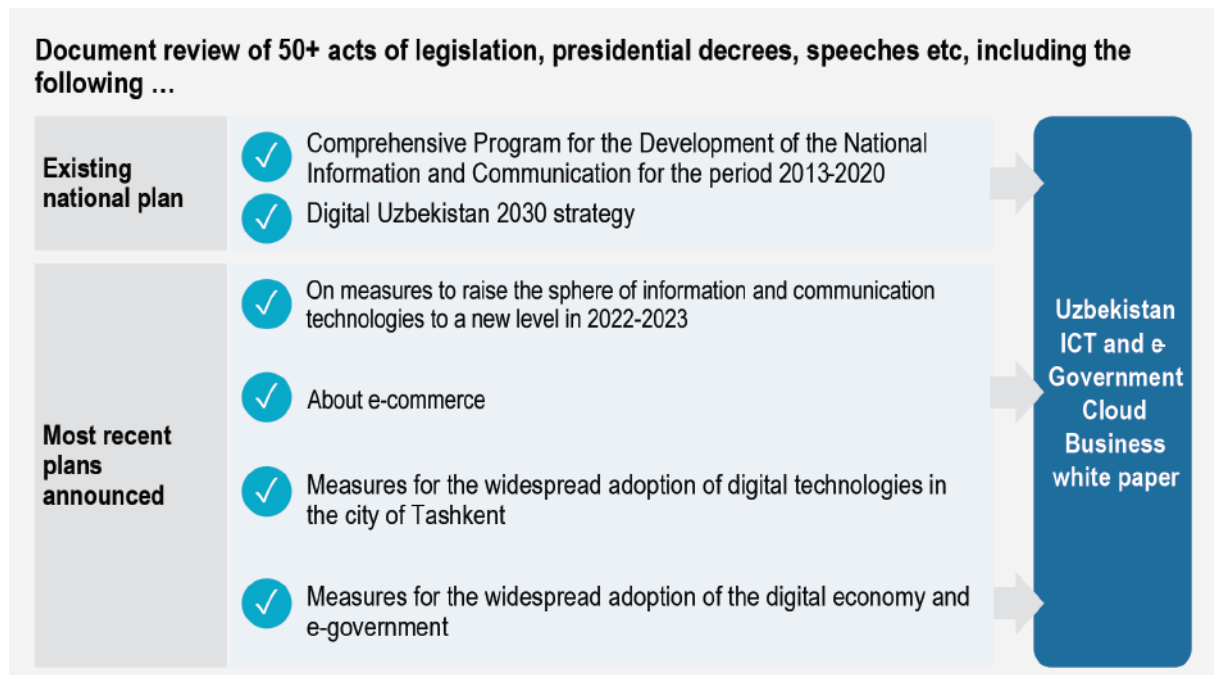→ Uzbekistan ICT and e-Government Cloud Business white paper

Figure 4: Overview of reviewed government plans

02

The state of past and ongoing
digital initiatives on

2 The state of past and ongoing digital initiatives on e-government and data strategy in Uzbekistan

2.1 E-government positioning

Development of Uzbekistan e-government began in 2013 with the adoption of Comprehensive Program for the Development of the National Information and Communication System for the period 2013-2020. The e-government development was one of two programs, along the development of vital telecommunications infrastructure.[1] Most recently, a 2020 Presidential decree 6079 outlining the Digital Uzbekistan 2030 national strategy was adopted, which will further promote the all-rounded digital development of Uzbekistan, including particular focus on e-government digital services. Resulting from the government's continued efforts, the development of e-government has seen significant progress in Uzbekistan.

In 2022, Uzbekistan ranked 57th out of 193 countries in the OSI Online Services Index (OSI) in the UN E-Government Survey conducted by

the United Nations every two years (Figure 5). The Online Services Index measures the volume and quality of public online services provided (Figure 6). Thanks to various launches of e-government development initiatives, Uzbekistan's ranking in the UN E-Government Survey 2022 has improved significantly, climbing 17 positions from 74th place in 2014.

However, when comparing the results of the OSI index for 2020 and 2022, there is a decrease in the position of Uzbekistan by 11 points. The reason was that the methodology for calculating the Online Services Index in 2020 was not broken down into sub-categories, while in the 2022 edition, UNDESA included 5 different sub-categories such as institutional structure, content delivery, service delivery, e-participation and technology for evaluating the development of online services in UN Member States.

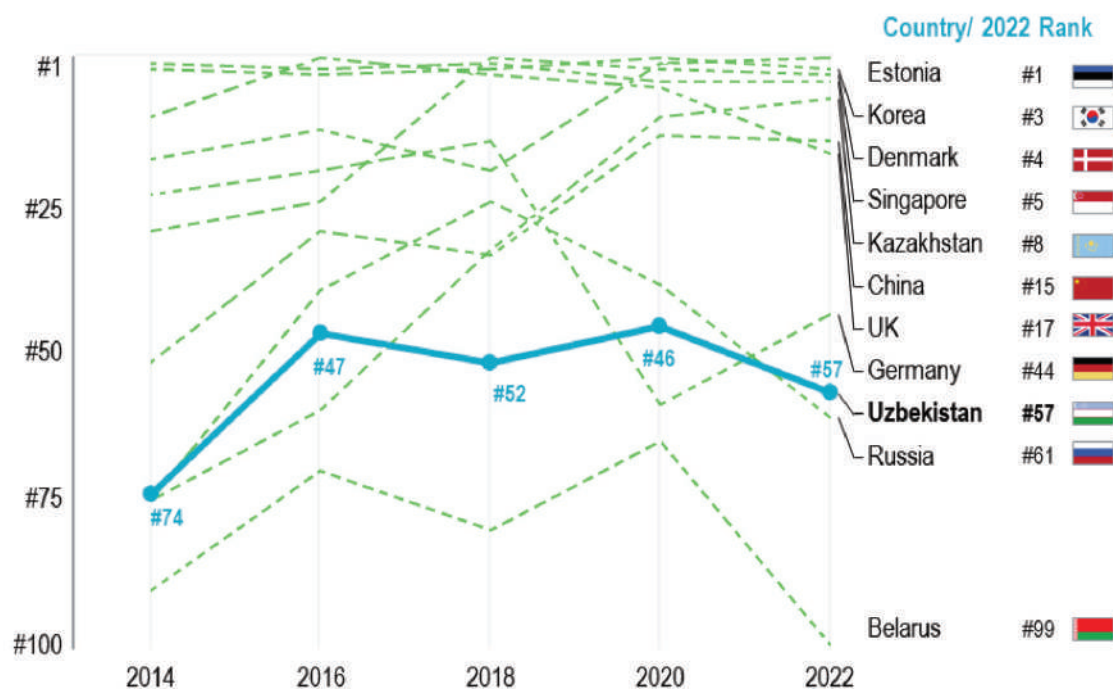**UN Online Services Index [OSI] Rankings, 2014-2020**

Figure 5:   UN Online Services Index Rankings

Overview of United Nations' E-Government Development Index

Overview of the United Nations' E-Government Development Index (EGDI)

Key globally recognized E-Government ranking is **the United Nations' E-Government Development Index (EGDI)**.

The EGDI is based on a comprehensive *Survey* of the online presence of all 193 United Nations Member States, which assesses national websites and how e-government policies and strategies are applied in general and in specific sectors for delivery of essential services. The assessment rates the e-government performance of countries relative to one another as opposed to being an absolute measurement.

The EGDI is a composite measure of three important dimensions of e-government, namely: provision of online services, telecommunication connectivity and human capacity.

Mathematically, the EGDI is a weighted average of three normalized scores on three most important dimensions of e-government, namely: (1) scope and quality of online services (**Online Service Index, OSI**), (2) development status of telecommunication infrastructure (**Telecommunication Infrastructure Index, TII**), and (3) inherent human capital (**Human Capital Index, HCI**)

= 1/3 x Online Service Index (OSI)
(scored based on Online Services Questionnaire of 148 questions)

+ 1/3 x Human Capital Index (HCI)
(accounts for adult literacy rate, primary-tertiary enrolment ratio, expected years and average years of schooling)
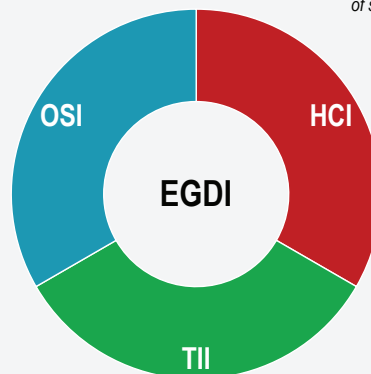
+ 1/3 x Telecommunications Infrastructure Index (TII)
(average of # internet users, mobile subscribers & fixed broadband subscriptions per 100 inhabitants and active mobile-broadband subscription)

Figure 6:   Overview of United Nations' E-Government Development Index

In the overall ranking of the EGDI 2022 index, Uzbekistan ranks 69th out of 193 (Figure 7). The EGDI rating is calculated on the basis of three sub-indices: the Online Service Index (OSI), the Telecommunications Infrastructure Index (TII) and the Human Capital Index (HCI). Occupying 57th place in the OSI sub-index rating, Uzbekistan belongs to the top 30% of the leading countries in terms of development e-Government Services (UN rating - "high OSI".

Along with the current results of the Online Services Index, the TII Telecommunications Infrastructure Index (UN rating - "high TII") also had a significant impact on the overall position in the EGDI ranking, with an improvement in the position by 36 points , from 123rd place in 2020 to 87th place in 2022, and the HCI Human Capital Index (UN rating - "very high HCI") with a 10-point improvement in position, from 90th place in 2020 to 80 rank in 2022 (Figure 8).

UN E-government Development Index [EGDI] rankings, 2022
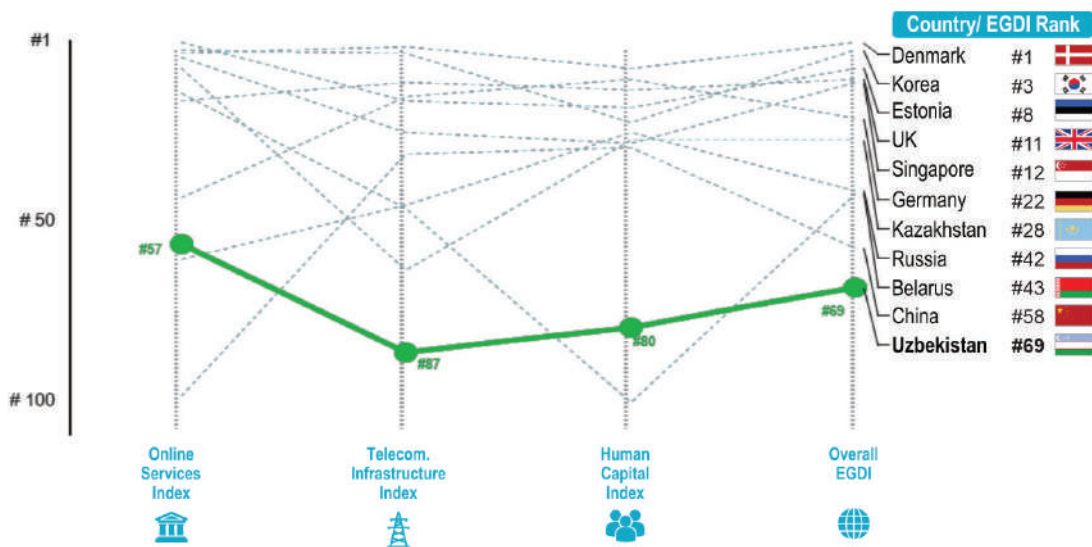
Figure 7:   UN E-government Development Index [EGDI]

Comparison of Uzbekistan with countries with similar OSI score in EGDI ranking, 2022

Country		OSI	TII	HCI	EGDI level	Rank
Uzbekistan		High	High	Very high	High	69
Kazakhstan		Very high	Very high	Very high	Very high	28
Korea		Very high	Very high	Very high	Very high	3
Singapore		Very high	Very high	Very high	Very high	12
Estonia		Very high	Very high	Very high	Very high	8
UK		Very high	Very high	Very high	Very high	11

Figure 8:   Scores of Uzbekistan in EGDI sub-indices compared with similar countries by OSI

Overview of Digital Uzbekistan 2030 strategy

Strategy "Digital Uzbekistan - 2030" was developed by the Ministry of Digital Technologies with the participation of interested ministries departments, representatives of the business community and academia, as well as foreign experts. The strategy was adopted on October 5th, 2020, with the passing of Presidential Decree 6079.

The Digital Uzbekistan 2030 Strategy aims to ensure the rapid digital development of economic sectors, the social sphere and the system of public administration, including the further improvement of mechanisms for the provision of e-government services.

The Strategy sets out the strategic goals, priorities and medium- and long-term goals for the development of the digital economy and e-government in the Republic of Uzbekistan, as well as the UN's Sustainable Development Goals and the development of e-government.

If we do not perform this work [of national digitalization] in the next 2-3 years, every year of delay will cost our country ten years of progress."

President of Uzbekistan
Shavkat Mirziyoyev
May 2020

Figure 9:   Overview of Digital Uzbekistan 2030 strategy

The Digital Uzbekistan 2030 strategy aims to support the further development of e-government and sets the goal of bringing the UN EGDI score to 0.86 by 2030 and helping Uzbekistan enter the list of countries with a very high e-government development index. This goal is achievable, but its achievement will require targeted measures for the development of infrastructure, as well as continuous improvement of the e-services package and the development of human capital.

The strategy outlines a number of key performance indicators, which will support the development of e-government, including infrastructure, e-government services and IT industry target indicators (Figure 10, Figure 11).

As for the infrastructure, the strategy sets targets for the length of national fiber optic network, which will in turn promote internet availability and accessibility, driving it to reach 100% by 2030. The strategy sees importance of e-government service quality, wider adoption of self-service access and mobile-first approach, as well as the role of e-government in transactional services. In general, the achievement of strategy goals will be facilitated by the growing IT industry, supported by the government through education programs and startup acceleration programs.

Key performance indicators of Digital Uzbekistan 2030 strategy relevant for the E-Government development

Key performance indicators of Digital Uzbekistan 2030 strategy

Infrastructure indicators

	2020	2022	2025	2030
The length of the optical fiber communication network built throughout the country [1 000 km]	41	70	120	250
High-speed Internet coverage of the territory of the republic with the global information network [%]	67	74	85	100
The level of high-speed Internet access of social facilities to the global information network [%]	45	100	100	100
The level of broadband Internet access in households [%]	67	74	85	100
Broadband coverage of populated areas with mobile networks [%]	78	100	100	100

E-Government indicators

	2020	2022	2025	2030
E-Government Development Index	0.66	0.70	0.75	0.86
Share of e-government services provided through the EPIGU in relation to CGU [%]	34	60	70	90
Share of e-government services provided through the mobile application compared to EPIGU [%]	5	30	42	60
Share of transactional services provided through EPIGU [%]	25	45	60	75

IT Industry

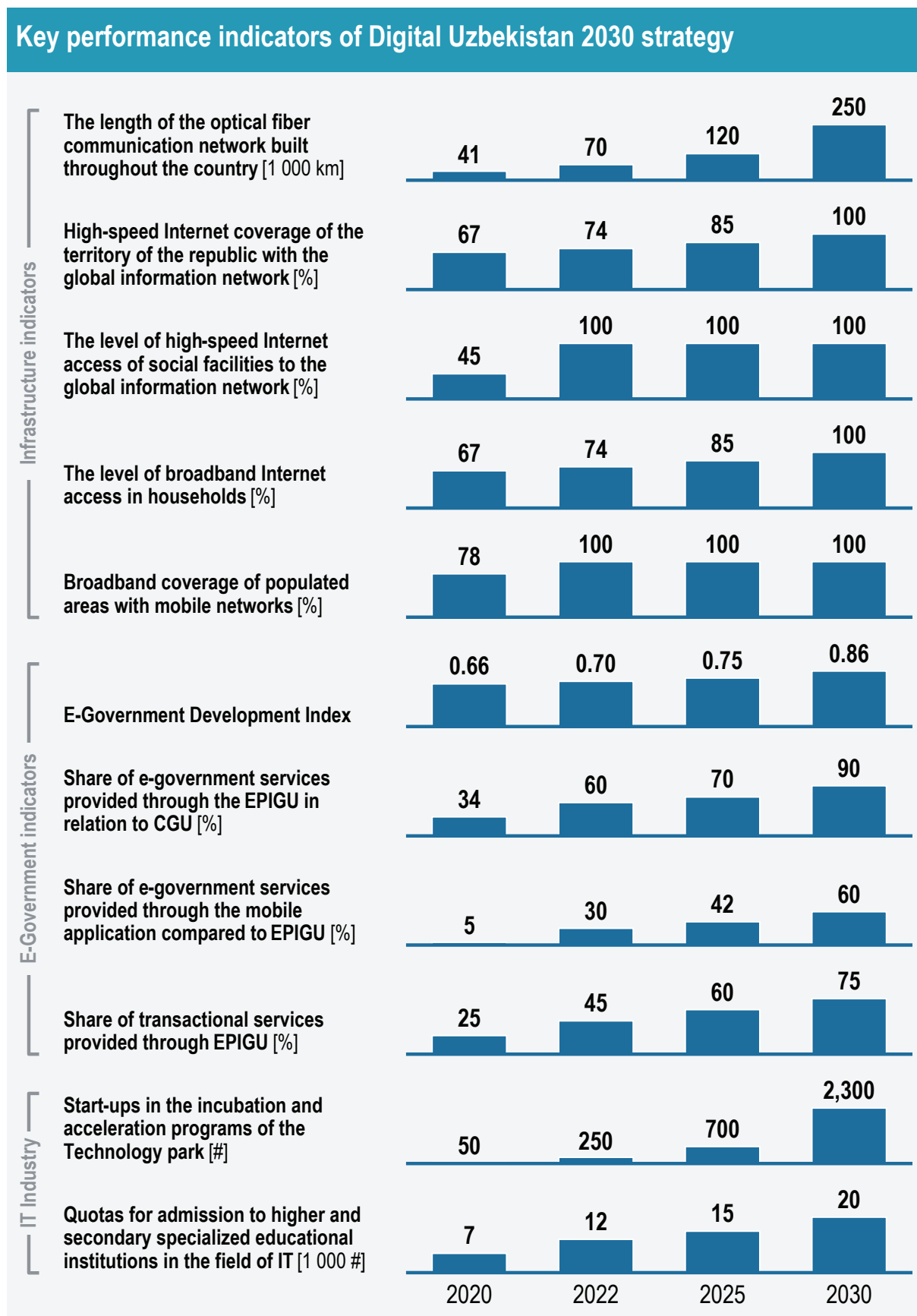|	2020	2022	2025	2030
Start-ups in the incubation and acceleration programs of the Technology park [#]	50	250	700	2,300
Quotas for admission to higher and secondary specialized educational institutions in the field of IT [1 000 #]	7	12	15	20

Figure 10: Key performance indicators of Digital Uzbekistan 2030 strategy relevant for the E- Government development[2]

Uzbekistan ICT and E-Government Cloud Business

Overview of IT industry development in Uzbekistan

The rapid adoption of ICT demanded quick development of the Uzbekistan IT industry. In order to create favorable conditions for the formation and active development of high-tech industries based on the use of ICT President's Decree #5099 was passed June 30th, 2017.

On July 24, 2019, the opening ceremony of the first IT Park in the Republic of Uzbekistan was held. IT Park was created at the initiative of the President of the Republic of Uzbekistan to improve the startup ecosystem. Over the next two years, IT Park has contributed to education, to the development of a startup ecosystem, as well as to the growth of domestic IT companies, helping in the effective implementation of their activities on the territory of the Republic of Uzbekistan and beyond.

Each branch of the IT park is equipped with uninterrupted power supply, high-speed Internet, air conditioning, fire-fighting, sanitary and epidemiological equipment and security. All conditions for comfortable and productive work are created. Since 2019, 11 branches of the IT park have been opened in Gulistan, Margilan, Andijan, Samarkand, Jizzakh, Navoi, Nukus, Karshi, Urgench, Tashkent and Bukhara. In total, it is planned to open 14 branches of the IT park in the country (one in each region) to provide high-quality infrastructure for IT specialists.

In addition to the IT park, more than 80 specialized IT schools have been opened in the country at the initiative of the President of Uzbekistan. By the end of 2024, it is planned to open more than 205 IT schools across the country - one school in each district, respectively.

A large-scale project One Million Uzbek Coders has also been launched, in which 2,503,060 users have registered in 3 years. One Million Uzbek Coders is a free educational platform created by the Technopark in collaboration with the Dubai Future Foundation, which allows you to master the basic levels of data analytics, frontend and backend development, and mobile application development for free, based on video tutorials from international experts.

In addition, in order to increase the student's entrepreneurial spirit, on the initiative of IT Park, incubation centers were created in 16 universities of the country, where comprehensive programs are being implemented to work with students and develop their projects.

IT Park resident facts

1,122 Residents of IT Park

491 Residents founded in 2022

173 Residents with foreign capital

Key industries

FinTech   MedTech   E-Commerce   EdTech   AgroTech

Resident benefits

0% VAT, Corporate, land value, social security tax

0 Customs duties

7,5% Personal income tax
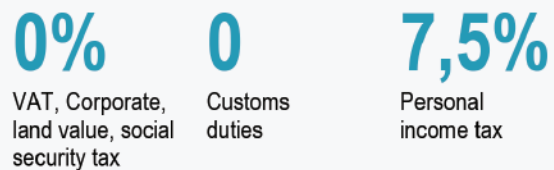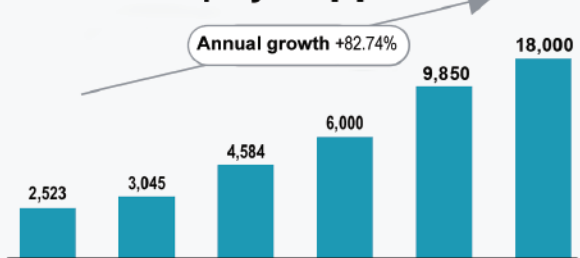
Figure 11: Overview of IT industry development in Uzbekistan[3,4,5]

Besides the setting of KPIs a number of measures is implemented to facilitate the realization of the strategy most notable of which include the establishment of E-Government Projects Management Center, introduction 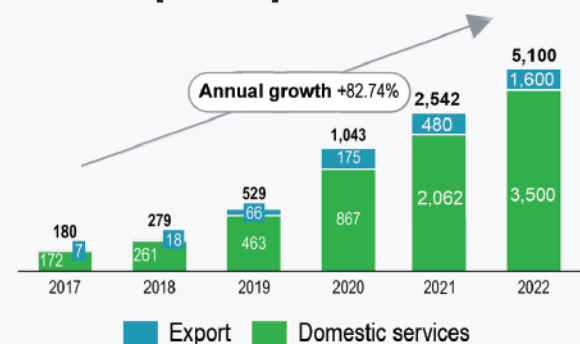of CDO position in all the government's ministries, introduction of ranking system for all government entities based on their digital maturity and launch of digital literacy and upskilling programs throughout the country, including the launch of "One Million Uzbek Coders" program. All these measures illustrate the willingness of Uzbekistan government to succeed in digitization of the country and the high regard for the strategy in current agenda.

In the interests of the development of e-government services, the main goal was to increase self-service using these services to the level of 60% in 2022 and 90% by 2030. As of the end of December 2022, the share of services provided through the Single Portal of Interactive Public Services (SPIPS) was 66%, and the share of services provided through Center of Public Services (CPSs) was 34% (Figure 12).

Proportion of e-government services offered through SPIPS portal and physical CPS locations
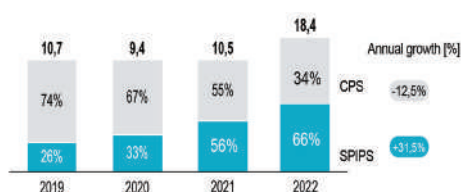

Figure 12: Number of requests for e-government services by channel, 2019 - 2022 [mln requests, %][6]

To support further growth and bring the share of services provided through the SPIPS to 90%, the government of Uzbekistan needs to expand the current range of services. At the end of 2022, 371 electronic government services were available on the SPIPS portal, or 48% of the total number of government services (774). The number of services available has grown significantly since 2021. The average increase was +22%. (Figure 13).

Number of E-government services available through SPIPS portal
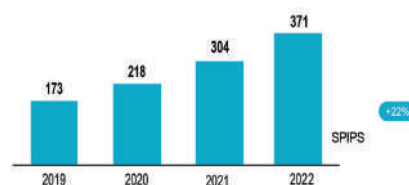
Figure 13: E-Government service available through SPIPS portal, 2019 – 2022 [#][7]

By 2030, access to 60% of electronic government services will be through a mobile application, which will require expanding the package of services in this service channel. As of the end of December 2022, 157 electronic government services were available in the mobile application, or 42.3% of the 371 services provided through the SPIPS portal.

The emphasis on mobile services is the right vector for Uzbekistan, given the global trend in the development of mobile Internet and the readiness of ICT infrastructure in the country. As of 2022, mobile broadband Internet is available in 97% of the country's population centers, and in 2023 the coverage is planned to be increased to 100%. At the same time, access to mobile data transmission networks has a wider coverage compared to fixed broadband access (Figure 14).

Uzbekistan broadband subscriptions per 100 people

Figure 14: Uzbekistan broadband subscriptions[8]

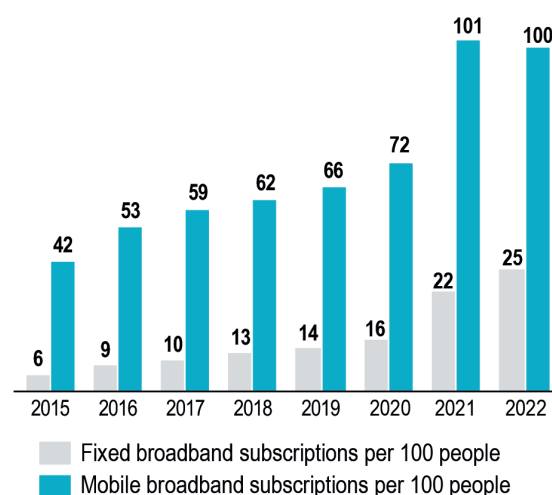Despite the rapid growth in the number of available services and a thoughtful approach to the development of SPIPS and mobile applications, there is still huge potential for promoting e-government services. As of the end of 2022, 5.4 million people were registered in the unified identification system ONE ID of Uzbekistan, while there were 4 million active users of electronic public services, or 11.1% of the country's population (36 million people) (Figure 15).

Number of users of e-government services in Uzbekistan
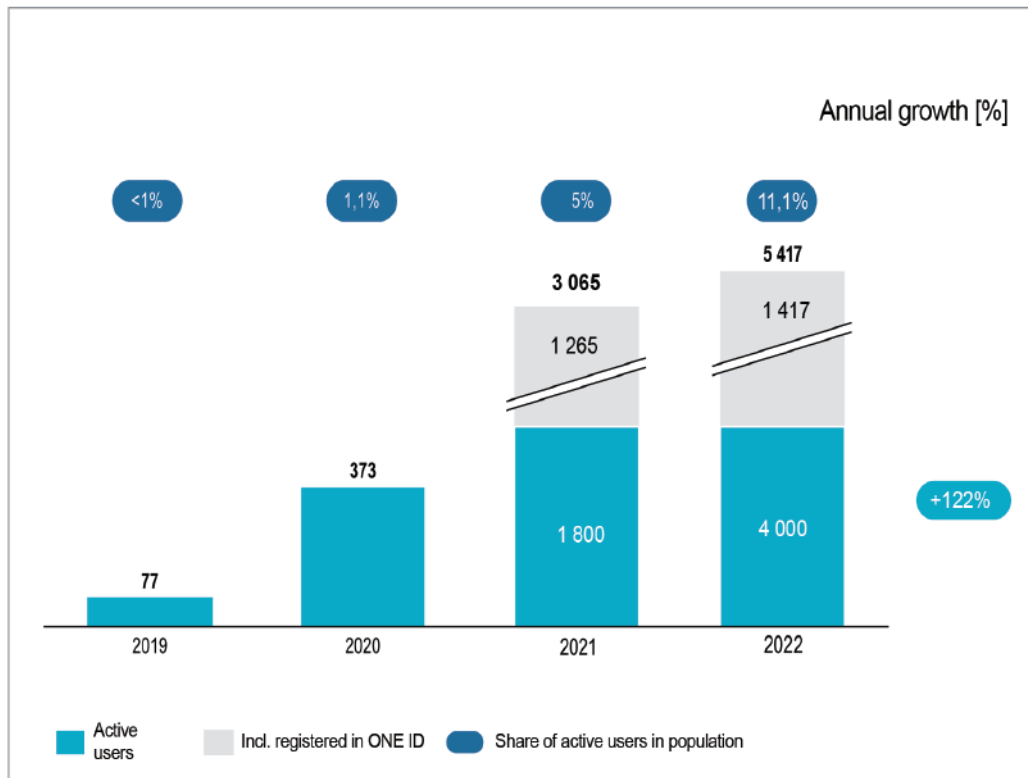
Figure 15: Number of users of e-government services in Uzbekistan [000 people][9]

Key takeaways

The development of E-Government of Uzbekistan is a vital part of Digital Uzbekistan 2030 strategy and is recognized as such. Under the leadership of the President Mirziyoyev, the e-Government of Uzbekistan has been rapidly developing with a constant expansion of available services. As of 2020 the Uzbekistan was among Top 20% of countries worldwide in terms of online services of e-government according to United Nations' E-Government Development Index.

To facilitate further development Uzbekistan would need to (1) increase adoption of digital e-government services and (2) further develop its supporting ICT infrastructure. Both of those areas for development are outlined in the Digital Uzbekistan 2030 strategy.

2.2 Digital and data services portfolio and ministry focus

The Uzbekistan has a diverse e-government service portfolio with services of different complexity for both individuals and enterprises to address wide-variety of life-events. As previously mentioned, currently 371 e-government services are available, and the number of available services is constantly growing.

The goal of Uzbekistan's government is to provide well rounded e-government service experience for individuals and enterprises. Current e-government service portfolio offers 17 categories of services for both types of users (Figure 16).

Key categories of e-government services available in Uzbekistan

Justice	Utilities	Finance and banking
Transport	Education	Information and communication
Family and children	Licensing	Certificates
Youth	Real estate	Taxes
Citizenship	Customs	Culture and sports
Healthcare and social security	Ecology and geology	

Figure 16: Key categories of e-government services available in Uzbekistan[10]

Uzbekistan's e-government service portfolio includes different types of services by complexity. Informational, interactive, transactional, and transformational services are available.

Diversity of available service types signals high level of service development, as confirmed by Uzbekistan's high OSI ranking position.

Types of e-government services by complexity

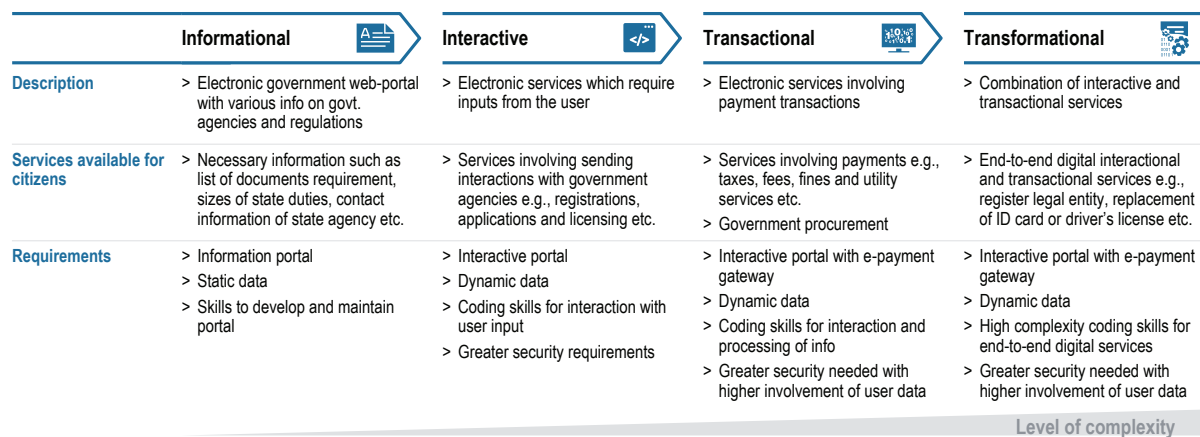|	Informational	Interactive	Transactional	Transformational
Description	> Electronic government web-portal with various info on govt. agencies and regulations	> Electronic services which require inputs from the user	> Electronic services involving payment transactions	> Combination of interactive and transactional services
Services available for citizens	> Necessary information such as list of documents requirement, sizes of state duties, contact information of state agency etc.	> Services involving sending interactions with government agencies e.g., registrations, applications and licensing etc.	> Services involving payments e.g., taxes, fees, fines and utility services etc. > Government procurement	> End-to-end digital interactional and transactional services e.g., register legal entity, replacement of ID card or driver's license etc.
Requirements	> Information portal > Static data > Skills to develop and maintain portal	> Interactive portal > Dynamic data > Coding skills for interaction with user input > Greater security requirements	> Interactive portal with e-payment gateway > Dynamic data > Coding skills for interaction and processing of info > Greater security needed with higher involvement of user data	> Interactive portal with e-payment gateway > Dynamic data > High complexity coding skills for end-to-end digital services > Greater security needed with higher involvement of user data

Level of complexity

Figure 17: Types of e-government services by complexity

Due to the nature of services and the structure of the economy of Uzbekistan, services for individuals are used more often. In 2022, 18.4 million applications for services were processed: 98% of requests were received from individuals and 2% from organizations. In terms of the user base, the demand for e-government services in Uzbekistan is evenly distributed across different age groups (Figure 18). About 51% of users are young adults aged 18 to 34, while other age groups are evenly represented in the second group.

To support the adoption of digital services, especially by the older population, the Uzbekistan government offers multitude of channels for e-government services, including assisted service offering, through Center of Public Services (CPS) and postal office (more information in Chapter 2.3).

Currently, the main demand is concentrated in the segment for individuals. In 2022, the top 10 services for individuals accounted for 57% of requests, or 10.5 out of 18.4 million requests, and the top 10 services for organizations accounted for 4% of all requests (Figure 19).

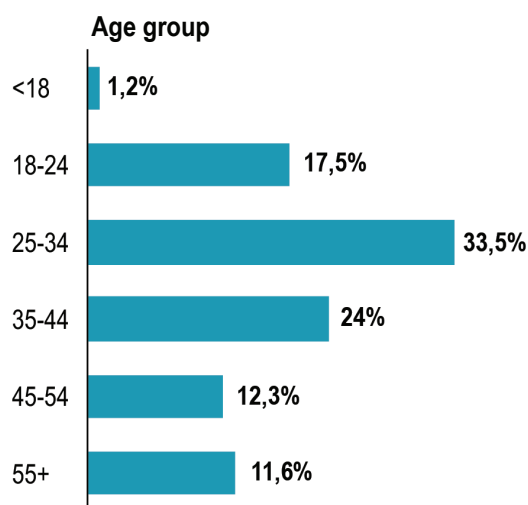## Uzbekistan e-government services users

Age group

Age group	%
<18	1,2%
18-24	17,5%
25-34	33,5%
35-44	24%
45-54	12,3%
55+	11,6%

Figure 18: Distribution of e-government users by age group, 2022 [%][11]

Top 10 e-government services for individuals and enterprises

Individuals

Service	Requests
Familiarization with the credentials of legal entities and individual entrepreneurs	2 571 290
Information on the place of permanent residence	1 806 285
Submission of an application for the placement of a child in a preschool educational institution	1 764 900
Submission of data on foreign trade contracts to the Unified Electronic Information System of Foreign Trade Operations	775 370
Obtaining information on imported goods on vehicles into the territory of the Republic of Uzbekistan	696 287
Registration of a cadastral passport	688 742
Information on accrued wages	594 421
Checking the queue for buying a car through UZAUTO MOTORS JSC	578 989
Obtaining information on imported goods by rail into the territory of the Republic of Uzbekistan	548 628
Applying for benefits	527 972

Enterprises

Service	Requests
Submission of data on foreign trade contracts to the Unified Electronic Information System of Foreign Trade Operations	135 142
Registration of a cadastral passport	101 549
Familiarization with the credentials of legal entities and individual entrepreneurs	92 185
Obtaining information on imported goods by rail into the territory of the Republic of Uzbekistan	87 154
License for international transportation of passengers and goods by road	83 830
Submission of an application for state registration of rights to real estate	68 679
Submission of an application for approval of design estimates	52 343
Notification on securing the payment of customs payments for the movement of foreign goods	47 651
Obtaining permission to install tinting (dimming) on the glass of passenger vehicles	36 192
Obtaining information on imported goods on vehicles into the territory of the Republic of Uzbekistan	35 337

Economy and business | References | Family and Children | Customs | Real estate | Taxes | Transport | Health and social protection
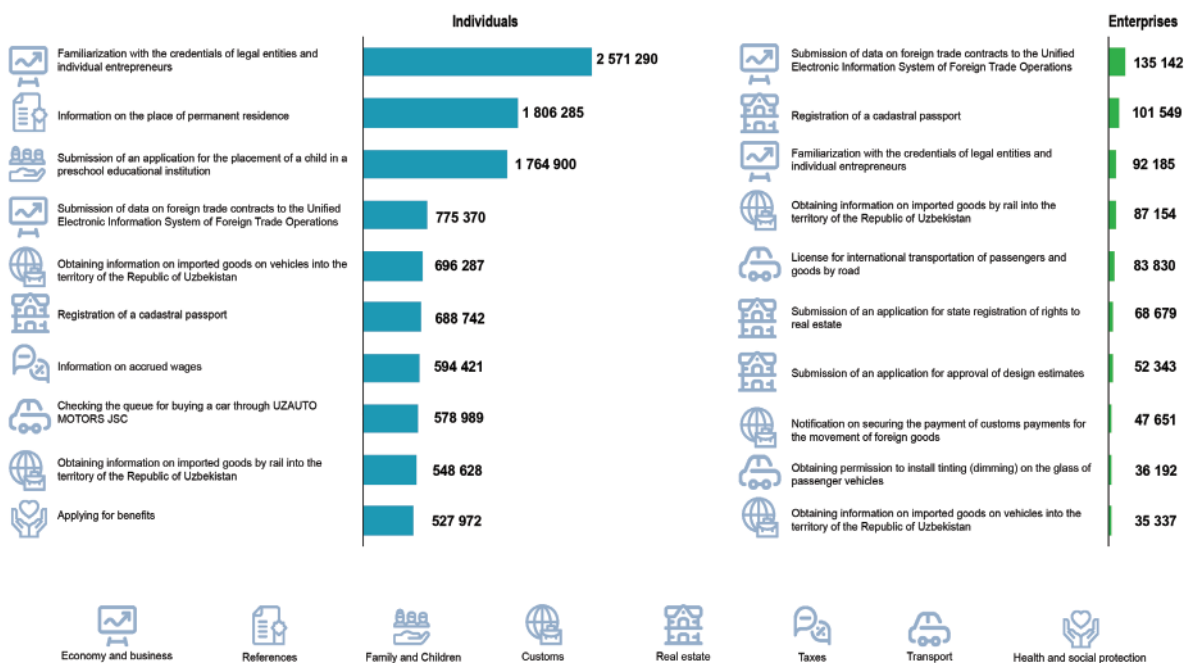
Figure 19: Top 10 services by user-type and category, 2022 [000 requests]

The same concentration of services is in line with historical usage statistics. Of the 60 million service requests from 2017 to date, 63% of the requests were for services in the 10 most frequently used categories (Figure 20). At the same time, 361 services that are not included in the 100 most popular services accounted for less than 1% of calls.
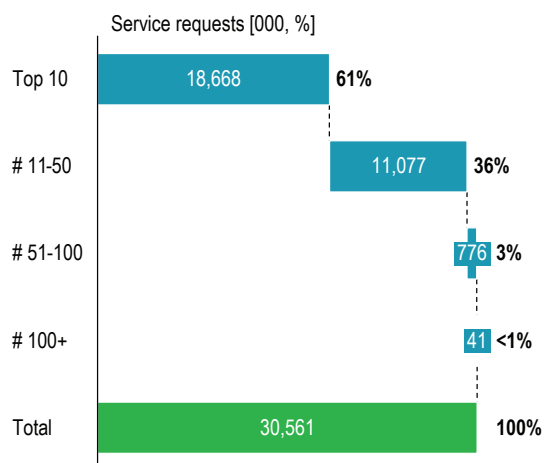
Distribution of service requests by frequency groups

Service requests [000, %]

Figure 20: Historical distributions of service requests by the frequency of use, 2017 – 2022 [000 request, %]

At first glance, the composition of the portfolio includes the most demanded services, but two main facts should be noted: (1) the current active user base is 11.1% of the total population; (2) 48%, or less than half, of all public services are available. Therefore, it is impossible to draw a conclusion about the degree of balance of the current portfolio of services.

Uzbekistan's ambition is to ensure that the service portfolio provides all vital e-government services with 90% of them accessed online through SPIPS and 60% of online services accessed through mobile devices. That requires expanding the available service portfolio with relevant services for the entire population.

Currently, the service portfolio expansion is approved on a yearly basis with the publication of Cabinet of Ministers decree. Long-term pipeline for service digitization is not set and no particular ministry focus is proclaimed. The operational model for new e-government services introduction is not formalized but works as follows (Figure 21)[12] Cabinet of Ministers, Ministry of Digital Technologies and other ministries, as well as the E-Government Projects Management Center formulate initiatives on new services, which will then be considered in the Cabinet of Ministers meeting.

To formulate the initiatives, the E-Government Projects Management Center may employ a population survey to gauge demand for e-government services. A preliminary list of services may be reviewed by the UZINFOCOM to provide suggestions. The UZINFOCOM is the partly-state owned IT-integrator solely responsible for technical implementation of services.

After the list of services for digitization is approved, the E-Government Projects Management Center assumes responsibility to manage implementation, conduct business process reengineering for government services identified for digitization and prepare technical scope of work for UZINFOCOM. In this task, the E-Government Projects Management Center is supported by CDOs of the ministries and other government entities, whose services undergo digitization. Based on input from the E-Government Projects Management Center and ministries, UZINFOCOM conducts technical implementation and carries out the support to the service after it is published. Private contractors are not involved in the digital service implementation process, which may hinder service rollout speed.

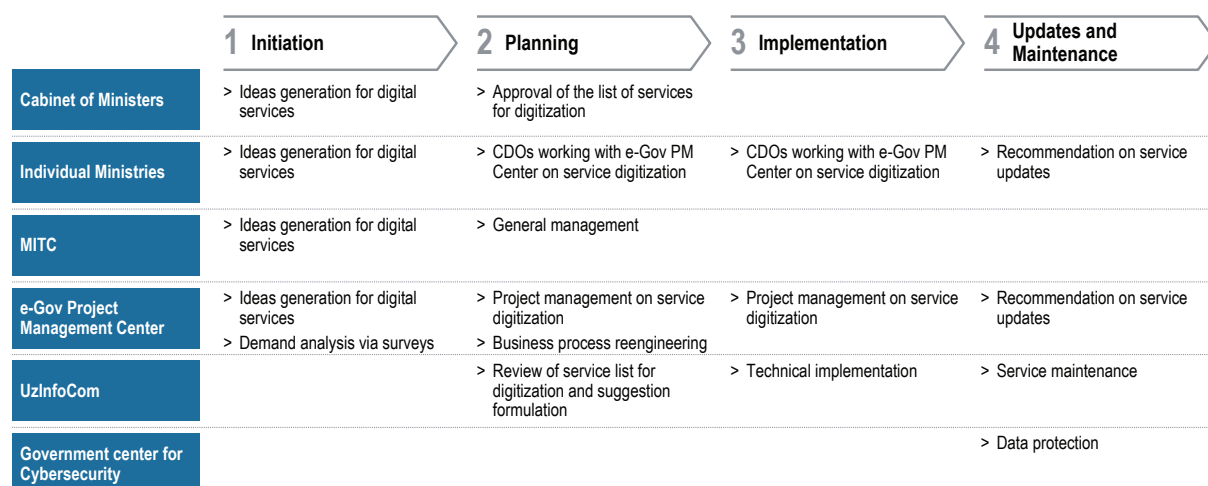## E-Government digital service implementation value chain

	1 Initiation	**2** Planning	**3** Implementation	**4** Updates and Maintenance
Cabinet of Ministers	> Ideas generation for digital services	> Approval of the list of services for digitization		
Individual Ministries	> Ideas generation for digital services	> CDOs working with e-Gov PM Center on service digitization	> CDOs working with e-Gov PM Center on service digitization	> Recommendation on service updates
MITC	> Ideas generation for digital services	> General management		
e-Gov Project Management Center	> Ideas generation for digital services > Demand analysis via surveys	> Project management on service digitization > Business process reengineering	> Project management on service digitization	> Recommendation on service updates
UzInfoCom		> Review of service list for digitization and suggestion formulation	> Technical implementation	> Service maintenance
Government center for Cybersecurity				> Data protection

Figure 21: E-Government digital service implementation value chain

Based on the aforementioned process, there are potential areas to improve starting with formalization of procedure for new digital services rollout. The rollout of services may be scheduled at least two-years in advance with each review of the Digital Uzbekistan 2030 strategy. Additionally, formalization of procedure may lead to standardization of government service demand analysis, which would help to make informed decisions. The pipeline of services subject to digitization may also be built based on the ranking system of government entities established with the adoption of Cabinet of Ministers decree 373 from June 15, 2021 (more on Target vision in Chapter 4).

Overview of the Uzbekistan government entities Ranking system of Digital Transformation

Overview of the Ranking system of Digital Transformation

Cabinet of Ministers decree 373 passed on June 15th 2021, adopts a **Ranking system of Digital Transformation** of government bodies, economic management bodies, municipalities and regional authorities.

Rating score is the **determination of the position of organizations and regions in the list by assessing the state of digital development** using rating indicators and indicators.

The level of efficiency of ICT implementation and development is assessed every quarter in a rating **from 0 to 100 points** depending on the number of identified indicators and is divided into **red, yellow and green** categories.

Two separate ranking systems are available for government bodies and economic management bodies. Criteria include (1) transparency and electronic participation, (2) e-government services, (3) information security, (4) informational systems, (5) organization. For e-government services government bodies may get up-to 20 points, economic management bodies – up-to 9 points.

Ranking results of 107 government and economic management bodies of Uzbekistan, 2022

Green 71 to 100 pts.

Yellow 55 to 70 pts.

Red less than 55 pts.

Government bodies — 59
- 16 (27%)
- 9 (15%)
- 34 (58%)

Economic management bodies — 48
- 5 (10%)
- 12 (24%)
- 31 (63%)

Figure 22: Overview of the Uzbekistan government entities Ranking system of Digital Transformation

2.3 Segments and interfaces/ channels prioritization

Uzbekistan e-government service portfolio is offered through 6 channels: (1) SPIPS portal, (2) MyGov mobile app, (3) CPSs – Center of Public Services, (4) government bodies websites, (5) more than 800 postal offices, (6) consulates.

Channel offering is directly linked to the Digital Uzbekistan 2030 strategy and addresses current gaps in e-government services accessibility and adoption, while maintaining and developing perspective growth areas.

As observed in international best practices Uzbekistan government develops a unified window for the e-government services in the form of SPIPS portal, while maintaining legacy service access through individual government bodies' websites.

The SPIPS portal is supplemented by physical service centers to smoothen the transition for portions of the population who are not ready for online-only access to e-government services. The strategy sets the goal to achieve 90% of services carried out online through SPIPS as opposed to CPSs by 2030.

Keeping in mind higher accessibility of mobile internet connection in the country, the strategy sees a mobile-first approach, where 60% of service requests would be filed on mobile devices by 2030. To achieve that goal the MyGov app is being constantly promoted and updated with vital government services.

To promote accessibility of e-government services in rural areas with under/un-developed ICT infrastructure and for citizens living abroad, the government offers access through postal offices and consulates respectively.

Overall, channels are structured in two dimensions: type (digital/physical), and priority (primary/supplementary) (Figure 23).

Uzbekistan e-government channels
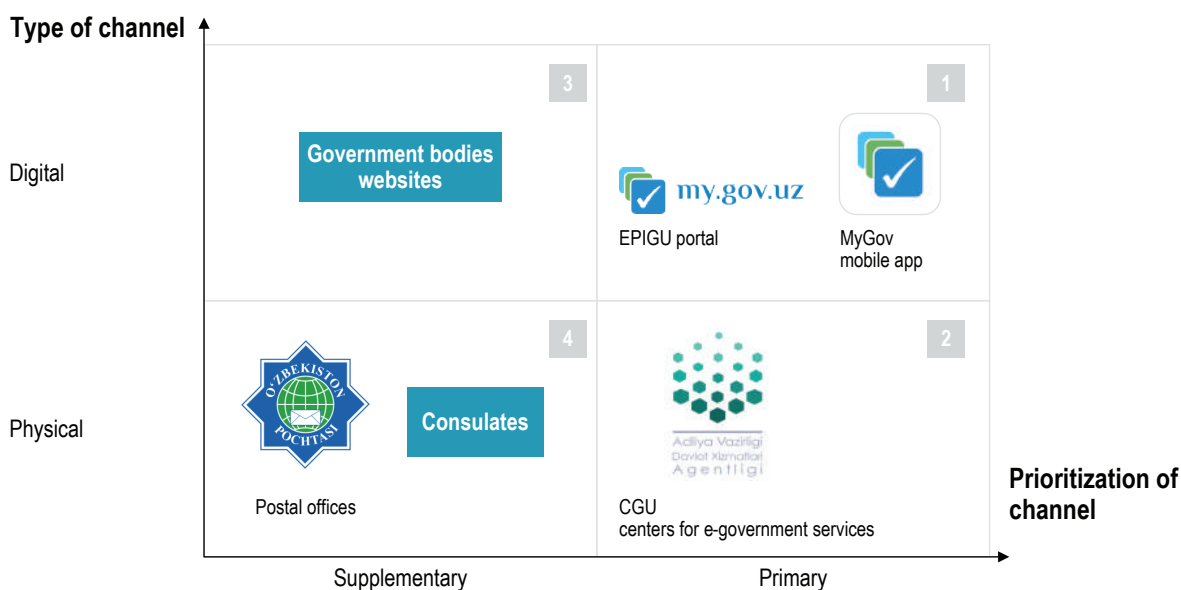
Figure 23: Uzbekistan e-government channels matrix

Primary digital channels include SPIPS with 371 available services and MyGov mobile app with 157 available services. Both SPIPS and MyGov offer self-service online digital government services for individual and enterprise users.

The structure of SPIPS portal allows users to access services in different ways. Users may either choose the most popular services for individuals or enterprises from a quick access menu or navigate to service by category (Figure 16), life event (e.g. birth of a child, reaching retirement age, etc.) or an organization, providing the service (e.g. Ministry of Economy and Finance, State tax committee, etc.).

Some of the services are also available through supplementary digital channels – websites of government bodies. Notably, no services available through individual websites are unique to these websites. Service offering on websites of individual government bodies are linked to the services on SPIPS portal through the unified portal's APIs. Supplementary online channel acts as an extension of SPIPS to provide more convenience to users already accessing or more familiar with the government body website.

Primary physical channels are CPSs, which provide a single window of assisted access to government services for individuals and enterprises in physical locations. CPSs are present in 207 locations throughout the country. Users of CPS are offered access to 162 government services with assistance from 3,900 CPS employees. In addition, CPSs offer access to semi-digitized services, where the request is started online, and the result is received as a physical document. Being a primary channel, CPSs compete with SPIPS service offerings. Currently 34% of service requests are handled by CPSs (Figure 12, p. 17). The ambition is to bring down the share of CPSs to 10% by 2030.

For citizens living in remote areas and abroad, government services are also offered through supplementary physical channels – over 800 postal offices throughout the country and consulates on foreign soil. Postal offices are mainly aimed for regions with under/un-developed ICT infrastructures or regions with aging population. Postal offices offer around 62 vital government services with assistance from postage workers. In the future, self-service counters are planned to be introduced in those offices.

Uzbekistan postal service e-government access point

Figure 24: Uzbekistan postal service e-government access poin[13]

2.4 Infrastructure and prerequisites

The level of developed ICT infrastructure is a key determinant for how well e-government will function according to vision and to what extent the population will adopt it. The level of infrastructure development is especially important for countries such as Uzbekistan, which is relatively landlocked and has diverse geographical terrain, with populations in remote areas. Uzbekistan has noticeably progressed in the development for both fixed and mobile broadband infrastructures, nevertheless, there is still much to be developed, chiefly in government integrated data center construction.

As previously mentioned, the development of ICT infrastructure in Uzbekistan was one of the strategic pillars of the Comprehensive Program for the Development of the National Information and Communication Systems 2013-2020.

In terms of ICT infrastructure, there has been a visible increase in network coverage and the number of data center facilities. The proportion of the population covered by at least a 3G network has increased from 74% in 2019 to 97% in 2022 (Figure 25), and on related terms, the number of broadband subscriptions has also increased, mainly driven by mobile broadband. From 2015 to 2022, the number of fixed broadband subscriptions increased from 6 per 100 people to 25 per 100 people, while mobile broadband subscriptions increased from 42 to 99.8 per 100 people over the same period.

Uzbekistan mobile internet coverage
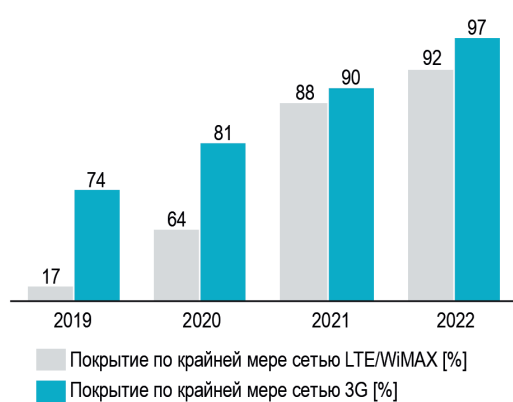
Figure 25: Uzbekistan mobile internet coverage[14]

Uzbekistan broadband subscriptions
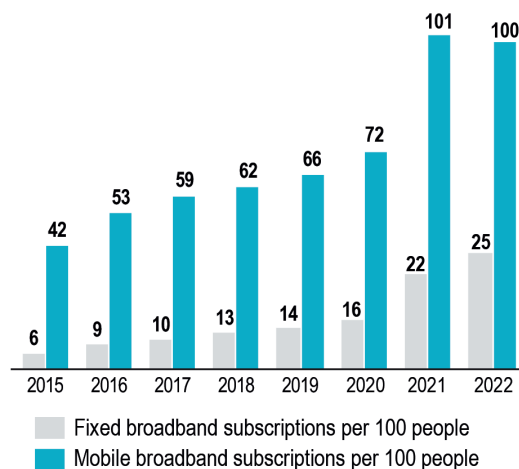
Figure 26: Figure 26. Uzbekistan broadband subscriptions per 100 people[15]

Overall Uzbekistan's Internet penetration remains moderate at 86% today due to constraints on telecommunications availability and affordability. This is partially due to total dependence on international terrestrial trunk channels for data transmission – a disadvantage of being landlocked with limited access to the main underwater lines – and also partially due to the market structure of the telecommunications industry in Uzbekistan. In terms of internet availability, the proportion of the population in Uzbekistan covered by at least a 3G mobile network is lower than in any other region of the world with the exception of Africa (Figure 27).

In terms of deployment the next-generation Internet protocol, IPv6 (Internet Protocol version 6), Uzbekistan has not started the transition yet. IP address is a key resource in Internet. According to APNIC statistics in 2023, Uzbekistan only has 0.29% of IPv6 adoption rate, compared to 33% worldwide. According to the Roland Berger's 2022 Global IPv6 Development Report, Uzbekistan is ranked in 90th among the 92 countries studied. On the other hand, the IPv6 address resource is extremely limited in the country: only 8.2 addresses per 1,000 people. This will hinder the sustainability development of Internet of Uzbekistan.

Population covered by at least a 3G mobile network [%]
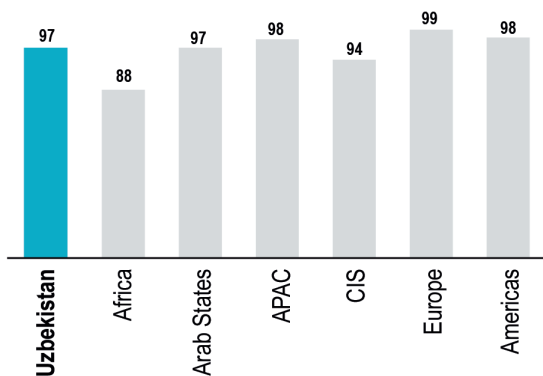
Figure 27: Mobile internet coverage

Affordability is also affected by inadequate competition in the market, which has driven up prices while limiting investment. Ministry of Digital Technologies currently has a monopoly over the country's international gateway, which it operates through Uztelecom, resulting in prices for IP transit in Uzbekistan being among the most expensive in the world and the country's bandwidth critically low on a per capita basis. Currently, Uzbekistan has only about 170,000 km of fiber optic communication lines, which is not enough for a country of this size. The Digital Uzbekistan 2030 strategy aims to address these challenges and improve length of fiber optic infrastructure and internet coverage for both fixed and mobile.

In terms of data center infrastructure, the unified state standard for data centers was introduced in 2014, and a number of commercial data centers have been built. Today, commercial data center capacity in Uzbekistan is estimated at 80–100 racks[16]. However, Uzbekistan's largest data center, run by Uztelecom, is still about 100 times smaller than the largest data center in Russia. This is still significantly smaller in capacity compared to international hyper-data centers.

In 2022, Uzbekistan introduced a state integrated data processing center. Currently, data of government bodies is managed in a hybrid model, where some entities have their own capacities, while others procure data center services from two major providers of data center services, namely the state-owned Uztelecom and public-private UZINFOCOM. Government bodies may also procure services from fully private players, but historically have

not done so. The rationale behind inhouse data management for some government bodies is the sensitive data contents. To ensure that all government data is protected, the Government Center for Cybersecurity was established in 2020. Other government bodies may use their own infrastructure due to availability of spare capacities and costs of data migration to integrated government data center.

To ensure the data enablement for e-government services operation, the interdepartmental integration platform (IIP) was established in 2016. IIP serves for interdepartmental data exchange and provides access to government bodies to central database. Over a 100 government bodies have access to IIP and 124 web-services are available from 110 government information systems. The introduction of IIP allowed the switch to electronic document management for government bodies in the beginning of 2021.

2.5   Associated data architecture and prerequisites

Uzbekistan has come a long way in terms of government data governance from a divided data sharing in the past to a modern centralized integrated e-government architecture. While many government bodies have made significant progress in building and maintaining information systems to support e-government, there are still some laggards. To drive the e-government forward, Uzbekistan needs to harmonize its information systems development and promote integration to the central government platform, which will in turn improve data governance and data sharing.

Historically, similar to other countries, Uzbekistan had a divided data governance structure, where any data sharing was conducted on an informal basis and bilaterally between various departments.

Limitations to the past mode of sharing were that (i) government departments were not aware of the existence of information repositories in other departments which may have useful potential to their department, (ii) data sharing was done on an ad-hoc basis and information was thereby not shared in a timely manner, and (iii) there were no safeguards on the reliability of data being shared between agencies.

Legacy mode of data sharing between government departments
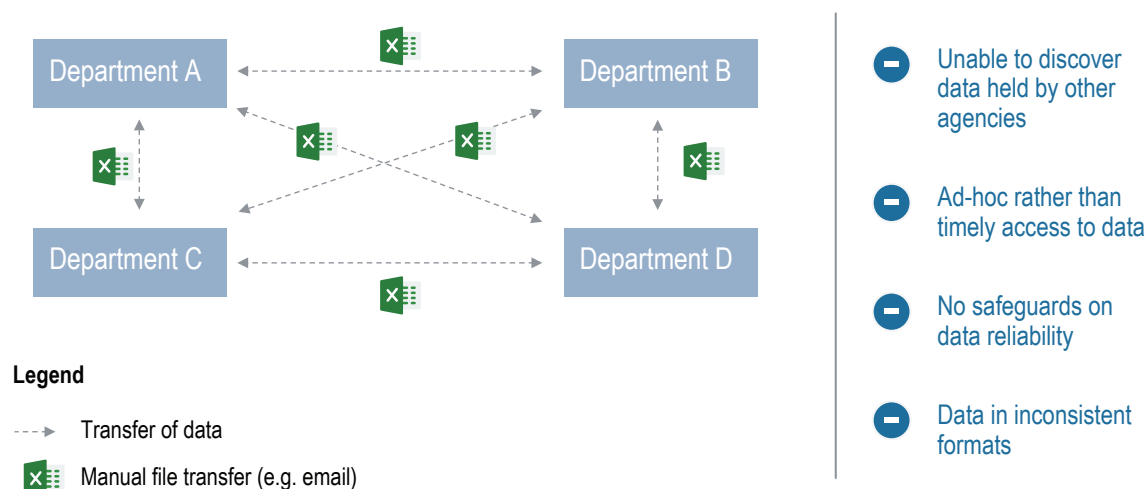
Figure 28:   Legacy mode of data sharing between government departments (prior to 2016)

It was clear, that the legacy system did not work, and to enable the adoption of e-government, the software and databases of various departments must be interoperable. This means that data shared by one government agency is by default in a format that all other government agencies can also use. With the adoption of E-Government law #395 from December 9th, 2015, Uzbekistan has begun building centralized e-government architecture.

Uzbekistan E-government architecture consist of (Figure 29): (1) central databases, (2) interdepartmental integration platform (IIP), (3) information systems and information resources of state bodies and their complexes, (4) official websites of government bodies and the SPIPS portal, (5) data center and interdepartmental data transmission network.

The central databases of e-government are state information resources that represent unified centralized sources of information, which summarize and store basic information of state bodies for the provision of state services and interdepartmental electronic interaction.

The IIP ensures the interaction of government bodies to implement their functions and tasks in the provision of electronic government services.

Information systems and information resources of state bodies in e-government ensure the collection, storage, search, processing, and use of information within the powers of these bodies.

Electronic government services are provided to applicants through the official websites of

government agencies and the SPIPS Portal, which is a single point of access to interactive government services provided by government agencies.

The e-government data center provides storage and integration of departmental and interdepartmental information systems and information resources of state bodies that provide e-government services, central databases of e-government.

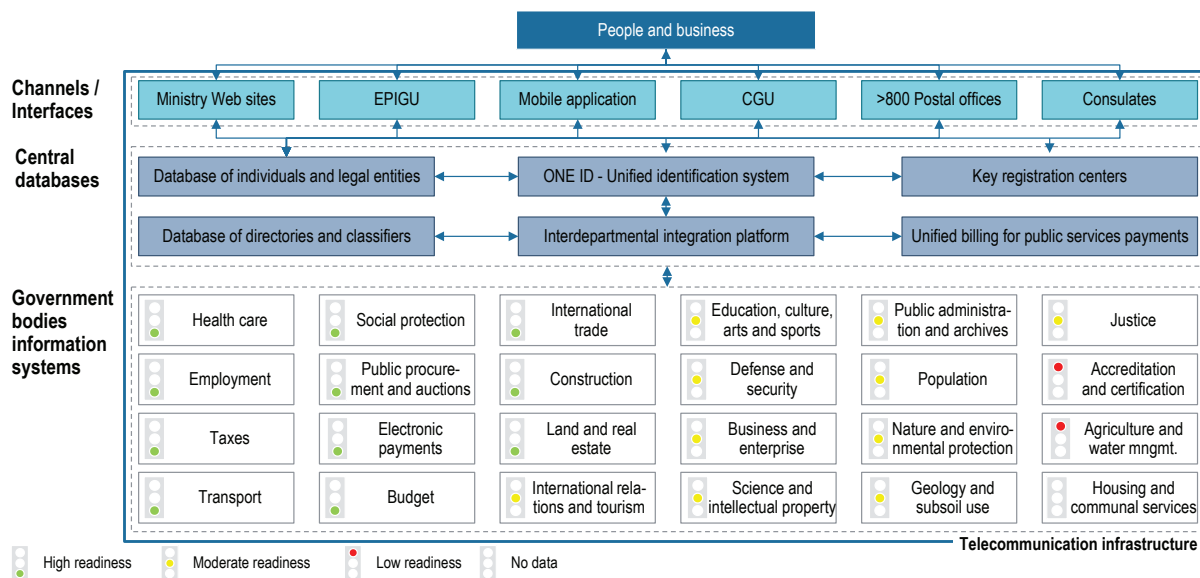## Uzbekistan e-Government architecture and government bodies information system readiness

Figure 29: Uzbekistan e-Government architecture and government bodies information system readiness

As many government bodies' information systems are managed separately, either inhouse or through contractors (Figure 30), they differ in terms of availability of data to enable government service digitization.

To ensure further development of e-government services, at least 13 information systems of government bodies would require update[17] with machine readable data, improved data governance and data sharing.

To realize future development plans government may also need support from local ICT industry, which would require growing national technological champions (Figure 31).

Current models of government data management in Uzbekistan

Figure 30: Current models of government data management in Uzbekistan

Growing technological champions

Overview

Sberbank – Russia's largest bank has been consistently expanding its product portfolio from traditional banking services to include digital products and services.

Sberbank's total investment in non-banking products and services, including those in organically created companies, has been around RUB 125 billion since the ecosystem was launched. In 2021, the revenue of the companies included in the ecosystem was about 121 billion rubles.

Achievements

Development of technological capabilities allowed Sberbank to launch one of the breakout projects SberCloud.Advanced platform deployed by SberCloud – SberBank's own cloud provider in cooperation with Huawei. In this case, Sberbank provides digital services while Huawei provides the cloud technology stack, which became the basis for providing digital e-government services to end-users.

Figure 31: Growing technological champions

Overall, the state of E-government development in Uzbekistan today can be summarized with the following analysis of strengths, weaknesses, opportunities, and threats.

Strengths

> Strong political will from the President in e-Government development
> Strong existing foundation in e-government services
> Introduction of E-Government PM Center and CDO positions in all ministries to facilitate development of E-Government
> Growing IT industry supported by government initiatives and digital literacy programs

Opportunities

> Rapidly rising internet penetration rate due to network expansion and smartphone affordability
> Availability of global best practices in terms of e-government development
> Huge progress could be made with the expertise and investment of foreign partners in ICT infrastructure

SWOT Analysis

Weaknesses

> Low level of e-government service penetration
> ICT infrastructure relatively weak, constrained by geography and market structure
> No involvement of a private contractors to digital service implementation
> Low readiness of some government bodies information systems

Threats

> Continuing low adoption of digital services due to low readiness of population or infrastructure constraints
> Potential for continued underinvestment in ICT infrastructure, especially if there are funding constraints
> Possibility that lack of appropriate human capital could constrain development of IT industry

Implications for Uzbekistan

With the strong foundation of current service offering and continuing support from the government, Uzbekistan is on the right path to building a national electronic government. Currently, the development is hindered by low adoption and lagging infrastructure development, which may pose a threat to an envisioned future state. To address that, Uzbekistan should continue to promote the infrastructure and human capital development and emulate international best practices.

The next chapters focus on overview of insights from international case studies and suggestions to drive Uzbekistan forward in further developing its e-government.

03
CHAPTER

International benchmark and best practices

3 International benchmark and best practices

As mentioned in Chapter 2, Uzbekistan ranked 69th in the United Nations e-Government Development Index 2022, indicating that there is room for improvement in e-government development. In this regard, it is advisable to study and adapt the best practices of countries leading in the development of e-government and infrastructure, such as Denmark, Estonia, Korea, Singapore, UK, Germany, China, and Commonwealth of Independent States (CIS) countries such as Belarus, Kazakhstan, Russia.

This chapter will demonstrate the global best practices that are useful benchmarks for Uzbekistan.

We will also explore global progress and trends in the Vision and strategy for e-government development and its key dimensions; service offering, data architecture, infrastructure, operating model and resource utilization (Figure 32).

3.1 Global e-government progress and trends

Globally, there is a continued increase in the uptake of e-government development, with service offerings and operations becoming more seamless and advanced with the rise of emerging technologies such as wireless broadband (LTE and 5G), cloud computing, big data, artificial intelligence and Internet-of-Things (IoT). The evolvement of e-government service offerings and operations have brought changes in various dimensions of e-government development.

Dimensions of e-government development
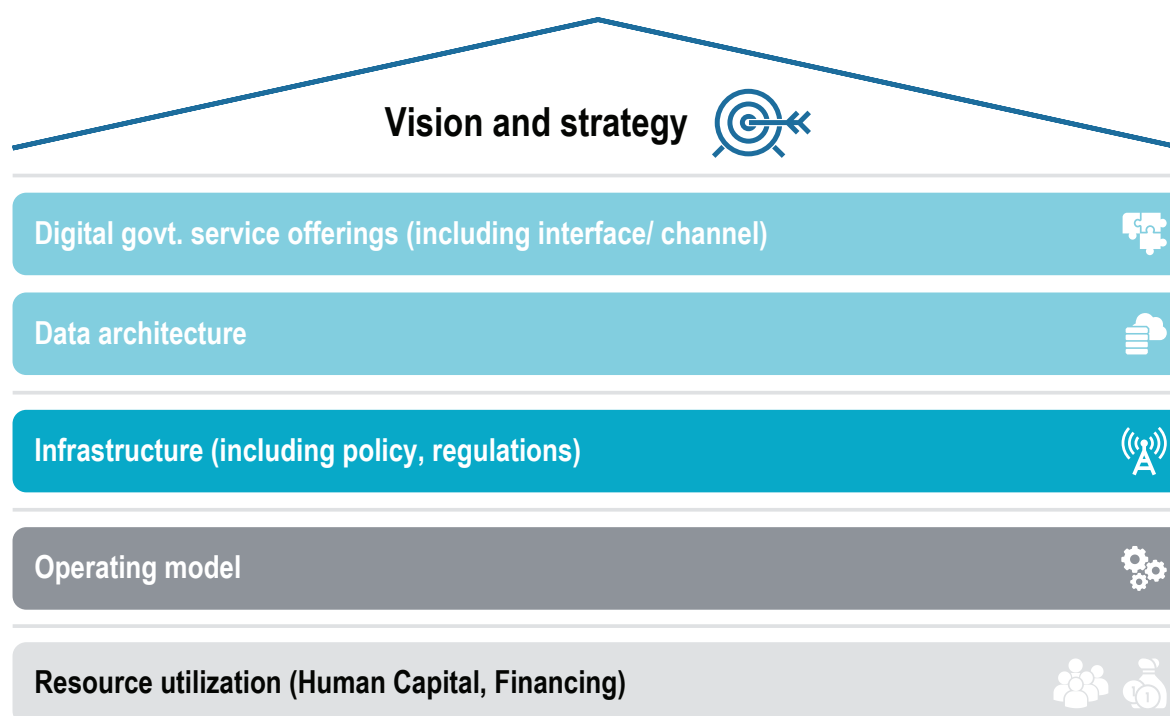
Figure 32: Dimensions of e-government development

Vision and strategy: A growing focus on e-government development is to develop comprehensive e-government strategies with support from top leadership (e.g., President).

In government services, the requisites are a clear vision, which entail improving the lives of citizens as well as the economy, and well-defined strategy with a clear framework for key dimensions such as service offerings, infrastructure, policies, resources, and an actionable implementation roadmap.

Service offering: Governments are increasingly growing the amount of digital services they offer, and our analysis show three trends;

- The emergence of IoT & Cloud Computing and rising relevance to harness Big Data in e-government services (Figure 33, Figure 34);

- The rise of Mobile App and One-stop portal as a convenience, in line with the growth of mobile penetration; and

- Constant iterative process to maintain and improve e-government services.

Global big data storage volume, 2017-2025E [zettabytes][18]
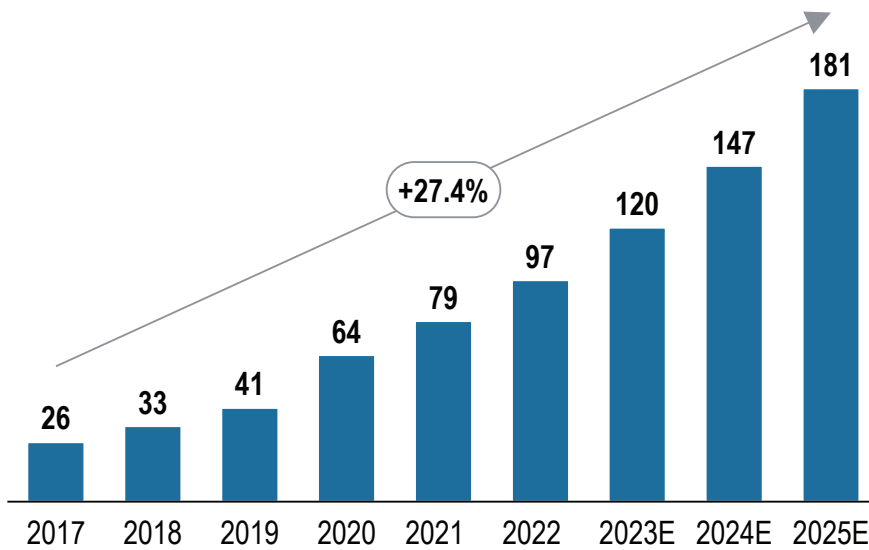
Figure 33: Global big data storage volume, 2017-2025E [zettabytes]

Impact of emerging technologies on big data
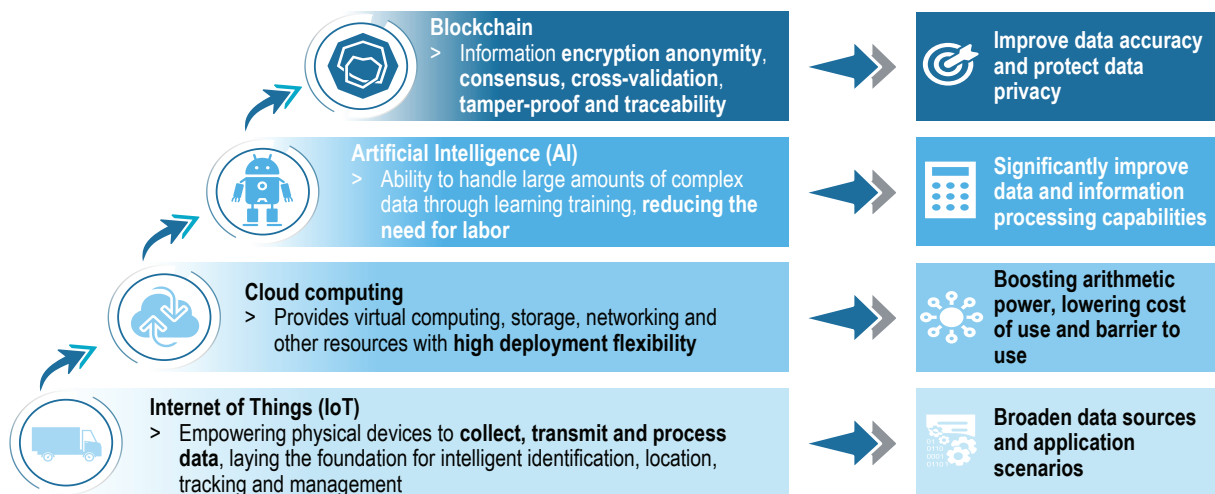
Figure 34: Impact of emerging technologies on big data

Data architecture: Data architecture refers to the model of which data is collected, stored, processed, and used. Specifically, data architecture can be described with four main aspects:

- Data interface and presentation,
- business processes on raw data such as analytics,
- technology application (storage of original data, process, analysis, report, recommendation, display), and
- data governance.

Overall, there are two trends observed. Firstly, secure data sharing through interoperable systems and open data are growing in importance due to the greater amount of data being processed via expanded service offerings.

Consequently, the need for data governance and protection is also growing, therefore data architecture should adopt the latest data technology such as cloud computing, especially for open source technology.

Infrastructure: There are two key elements in ICT infrastructure: widespread connectivity and cloud-based data center.

In terms of connectivity, mobile and fixed connectivity have seen improvement in penetration, however, there remains to be room for growth especially in the rural areas. More fixed and wireless broadband needs to be deployed to further improve penetration, with the latter more feasible in rural areas. In line with the growth in scale and advancement of digital services offered, demand for international gateway is increasing as more data is involved which requires more bandwidth. Demand for emerging technologies (Figure 35) such as IoT is expected to rise as governments offer innovative services and develop Smart Cities with IPv6 for a fully-connected Internet.

Similarly, with increasing data collection and usage, data center adoption has increased, as well as edge computing to support processing of vast amount of data.

More services and data collection have also resulted in heavier focus on regulation (e.g., data privacy, cybersecurity) and policies.

Emerging data technologies
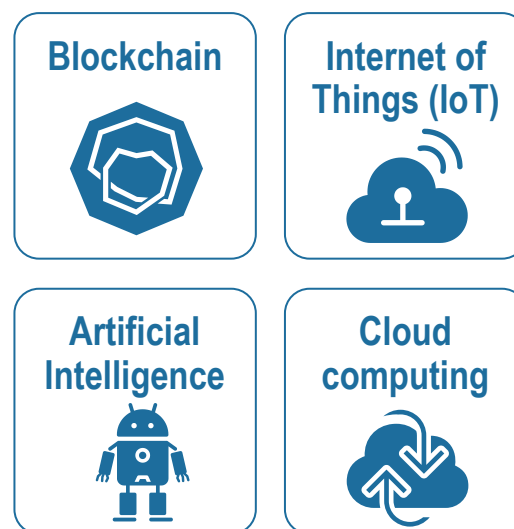
Figure 35: Emerging data technologies

Operating model: One of the key roles of an e-government is to offer digital services to its

Citizens. This involves three main aspects of operations (Figure 36).

Operations to develop and offer digital services

Figure 36: Operations to develop and offer digital services

1 Understanding of services

> Understanding the purpose and usage of services for each ministry and the demands and preferences of users

2 Data handling

> Ensuring the necessary data are available, data storage, sharing, processing and analysis to enable development of digital services

3 Infrastructure operations

> Ensuring the necessary infrastructure such as broadband, data center and cloud platform are running smoothly to enable development of digital services

Example data operations for Uzbekistan: data quality and protection check
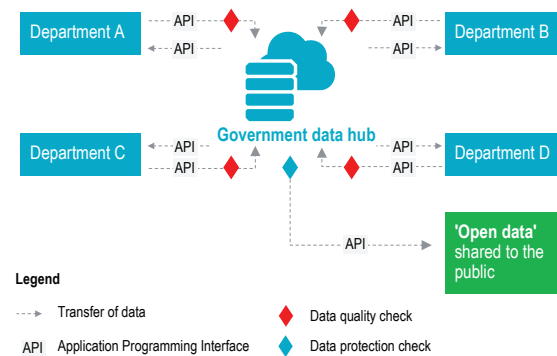
Figure 37: Example data operations for Uzbekistan: data quality and protection check

Firstly, offering digital services requires understanding of usage and application, such as, which are the priority services, where is the demand and preferences of users.

Secondly, as data is a key enabler for digital services, offering digital services involves handling of data including digitalization for those not in digital format, data quality and protection check among others (Figure 37).

Thirdly, it also involves infrastructure operations such as maintenance of network and data center to ensure the necessary infrastructure are in place to develop and offer digital services. To

execute these operations smoothly, a dedicated team focusing on e-government development is required to support the government. Digital skills to digitize, maintain and improve the services should also be fostered.

Meanwhile, to offer advanced services such as smart services, adoption of new technologies (e.g., artificial intelligence, machine learning) may necessitate forming external partnerships and develop an ecosystem.

Resource utilization: Two key resources to enable e-government development are human resource with digital skills and financial resources.

Our analysis on various countries show increased action to train and improve the digital skills of civil servants and general populace through various programs.

There are also various funding models for financing, including PPP, which encourages private companies to participate in e-government development.

The following section will show how Uzbekistan can advance its e-government development through key learnings and trends identified from best practices in case studies.

3.2 Global key learnings and practices on e-government strategy and digital & data services

In this module, we will outline trends and identify best practices for Uzbekistan in the following areas:

- Vision and strategy
- Service offerings
- Data architecture

Vision and strategy

As internet penetration and ICT adoption increase globally, governments around the world have embarked on digital transformation journeys to improve operational efficiencies and the services offered to their citizens.

Vision and strategies are important to guide the digital transformation journeys, as can be seen in the Digital Kazakhstan and Informational Kazakhstan (Case study 1) thanks to which Kazakhstan took 28th place in the UN E-Government Development Index for 2022[19].

The two comprehensive strategies, which were supported by the president, have set clear visions to improve the lives of its citizens and transform the nation into an Information Society. Well-defined strategies and objectives for the development of its e-government have also been set, such as digitizing 80% of its services. The development of ICT infrastructure and human capital are also key enablers of its e-government development.

Key takeaways for Uzbekistan

- Development of e-government should be driven by comprehensive strategies with clearly defined vision and strategies.

- Leadership support at the highest level is crucial.

- The vision of a government should be to improve citizens' lives by making them easier and smarter as well as improving competencies of the economy.

- Strategies need to be comprehensive, with clear structure covering key enablers, policies and actionable roadmap.

- Laws and regulations must be supportive, rather than restrictive

- With the potential impact of emerging technologies, future strategies for Uzbekistan should consider developing emerging technologies as well.

Case study 1 – Kazakhstan e-govt development strategy 'Digital Kazakhstan' & 'Informational Kazakhstan'

Overview

Development of e-government in Kazakhstan are promoted in two of its national strategies – Digital Kazakhstan, which aims to accelerate the development pace of the Kazakh economy and improve the quality of our citizens life and Informational Kazakhstan – 2020 which aims to convert Kazakhstan into an informational society

Key features
- **Clearly defined targets:** Quantitative targets have been set for e-government development, such as share of e-govt. services reaching 80% of total govt. services and achieving top 25 in UN Index 2020
- **Leadership support from the top:** The strategies have been approved and are supported by the President
- **Development of enablers:** Strategies include plans to develop ICT infrastructure and human capital
- **Clear implementation plan:** The Informational Kazakhstan program was implemented in a 2-phase approach, with clear timelines for each project
- **Supportive regulations:** Various regulations to support e-govt. development, such as the Law of Informatization
- **Adoption of advanced technology:** Project to develop state cloud platform G-Cloud as infrastructure for e-government

Key learnings
- Leadership support at the highest level is crucial (e.g. President)
- Clearly defined quantitative targets are important for measurement of achievement and progress
- Well defined implementation timeline and plan is important for execution of strategy
- Strategy should include development of key enablers which is crucial for development of e-government

Achievements
- Ranked 28th in the 2022 United Nations E-Government Development Index
- Offer >500 e-government services
- E-government services used by ~50% of the population

Service offering

E-government services can be categorized into two categories: Government-to-Citizens (G2C) and Government-to-Business (G2B). Through benchmarking, we have found that countries with leading e-government development offer significantly higher number of e-services compared to the 371 e-government services currently offered by Uzbekistan.

The most common G2C digital service offered is in public administration, for example, personal ID application/ replacement, birth certificate applications, public utilities payment, welfare, taxation and regulatory services.

For G2B digital services, business registration, taxation and business permit/ license application are the most common (Figure 38).

Overview of e-government services offered by benchmarked countries

E-Government service	Korea	Estonia	Denmark	Singapore	UK	Kazakhstan	China	Russia	Uzbekistan	Germany	Belarus
Govt-to-Citizen (G2C)											
Public administration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Visa and immigration	✓	✓	✓	✓	✓			✓	✓	✓	✓
Employment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Real estate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Education	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Healthcare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Family	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Welfare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Law & justice	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taxation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Transportation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Utilities	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Govt-to-Business (G2B)											
Business registration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Taxation	✓	✓	✓	✓	✓	✓			✓	✓	✓
Procurement	✓	✓	✓	✓	✓		✓	✓		✓	✓
Business license/ Permits	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Intellectual property		✓	✓	✓	✓	✓	✓	✓			✓
Estimated # e-govt services	19,000	3,000	2,000	1,600	1,500	1,500	1,300	1,200	371	500	400
Online Service Index (OSI)	1	2	3	5	6	11	14	39	46	59	65

Tier 1 ● Tier 2 ● Tier 3 ●

Figure 38: Overview of e-government services offered by benchmarked countries

With the vast number of government services that can be digitized, prioritization on the sequence of digitization is needed as digitizing a large amount of services will take time.

The benchmarked countries undertook the strategy of prioritizing digitization for services with the highest user volume. This enabled offering meaningful e-government services to citizens from the outset and ultimately resulted in increased adoption of e-government services. For example, the UK government undertook a 400-days transformation Program to digitize 25 services with the highest user volume when they began digitizing their government services (Case study 2).

The success of this strategy was illustrated in the outcome that showed 10% of the UK population using 20 of the digital government services within the first 2 years of launching.

Key factors contributing to the effectiveness were the close collaboration between the central implementation agency i.e., the UK Digital Government Service, and various agencies to understand the pain points of users and their preferences. This then led to developing user-centric e-services, and constantly worked on to maintain and improve the services offered.

Case study 2 – Digitization of UK government services

Overview

The UK govt. began digitizing its services through a 400-days Transformation Program, focusing on its 25 highest volume services first. It managed to successfully launch 20 new digital services which was used by 10% of the UK population in the first 2 years

Example services

Government-to-Citizens (G2C)
> Online visa application service for visiting the UK
> Fully digital tax management
> Apply to use e-passport gates for frequency travelers to the UK
> Application and management of student loans and grants
> Digital service to make registering to vote simpler and faster

Government-to-Business (G2B)
> Tax management for businesses
> Quick and easy online renewal of patents

Key success factors

> **User-centric** – selection of high-volume transaction and **delivering according to the demands of users** (channel, user interface)

> **Streamlined and close cooperation** between central and relevant ministries

> **Leadership and support** from the top leader to drive change

> **ICT** (coding, UI/UX etc.) **and business skills** (process engineering) to deliver result in a short timescale

Besides prioritizing services with the highest user volume, governments have also developed one-stop portals to integrate services from different agencies. Adopting a mobile-first approach and developing mobile e-services platforms to offer additional convenience to citizens potentially increased adoption of e-government services.

Kazakhstan, Russia and Turkey have all introduced similar unified platforms, with Russia's Unified Portal of Public Services (www.gosuslugi.ru) standing out regionally.

Russia's digital government initiative has been a centerpiece since its inception in 2009. It has undergone a series of revisions and updates over the years and to date has 70 million registered users. The percentage of Russians registered on the unified portal is comparable to the participation rates in advanced countries like the United Kingdom and Australia.

Turkey's e-devlet portal has enabled access to 5,223 services from over 646 government bodies.

In the mobile category, all these countries far exceed Uzbekistan in terms of quality of e-government mobile apps which accompany the web portals.

Turkey's mobile app contains more than 2,500 services, while Kazakhstan's mobile app contains 400 services, which is more than double the number of services offered by Uzbekistan's Unified Public Services mobile app (Figure 39).

In Russia, it is mandatory to have the Gosuslugi mobile pre-installed in all mobile phones sold.

Kazakhstan placed such importance on their mobile app that they revamped an already award-winning mobile app to launch a newly improved version in 2019.

Comparison of one-stop e-government platforms

Comparison of integrated digital government service platforms

Uzbekistan

Web portal
> Access to 371 public services in 17 functional categories

Mobile App
> In 2020, a mobile application was launched that gives access to 157 services
> Currently is available only for Android OS

Uzbekistan Unified portal of interactive public services

Kazakhstan

Web portal
> Launched in 2012, access to 800 services (80% of total services)

Mobile App
> Updated mobile application, launched in 2019, with access to 400 services
> Authentication by face-ID available

Kazakhstan e-government Portal

Turkey

Web portal
> Access to 5,223 services across 646 government agencies

Mobile App
> Access to 2,502 services across 96 agencies
> Connected to hundreds of local municipalities

Turkey E-devlet mobile app

Russia

Web portal
> Launched in 2009, with more than 30,000 services available

Mobile App
> Mobile app was launched in 2012
> In 2020, mobile app will be relaunched in the new format with newly available "super services"

Russia Gosuslugi web mobile app

Figure 39:   Comparison of one-stop e-government platforms

To further promote adoption of e-government services, governments have run promotional campaigns to increase awareness of its citizens of the services and their benefits. For instance, during the launches of e-services in Turkey, notifications were sent to citizens via SMS and email, alongside paid advertisements on TV, post offices and government offices. These public service announcements highlighted the potential time savings when using e-government services (Case study 3).

Key takeaways for Uzbekistan

• There is significant room for Uzbekistan to increase the scale and advancement of e-government service offerings, through prioritization based on user volume. This

will allow the e-government to achieve high impact and adoption of its digital services.

• In developing e-government services, input from respective agencies should be considered to gain a better understanding of the users' needs to develop user-centric digital services.

• Development of e-government services is a continuous iterative process where maintenance and constant improvement are required.

• To offer additional convenience and increase adoption of its digital services, one-stop platforms including mobile apps integrating a large range e-government services should be developed.

- Promotional campaigns can increase awareness on the availability and benefits of digital services and increase adoption

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Case study 3 – Promoting adoption of the government e-services platform in Turkey

Overview

The transition towards e-government services is not just about setting up e-government services portals or mobile applications. Turkey shows us that action is also needed to ensure people have a convenient way to access these online services, are aware of online services and their benefits, and change their habits such that the e-services platform becomes the default way to access public services

Key initiatives

> **ID rationalization exercise**: Even before government services were moved online, different ID numbers for accessing various government services (e.g. driver's license, passport, tax, healthcare, real estate, municipalities, education) were rationalised into a single unique national ID. This enabled the government to simplify the databases and citizens to conveniently access all government services with a single login ID when the e-services platform was introduced.
> **Promotional campaign leveraging on key services**: Notifications sent to citizens via SMS and email, as well as advertisements on TV, post offices and government offices, were used to highlight the potential time savings from e-government services. There were a few key services that drove the adoption of e-government portal usage like social security, tax and legal queries. After citizens received their passwords and downloaded the e-government portal application to their smartphones they also started checking and using other available services like online doctor appointments, ID/ driving license/ passport applications.

Results

> There have been more than 1 billion logins to the system by end of 2022; 45 million citizens have used the system in 2022 which is 55% of population
> Most used services are court session queries, social security queries, and tax debt

Sample of promotional materials
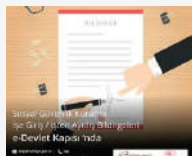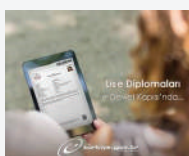
Data architecture

Governments are arguably one of the largest users and owners of data, with vast amount of data collected daily from citizens and businesses from various sources including birth registrations, travel histories, health records, business registrations and many others.

The large amount of data represents a key asset, from which insights and understanding of the nation and its people can be drawn.

Data can enable improvement in e-government development through delivery of personalized e-services, data-driven policy planning and streamlining of processes through data integration.

Globally, leading e-governments typically have strong data architecture which enables the government to operate and deliver services with the highest effectiveness and efficiency, as seen in the e-governments of Estonia (Case study 4) and Singapore (Case study 5). Data architecture of the two mentioned e-governments includes interoperable systems and open data systems (Figure 40) for automated and secure data sharing between government departments as well as with the private sector. Interoperable systems enable data flow between government agencies, leading to operational efficiency improvement. This is because it eliminates the need for manual data requests and processing by government agencies. Additionally, interoperable systems remove replicated databases and the need to collect data more than once from citizens and businesses, as evidenced by Estonia's 'Once-only' principle.

On the other hand, open data systems for data sharing with the private sector enables innovation and improvement in products and services. In handling large quantities of sensitive data, appropriate infrastructure needs to be in place to ensure data security, data privacy and safeguard that the data collected is utilized only within the country.

Meanwhile, data governance can further enhance a strong data architecture, as seen in the government of Estonia, which has a

central authority overseeing the data exchange ecosystem, and Singapore where data architecture is overseen by the Government Data Office (Figure 41).

Key takeaways for Uzbekistan

• Data systems should be interoperable to enable quick and efficient data sharing between agencies and eliminate the need for manual data request and transfers.

• An open data system accessible to the private sector should be adopted to drive innovation in service offerings.

• Stringent data security measures should be in place to protect the vast amount of data held by the Government.

• A central authority/ governing body should be appointed to oversee the data exchange system/ architecture, and to safeguard that the data collected is utilized only within the country.

Case study 4 – Data architecture of Estonia e-Government: X-Road

Overview

Estonia has chosen a relatively unconventional route and implemented a state-wide distributed integration bus called X-road. The X-Road platform facilitates secure exchange of information over the internet across disparate IT systems including between different government departments, citizens, and other private sector stakeholders. Originally developed in Estonia by the Information System Authority (RIA) in collaboration with private partners, X-Road technology is now managed by the Nordic Institute for Interoperability Solutions (NIIS), a nonprofit institute. X-tee is governed by the RIA in Estonia.

Key features

> **Digital Platform with interoperability across IT systems** – X-Road runs on decentralized database model where different departments maintain their own databases and uses common Application Programming Interfaces (APIs) and has adopted open standards for data exchange. Open standards have improved the efficacy of X-Road by enabling functionalities such as exchange of digital documents and the ability to search through a database

> **Privacy and security for data exchange** – Two-stage process to access information: The first stage is registration – Only registered organizations fulfilling key security requirements can exchange data on X-Road; In the 2nd stage, the registered organization can access information only if the organizations sharing data have an agreement to share information

> **Community** - Facilitates interoperability across various public and private sector information systems. For example, Estonia's Health Information System is underpinned by e-Health Records which functions as a nationwide database integrated across different healthcare providers, using the secure data exchange layer X-Road. This allows doctors to easily view a patient's medical history, ongoing treatments as well as test results, and can be especially useful during emergencies to access time-critical information

> **Governance** - The RIA of Estonia under the Ministry for Economic Affairs and Communications (MEAC) is the department responsible for developing and managing X-Road, while the legislative roles fall under MEAC

Key learnings

> **Data systems should be open and interoperable** for effective data sharing among public and private sectors, and enable private organizations and other countries to use them freely and/ or build on them

> **Decentralized databases** that can communicate with each other enabling availability of real-time data, eliminates duplication of data capture and storage efforts. This method also provides flexibility to the system as new databases can be built and connected but is also more secure as it eliminates a single point of failure

> Ensure **privacy and security** for data exchange

> **Accountable institution** to **manage and regulate** the data exchange ecosystem

X-road data architecture of Estonian e-government
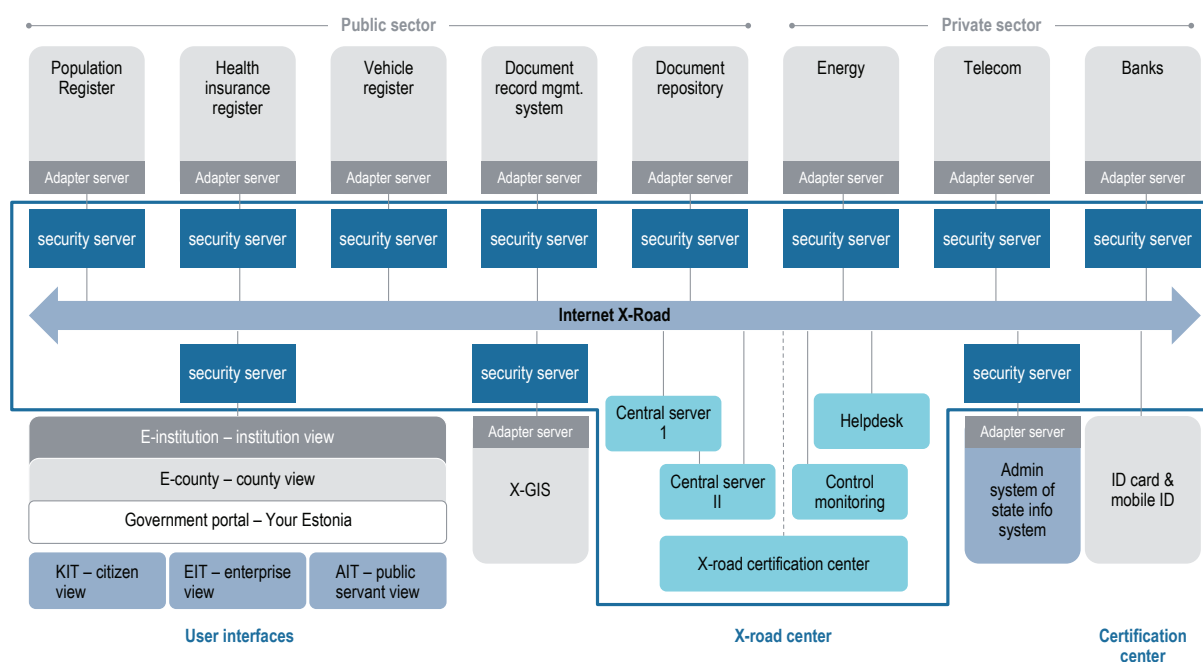
Figure 40: X-road data architecture used by Estonian e-Government[20]

Case study 5 – Data architecture of e-government in Singapore

Overview

In June 2018, the government of Singapore introduced the Government Data Strategy (GDS) which includes Government Data Architecture (GDA) to enable secure data sharing and usage across the public sector. The GDA facilitates the efficient data sharing of clean and authoritative datasets across public agencies with government data assets to be consolidated and made discoverable and accessible within 7 working days.

Key features

> **Organizational constructs –** Formation of two organizational constructs: Single Sources of Truths (SSOTs) and Trusted Centres (TCs). Ministries are appointed as SSOTs e.g., Ministry of Social and Family Development for family relationship data and are responsible for maintaining, cleaning, and distributing these data to the rest of the government while TCs aggregate data across the SSOTs and provide a one-stop-shop for users to access cross-sector government datasets

> **Privacy and security for data exchange** – GDA promotes secure data sharing and usage by incorporating data security safeguards across the government as public agencies using GDA's platforms enjoy a high standard of data security by default. Organizational constructs lessens the need for agencies to collect datasets on their own as they can obtain the same data from the Trusted Centres. Public agencies can also remove their datasets when they are done using them, without fear that the dataset will no longer be available. This reduces duplicative work for public agencies and minimises attack points from which a malicious attacker can try to extract data. Furthermore, datasets distributed through Vault are digitally watermarked and all user activities are logged and monitored

> **Digital infrastructure** - Infrastructure to digitize the management, governance, and use of data, to support and scale data transformation initiatives to accelerate harnessing data for insights and deploying data models into products and business processes. Examples include a code repository hosted on a common platform for data scientists to share their code with the public sector data community and a whole-of-government analytics platform enabling rapid development of data and AI models

> **One-stop portal –** The Vault is a one-stop portal for public officers to preview data and download synthetic datasets as part of data discovery, submit a single data sharing form for access to data from multiple agencies and download the requested dataset(s) once approval has been granted

> **Central implementing agency** – Government Data Office tasked with policy development to support data sharing and usage across the public service and to implement the GDS by 2023

Key learnings

> Establishment of **organizational constructs with clear role and responsibilities** can **streamline fast and secure data sharing** with **no discrepancies** between data distributed as it originates from the same source

> Ensure **privacy and security** for data exchange

> Formation of a **central implementing agency** can lead and accelerate implementation

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Organizational constructs of Singapore e-government
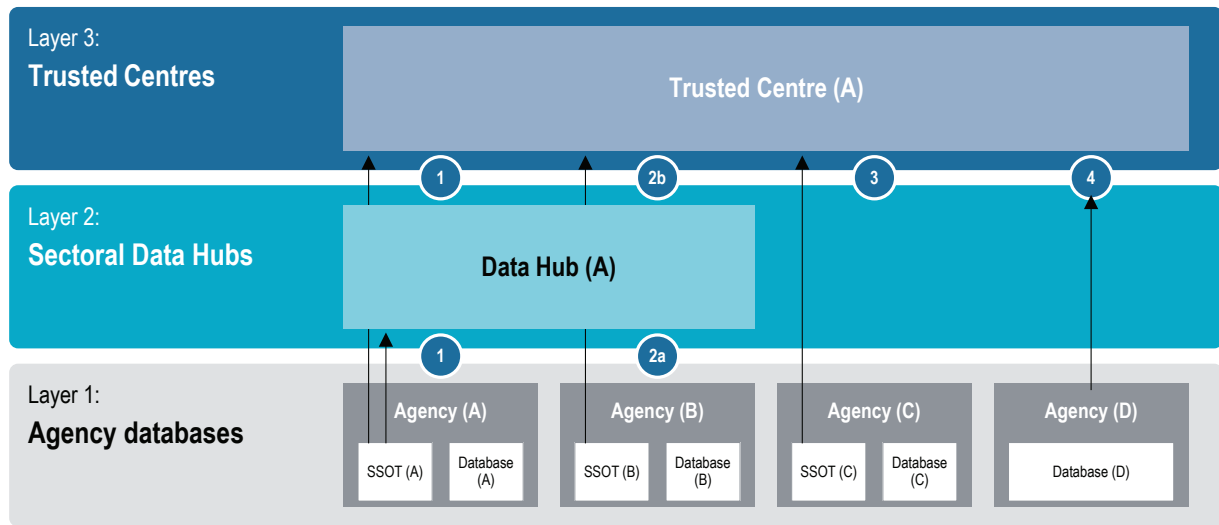
Figure 41: Data organizational structure of Singapore e-Government[21]

3.3 Global key learnings and practices on infrastructure and enablers

In this chapter, we will outline trends and identify best practices for Uzbekistan in the following areas:

- Infrastructure including ICT infrastructure, security, regulation and licensing

- Operating models

- Resource utilization in terms of human capital development and financing

Infrastructure

Digital services offered by governments are growing in volume and advancement with the emergence of new technologies and big data.

Growing alongside this is the importance and need for data infrastructure and regulations. Both play key roles in the provision and adoption of e-government services.

For example, broadband enables citizens and businesses to access e-government services, and consequently, with the growing scale of users and services, more data is collected, resulting in increasing necessity for data storage, regulations, and security.

In this section, we will analyze best practices for infrastructures which are key to provision and adoption of government e-services. These includes fixed and mobile broadband, data centers, international gateway, emerging technologies such as cloud computing, Internet-of-Things, as well as security, regulations and licensing.

Fixed and mobile broadband

Globally, countries with leading e-government development have significantly higher fixed and mobile broadband penetration (Figure 42).

Countries with rapidly developing e-government services also have higher broadband penetration in rural areas of the country, as seen in the case of India where broadband penetration in the rural areas has grown 35% annually over the past 3 years from 20% in 2020 to 43% in 2022.[22]

Due to the long-distance requirements for infrastructure, and the low level of users, development of ICT infrastructure in rural areas

have often been perceived as commercially unattractive for telecom companies.

Number of fixed and mobile broadband subscribers per 100 people
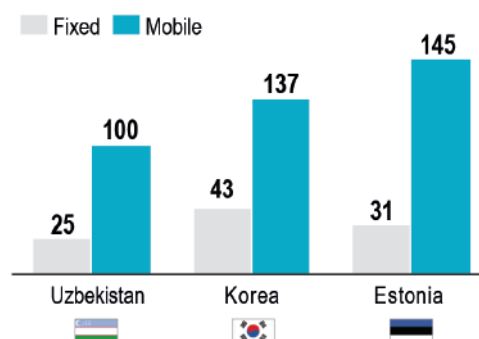
Figure 42: Number of fixed and mobile broadband subscribers per 100 people

Therefore, governments play a key role in extending broadband availability to rural areas of a country. This can be done with providing financial support or utilizing technology.

In terms of financial support, development of infrastructure in the rural areas can be made financially more attractive through a PPP. In the case of Pakistan (Case study 6), grants from the Universal Service Fund (USF) attracted many operators for its broadband deployment project in rural and underserved areas.

Alternatively, innovative technologies from global technology players can be leveraged through partnerships to extend broadband availability to rural areas, as done in Guizhou Province, China and in Ghana by Ghana Investment Fund for Electronic Communications in their partnerships with Huawei to deploy the RuralStar solution (Case study 7).

In addition to network coverage, IPv6 plays an important role in the digital infrastructure as it is the only way to sustainable Internet, not only because of its vast address space, but also the extensibility and security features. Lots of governments have release policies to promote IPv6 deployments among operators and public sectors. For example, in the United States, the Office of Management and Budget (OMB) memorandum published M-21-07, "Completing the Transition to Internet Protocol Version 6 (IPv6)" in 2020 to accelerate the IPv6 transition in federal governments. It requires that at least 80% of IP-enabled assets on Federal networks should operate in IPv6-only environments by the end of 2025.

Case study 6– Deployment of broadband infrastructure in rural areas in Pakistan

Background

Pakistan's "connect the unconnected" policy targets that each of the nation's 180 million citizens has a right not only to basic telecommunications services but also to e-services and broadband. Therefore, a universal service fund (USF) was set up to develop broadband infrastructure to extend broadband coverage to rural and unserved areas

Overview

> Government of Pakistan launched a Public-Private-Partnership (PPP) program to increase telecom and broadband penetration in unserved rural areas
> The Pakistan USF Broadband Program provided grants from the USF to operators to deploy broadband to unserved urban areas and rural communities, and nationwide core network
> The grants have attracted many operators, and broadband access projects have been awarded to the main fixed operator (PTCL), Wateen and Worldcall, while fibre projects have been awarded to PTCL and Wateen
> The USF was created in 2006 and has been collected since 2007 at a rate of 1.5 per cent of operators' adjusted revenues. No other government funds have been used to fund the Broadband Program

Impact

> Program has helped provide broadband internet access to ~240 towns and cities
> Nearly 800 secondary schools, colleges, and libraries have digital devices and a year of free broadband access

Key success factor

> PPP, grants and financial support can increase the attractiveness of developing telco infrastructure in rural areas for private companies and ultimately increase penetration of broadband and telecom penetration

Case study 7 – Partnership with Huawei to provide broadband coverage in rural areas

Overview

The valley where Maopo Village is located is often foggy, meaning that microwave solutions cannot be used there, and the cost of laying optical fiber on winding mountain roads is too high

Initiative and impact

Huawei's RuralStar solution was adopted to provide internet access in the village. The coverage rate in the village is now 85% and the downlink speeds reach 30 Mbps

Overview

The Ghana Investment Fund for Electronic Communications (GIFEC) plans to work with Huawei to deploy more than 2,000 RuralStar sites

Initiative and impact

Over 400 deployed RuralStar sites are already generating revenue, and a return on investment is expected in less than three years. It is estimated that 3.4 million people in 172 rural areas will benefit from this plan, and Ghana's mobile coverage rate will increase from 83% to 95% which will give an enormous boost to the local economy

Data center

With the transition towards a digital government, the volume of data being processed and stored by government agencies will no doubt increase exponentially in the years ahead. As a result, a key barrier which government agencies may face is the ability to store their data securely and affordably.

Hence, setting up an integrated government data center (GIDC) which provides data center services to all government departments would be vital in facilitating the transition of more government agencies onto digital platforms. The ownership of data stored in the GIDC would still belong to the client agencies, but government agencies would no longer have to worry about the hassle of maintaining their own servers.

Benefits of setting up a Government Integrated Data Center

Benefits of setting up GIDC

Enhanced security
Centrally manage cybersecurity risk

Procurement cost savings
Savings on hardware and operational costs

Pooling personnel resources
Overcome unequal distribution of IT expertise between agencies
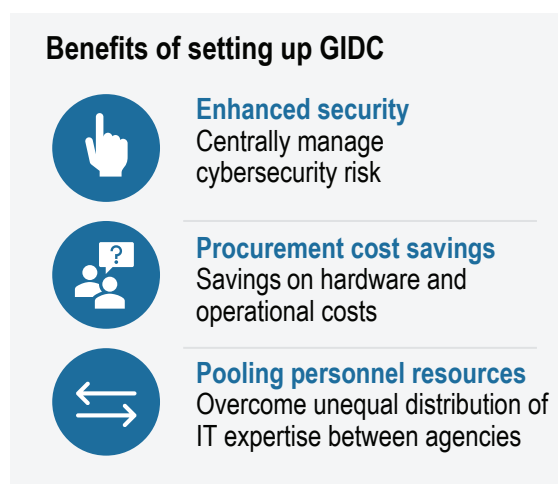
Figure 43: Benefits of setting up a Government Data Center

Adoption of a GIDC yields multiple benefits (Figure 43) including economies of scale. Rather than having each government agency maintain its own server, which incurs substantial equipment and human resource costs, a GIDC can pool all the data center requirements together to provide the same infrastructure at a fraction of the cost.

Additionally, having a GIDC also provides more assurance about information security since the central government can dedicate more resources to securing the GIDC than agencies can on their own. Typically, a GIDC would involve one data center build at a primary site, as well as another at a secondary site as a backup in the event of outages at the primary site.

If data traffic becomes high enough, it may also then be beneficial to establish mirror sites in each region to store the most frequently queried databases in order to reduce load on the central GIDC system. To guarantee the robustness of the data exchange and reduce the maintenance cost, it is recommended to deploy latest technologies such as software-defined networks, hyper-converged ethernet, autonomous-driving networks, etc.

Although the process of migrating to a central government data center has been complex and time consuming for countries where each agency had already developed their own data centers, as in the case of Korea (Case study 8), migration to a central government data center remains the most cost effective option in the long run.

In Uzbekistan, where most government agencies are in progress of developing or refining their data centers, there is opportunity to start off with the more efficient system of a central data center serving all agencies from the outset. Hence, it is recommended that a GIDC be set up at this stage to avoid costly data migration costs in future.

Case study 8 – Integrated Data Center for the e-Government of Korea

Overview

NCIS is the dedicated data center for the Korean government, providing integrated data center services to 44 client agencies. E-Government services of Korea started to be actively developed in Korea in the early 2000s, but hampered by duplication of efforts, shortage of proficient human resources and imbalanced management capability among ministries. This motivated the development of the GIDC. Business Process Reengineering (BPR) was conducted from 2002 and 2003 prior to the migration to the GIDC, with the first data center completed in 2005 and second data center completed in 2017

Function

> **Integration of govt. ICT systems**: Integrates, manages and operates over 47,000 hardware and software components for 44 central government ministries. managed on a real-time basis using 'n-TOPS

> **Provides security for govt. ICT systems**: Protects national IT resources from various cyber threats (hacking, viruses, DDos[1])

> **Resource pool**: Integrates purchases of all IT resources that each government organization needs. Simultaneously, it developed a cloud-computing environment, where government organizations can borrow hardware or software through the Internet

Impact

> Providing integrated data center services to **44 client agencies** to **support over 1,500 e-government services**

> **Auto-block almost 60,000~100,000 cyberattacks each day**

> **Savings of 30% of operational costs** by being the single acquisition and distribution window for data center services of all client agencies

Key success factor

> Strong personal commitment, from President and Task Force reporting to the President, was essential to overcoming resistance from agencies which initially did not want to a migration to the GIDC

Cloud computing

Cloud computing enables the provisioning of IT services such as computing power or data storage just on demand. Cloud computing has many advantages such as cost savings, scalability, or high availability, which make cloud computing of interest to many sectors. In particular, due to limited budgets of many governments, cloud computing and its advantages are relevant for the public sector and has been adopted by various leading e-governments, including the UK (Case study 9[23]), Denmark and Germany. Advantages of cloud computing for public services include:

Scalability: Only resources required are consumed. This helps to absorb high load peeks of applications.

Cost reduction: The flexible pricing model of clouds charges for the amount of IT resources consumed. This pay-as-you-go pricing model enables public services to save considerably in IT costs.

Simple implementation: Complex and time-consuming deployment can be avoided as cloud service providers typically offer APIs where individual cloud applications can be developed on.

Less maintenance needed: The professional operations team from the cloud service provider can handle operation and maintenance of the cloud infrastructure. High level automation also reduces workload on patch upgrade.

Increased availability of applications: Effective cloud resource management enables failure-proof operations. Deployment of applications on virtual cloud platforms enables easy switching in case of breakdowns hence avoiding interruptions in applications.

Case study 9 – UK Government Cloud Strategy

Overview

The UK government has adopted cloud computing with the aim of delivering computing resources to users as needed (an on-demand delivery model and transform the public sector ICT estate into one that is agile, cost effective and environmentally sustainable

Why did the case happen?

> The UK public ICT infrastructure has grown to meet the demands of its users and has led to high infrastructure cost. The past ICT made it difficult to achieve economies of scale in procurement of ICT services, deliver ICT systems that are flexible to support government policies and strategies. Besides, the public sector ICT was highly inefficient, characterized by high levels of duplication, silos, inappropriate provision and low levels of server utilization

Key features

> Government Application Store: Open marketplace displaying services that will be able to be procured, used, reviewed and reused across the public sector
> G Cloud Authority: To manage long-term adoption and cloud take-up by government, and will provide any on-going strategic and accreditation management
> 'Cloud First' initiative: To provide education on cloud ICT services, and support and guidance for purchasing and operating cloud ICT technology

Impact

> Projected government savings of approximately GBP 150-200 million annually from re-use of services and applications through the App Store and consolidation and increased utilisation of the data centre estate
> Other benefits: Best off-the-shelf industry ICT solutions, flexibility to change, ready and easy to use

Key learnings

> Adoption of cloud technology is an iterative approach with constant revision of best current ICT services, revision to approach and solution
> Adoption of cloud requires new working arrangements (changing procurement methods etc.) and new skills (e.g., ICT)
> Transition, business change and communication plans need to be clearly defined, with clear, consistent metrics established for performance and cost measurement

Internet-of-Things (IoT)

The emergence of new technologies such as IoT serves as opportunities for innovative e-government offerings beyond traditional government services.

Sensors embedded around physical objects can collect vast amount of data for analysis and action.

Automated processes can help citizens and businesses live and work smarter. Increasing adoption of IoT technology in smart homes, smart buildings, smart cities (Figure 44, Case study 10) and others, create convenience, cost reduction and personalization as key benefits.

IoT adoption in Smart City development

6 Smart Government
> Process automation for public governance
> E-services for people

5 Smart education
> Institutionalizing e-learning
> Educational platforms
> Digital service skills

4 Smart buildings
> Smart infrastructure management
> Smart home
> Digital technologies in construction

1 Smart Energy and Environment
> Smart energy management
> Smart water supply management
> Smart waste management

2 Smart mobility
> Intelligent traffic management systems
> Transport multi-modality
> Smart urban logistics

3 Smart healthcare
> Digital integration of IT systems
> Telemedicine
> Intelligent services for seniors and persons with disabilities
> Implementing AI technologies

Key enabler: Smart IT/ IoT infrastructure

Figure 44: IoT adoption in Smart City development

Case study 10 – Development of Smart City in France with Internet-of-Things (IoT)

Overview

Dijon has embarked on a 12-year project to become a **fully interconnected smart city**, connecting its 23 municipalities through advanced tech to improve public services for its citizens and increase sustainability

Government initiatives

> **Infrastructure and data**: Developed IoT platform connecting every citizen & public digital equipment to a central control system, and used digital data collected to offer new public services to its inhabitants
> **Investments**: Spent EUR 105 million to install IoT infrastructure across town, renovate existing traffic lights, CCTV cameras etc.

Impact

> Ability to **remotely control public equipment** to **improve daily public services** for its citizens in various ways such as transport, security etc.
> Every citizen can **communicate with the command centre instantly** via an app for various public services e.g., healthcare, utilities etc. (~630 calls from citizens per day)
> **~65% energy savings** for the city upon full transformation in approx. 10 years

International gateway

International gateways provide access to international terrestrial, submarine and satellite systems and manage incoming and outgoing international voice and data traffic by establishing interconnections between domestic and international networks. Today, most developed countries with global leading e-governments such as Estonia, Denmark, UK, Singapore, China have liberalized international gateway markets and are connected by numerous international links. It is commonly observed that markets with a monopoly tend to prevent its citizens and companies from obtaining affordable access and maximum benefits from internet services thus hampering the broadband expansion in the country. On the contrary, liberalizing the international gateway market can yield the following benefits which have been observed in the case of liberalization in Singapore and China (Case study 11 and 12):

Better user experience for the population as more people have access to the internet bacause of lowered broadband cost and this will ultimately promote digital services adoption.

Better quality service for end users as telco providers improve their customer service in a more competitive market.

Wider economic benefits due to increased international communications, investment from local and foreign firms in infrastructure, employment and digital economy activities which ultimately will also yield benefits for the government.

Case study 11 – Liberalization of International Gateway (IGW) market in Singapore

Overview

Singapore's regulator, the Infocomm Development Authority (IDA). fully liberalized telecommunications in Singapore and created the Code of Practice for Competition in the Provision of Telecommunication Services, which establishes a clear regulatory framework to help foster competition. IDA also developed a consultative methodology for creating policy and regulations. Applying this to international gateways, the first step was to determine clear goals that liberalization was meant to achieve. These goals were to create a vibrant international market in Singapore, with multiple players; to substantially increase Singapore's international bandwidth capacity, and to ensure significant falls in the cost of international communications

Why did the case happen?

> Advancement in technology has significantly brought down the cost of infrastructure hence ruling out the natural monopoly argument, as cost of investment in international gateways have been greatly reduced
> Singapore's aim to be a global economic and communication hub and increasingly diverse demand for services were valued greater than the incentive of a monopoly provider . Therefore, liberalization was needed to enable competition, increase customer choices and enhance market efficiencies

Impact

> The dominant licensee revamped and improved its operational efficiency, which led to lower tariffs and improved services for business and retail customers
> With international gateways opened to competition, more players entered the market. International direct dialing charges have fallen by more than 90 per cent since liberalization

Key learnings

> Liberalization of the international gateway is beneficial to the economy
> Liberalization needs to be done with a clear end-goal
> Consulting the industry in creating policy and regulations is crucial to identify potential problems early and minimize them

Case study 12 – Overview of international gateway liberalization in China

Overview

Maintaining international connectivity in today's era of globalization is essential for every country. One clear example is China's successful experience of reform and opening up (Figure 48). For more than two decades, China has attracted many multinational enterprises to develop business in China. As more and more multinationals move to and develop their businesses in China, more and more Chinese companies are expanding overseas and looking for opportunities in overseas markets. Through two-way openness, China has become the center of international business in the Pan-Asian region. The provision of end-to-end telecommunication solutions, as an enabler of international communications and foreign trade, is hence vital for national economic development

Digital Economy in China [RMB bn]
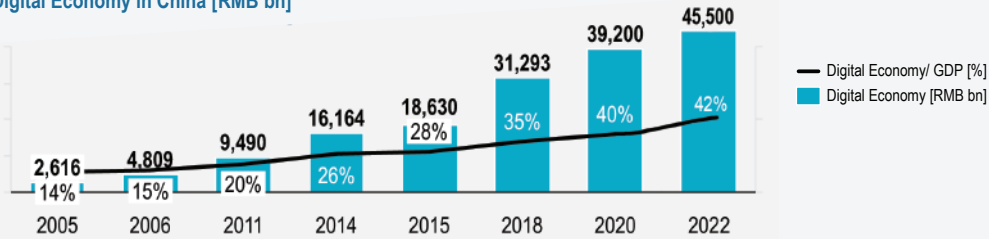
Legend: — Digital Economy/ GDP [%] ■ Digital Economy [RMB bn]

Data security

As the amount of data collected by governments increases, the need for ICT and data security increases. Generally, governments adopt three categories of ICT security measures: Technology, Governance and Regulations. Data security through technology involves advanced technologies such as data centers and blockchain, while governance involves the appointment of a governing body to oversee and manage risks and issues related to data security and cross-border data transfer Meanwhile, regulations involve drawing up of laws to minimize and manage risk involved. Figure 45 illustrates some examples of measures taken by benchmarked countries in each of the category.

Example of ICT/data security measures taken by benchmarked countries

1 Technology	Korea	Integrated Data Center Protects national IT resources from various cyber threats (hacking, viruses, DDos[1)]), prevents ~60k cyberattacks daily
	Estonia	KSI Blockchain: scalable blockchain technology developed to ensure integrity of data stored in government repositories; authenticity of the electronic data can be mathematically proven hence its full-proof from manipulation
2 Governance	Singapore	Cyber Security Group: Cybersecurity lead for the Government sector with a mandate to protect the Singapore government's ICT and Smart Systems
	UK	National Cyber Security Centre: Runs Digital Service Security which designs, builds and operates digital services to detect cyber attack
3 Regulations	Russia	Critical Data Infrastructure law: to ensure that Russia's critical data infrastructure is secure and stable in the face of cyber attacks, by informing federal agency immediately of any incidents and cooperate to detect, prevent and solve cyber attack issues
	Kazakhstan	'Cybershield' concept: Defines directions for the implementation of state policy to protect electronic information resources, information systems and telecommunication networks, ensuring the safe use of ICT

Figure 45: Example ICT/ Data security categories and measures taken by benchmarked countries

Regulation and licensing

To promote adoption of e-government services, and with the exponential increase in government data, there are several emerging data regulations and policies:

Electronic Government Act – To facilitate the efficient realization of electronic government, enhance productivity, transparency and democracy in the public administration (e.g., Korea).

Cybersecurity – Alongside the increasing usage of data, there is a growing demand for the enhancement and enforcement of data security and protection, as evident in the growing number of countries with cybersecurity legislation available online increased from 109 in 2018 to 136 in 2022[24].

Data privacy – Governments are articulating and publicizing privacy policies in an effort to promote transparency. The number of countries with privacy statements available on their e-government portals increased from 97 in 2014 to 142 in 2022[25].

Electronic ID – Several countries have mandated the use of e-ID at government agencies e.g., Estonia, Spain, Malta, which ultimately increases the convenience of using e-government services.

Key takeaways for Uzbekistan

- In terms of advancing rural connectivity, a few options can be explored to develop broadband in rural areas, such as through PPP and partnerships with technology players.

- The government of Uzbekistan should also consider adopting an integrated data center as it yields many benefits for the government such as security, operational efficiency and cost savings.

- The government of Uzbekistan may consider deploying cloud technology to improve its e-government development. It however, needs to be aware of and address several issues and challenges regarding cloud computing in the public sector such as security, privacy concerns, interoperability and data portability, identity and access management and auditing. Besides that, it needs to assess which cloud computing deployment model to adopt based on its strategy. For example, private and community cloud model allows more control in terms of security, privacy, while the public cloud offers a lower costs option. Another option would be a hybrid cloud with non-sensitive data processing done on public cloud.

- The government of Uzbekistan can consider adopting emerging technologies to offer innovative services to improve the daily lives of its citizens.

- In terms of data security, the government of Uzbekistan should adopt as many measures as possible in terms of technology, regulations and governance to develop a high level of data security.

- Lastly, there are several emerging regulations which Uzbekistan can consider adopting to promote the adoption of e-government services.

Operating model

The key role of an e-government is offering digital services to its citizens. In developing user centric e-services, several key steps and enablers are required. For instance, the government first needs to identify the relevant services to be digitized, followed by developing them based on user preferences (in terms of channel, user experience etc.) supported by data and infrastructure security, while constantly maintaining and improving the services. To effectively carry out these steps, the necessary resources such as data, infrastructure, human capital and funding should be coordinated and put in place.

As seen in various countries with leading e-governments, this can be accelerated through the formation of a central government body/ authority, or a 'project management center' (Figure 46).

Coordination of e-government by a project management center
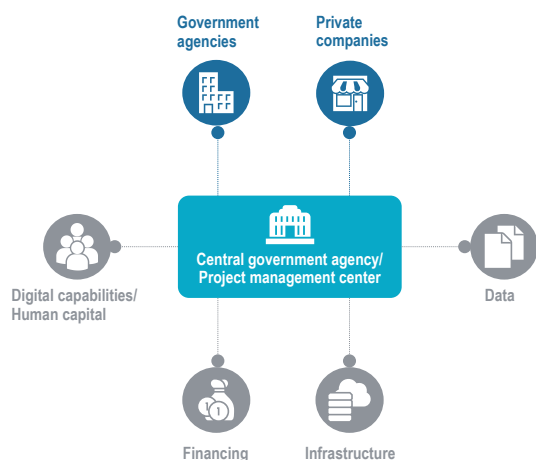
Figure 46: Coordination of e-government by a project management center

Singapore: Smart Nation and Digital Government Group (SNDGG) leads and coordinates development of e-government. Its role includes launching national projects (National Digital Identity, E-payments etc.), developing policies and strategies, working with ministries to develop plans for digitalization, coordinating enablers and resources (data, human capital, funding), procuring and coordinating private companies and leading ICT

infrastructure development in the government.

UK: Digital Government Service leads digital transformation in the government. Its main roles include building and maintaining platforms, products and services, working with ministries to understand citizens' pain points and needs in digitizing services and developing the government's digital capability.

Estonia: Information System Authority (RIA) coordinates and manages the data sharing ecosystem. X-road, procures and coordinates private sector involvement in the development of X-road (Case study 13).

Korea: E-gov project management center coordinates development of e-government services by prioritizing projects and developing a roadmap, coordinating projects and responsibilities of various government agencies and private companies involved, planning funding, human capital, and policies (Case study 14).

Besides, with the advancement of technology and digital services, additional digital skills are required for the upkeep and constant improvement of services. Countries with leading e-governments, including the four examples above, often form partnerships with private sector companies to support development of digital services and systems. Private sector companies have the know-how and specialized competency, as well as point-of-view of the citizens on how the services and user experience should be. Additionally, private companies may bring insights on the latest digital trends which can help the government constantly improve and innovate their service offerings.

Key takeaways for Uzbekistan

• As per countries with leading e-governments, Uzbekistan should form a project management center to lead and coordinate development of its e-government.

• The government of Uzbekistan should partner with private sector companies to develop its e-government services as they can add significant value by providing the necessary knowledge and skills to develop and constantly innovate services with the latest digital trends from the point-of-view of citizens.

Case study 13 – X-Road development and operations in Estonia

Overview
> The development and deployment of X-Road, Estonia's data sharing ecosystem which includes disparate databases, has been undertaken with extensive support from the private sector. The IT sector has been an integral part of the X-Road build since inception and continues to contribute in the running the platform

Role of e-Gov project management center
> Information System Authority (RIA) plays the role of the coordinator and the implementer by managing the functioning of X-Road. Specifically, it registers new members, documents data exchange between members, and supervises the security of the info systems. For example, RIA verifies and registers trust service providers - critical participants on X-Road

Role of private sector
> Private companies have been engaged to support X-Road on various roles, from development of the system, maintenance, operations to security. Examples of private companies and roles include:

> **CYBERNETICA** Cybernetica: Develop the first version of X-Road that was launched in 2001 and has since been involved in continuous development of the platform. The company has also been a critical player in developing the ID card and the i-voting solution

> **aktors** Aktors: a software company with competence in creating eGovernment infra, to develop and maintain the MISP which is a portal for small org. to access X-Road Trust service providers (TSPs) and helping in the effective running of X-Road. TSPs are commercial thirdparty vendors that provide services such as certification, OCSP, and timestamping. These services are important for security and help maintain integrity of the data exchanged on X-Road

Impact
> Estonia has been able to digitise 99% of government services; Today, over 1,000 organizations (both public and private) in Estonia use X-Road daily
> Saves Estonians 844 years of working time every year, for example companies can be incorporated in under 20 minutes and taxes can be submitted in five
> X-Road has also been implemented in Finland, Kyrgyzstan, Faroe Islands, Iceland, Japan while similar tech based on the Estonian interoperability experiences has also been implemented in Ukraine and Namibia

Key learnings
> **Single point of accountability to manage the various stakeholders enables effective management**
> **Ensure the right capabilities** – The Estonian ICT cluster is a collaborative platform that brings together public and private enterprises to create solutions together. Most of the e-solutions in Estonia have been created with ICT cluster partners. For example, the government sought the expert capabilities of
> **Cultivate network of innovators** – Government has taken numerous initiatives to support org./ developers in the effective usage and successful implementation of X-Road, e.g., developing training materials for developers; Also created global X-Road community of developers, users, service providers, etc., who help test and improve the code.

Case study 14 – Development of e-government in Korea

Overview

The development of Korea's e-government was carried out in 4 stages and the process was supported by an e-government special committee which consisted out experts from the private sector as well as private companies and the education sector. The e-government of Korea maintains centralized database integrating information from all agencies/ ministries

Role of e-Gov project management center

> Prioritization of projects and roadmap development, coordinating projects and responsibilities of various government agencies as well as with private and education sector, financial planning, policies and regulations

Role of private sector

> Provided expertise in policy development, and private companies participated in the development of e-government services

Impact

> Successful development of various e-government projects, increase in public sector efficiency and in administrative services
> Korea has consistently ranked in the top five of the Online Services Index since 2014 and ranked 3rd in the UN EGDI Index in 2022.

Key learnings

> The private sector plays a crucial role in e-government development, especially in policy development and development of e-services
> A well-organized implemented framework is important in the successful development and execution of projects, with clear roles and responsibilities of various agencies, committees and private sector

Resource utilization

Human capital and financing are two key enablers required to support the development of e-government.

As one of the three components considered in the UN e-government development index, human capital provides the necessary manpower, skills and knowledge to run a successful e-government. Large resource of human capital is essential especially during this period to adopt emerging technologies and advance the digital services offered by governments. Governments are increasingly prioritizing advancement of human capital and have formed various development strategies as seen with the government of Singapore (Case study 15)[26]. Human capital can be developed either within the government or externally, through collaboration and education. Development within the government will involve training of civil servants, while external development involves collaboration with industry and research institutions and educational scholarships to nurture digital talent.

Case study 15 – Initiatives for development of Human Capital in the e-government of Singapore

Internal development	**Government Chief Digital Technology Officer** Head of Profession with leadership in critical areas such as technology master planning for Whole-of-Government (WOG), competency development and manpower planning **Upskilling public service officers** > To train 20,000 officers in data science by 2023 > Developed digital literacy framework and training plan including ICT competencies for specific job functions > Digital Academy to uplift the digital skills of public service officers > On-the-go training courses through the public sector-wide LEARN app **Centre of Excellence (or CentEx) for ICT and Smart Systems** > House capability centres such as Data Science and AI, ICT infra, Application dev., Sensors and IoT, Cybersecurity etc. > Support development of ICT skills and leadership for WOG through building in-house reserve of deep technical skills, raising capabilities of ICT practitioners etc.
External development	**Cross-sector collaboration** > Collaborate with industry & research institutions to learn from industry and R&D players to deepen knowledge and stay ahead of technology trends > Identify and engage key strategic partners for Smart Nation and Digital Government interests and support in building up capabilities **Smart Nation Scholarship** > Launched in 2018 to identify young ICT engineering talent to fill technical leadership positions (e.g., Chief Data Scientists) in the future

Successful development of e-governments requires strategic, sustained, and clearly planned funding models. As e-government advances with emerging technology, continuous funding is needed to drive innovations and re-engineering of business processes. There are various options to fund development of e-government (Figure 47) with PPP being the most common but ultimately each model has its own advantages and risks. Selection on which model to adopt should be decided case-by-case and based on the strategy of the government.

E-government funding models

	Funding model	Advantage	Risks/ disadvantage
Government funding	National budget	Stable funding stream planned by the government, no additional cost of funding (interest)	Limited and potentially insufficient, especially for additional projects
Borrowings	Loans	Several options of development partners to borrow from e.g., World Bank Group, Asian Development Bank	Additional cost of funding will be incurred
	Bonds	Cheaper alternative to bank loans	Additional cost of funding will be incurred
Partnerships/ Leasing	Public-private partnership	Less capital expenditure as it is paid by the private sector, opportunity to leverage competency of private sector	Management of infrastructure/ hardware/ software is dependent on private partner, risk of incompetency
	Software leasing	Less upfront capital requirements as payment is made periodically	Property not owned by the government
	Share-in-Revenue/ Share-in-Savings	Lower upfront capital expenditure as payment to vendor is made periodically through revenue/ savings incurred, externalization of risk	Lower revenue for a period of time as a portion of revenue/ savings needs to be paid to the vendor
Paid by the citizens/ users	Taxes (e.g., VAT)	Steady source of funding from the citizens	Potential dissatisfaction among citizens as a result of additional taxes
	Pay-for-use	Potential recoupment of investment cost	Potential dissatisfaction among citizens and lower adoption of e-service
Indirect revenue	Indirect revenue from advertisements on portal	Additional source of revenue to help recoup investments	Amount/ content of ads needs to be controlled, potential data/security risk

[ ] Most popular model

Figure 47: E-government funding models

Key takeaways for Uzbekistan

- Human capital is crucial for the development of e-government and should be a priority for Uzbekistan, given its "Very High" ranking in the UN E-Government Index, 2022.

- Development of the local digital ecosystem should be considered given the large role the private sector can play in supporting e-government development, including being a source of human capital with digital skills.

- Sustained funding is essential for the sustainable development of e-government.

- There are various models of funding, but selection on which model to adopt should be decided case-by-case and based on the strategy of the government.

Overall, through benchmarking relevant countries, we have identified the following key takeaways from which Uzbekistan can learn from to further develop its e-government.

Key takeaways from global benchmarking

Vision and strategy

> Comprehensive strategy with clear vision and strategy, actionable implementation plan and focus on key enablers should be developed

> E-government development should be led and supported from the top .e.g., President

Service offerings

> Uzbekistan may increase # of services offered, digitizing should be based on user volume

> To promote adoption, mobile first strategy and unified portal should be adopted with promotional campaigns also an option

Data architecture

> Data is key in development of digital services hence interoperable data systems for convenient data sharing and open data should be adopted

> Central authority for data governance should be appointed to oversee data architecture

Infrastructure

> Financing and technology can be leveraged to expand broadband availability, including to rural areas

> IPv6 and its innovations can guarantee the Internet sustainability development and innovations

> Integrated data center and cloud platform yield various benefits for e-government development

> Emerging technology such as IoT can be used to offer advanced services to improve citizens' lives

> International gateway liberalization can promote adoption of e-government services

> Data security can be enhanced through technology, governance and regulation

> Supportive regulations should be adopted to promote digital services adoption

Operating model

> Dedicated team and skills are needed to lead and coordinate e-gov development

> Private sector can contribute significantly to the development of e-government

Resource utilization

> Digital human capital can be developed internally and externally through partnerships

> Various financing options exist to support e-government development

Figure 48: Key takeaways from global benchmarking

04

CHAPTER

Uzbekistan e-government target and vision

4 Uzbekistan e-government target and vision

Uzbekistan has launched a focused e-government program since 2013 and seen some credible results on this front. As discussed in Chapter 2, the development of e-government is a vital part of the Digital Uzbekistan 2030 strategy.

Under the leadership of President Mirziyoyev, the e-government of Uzbekistan has been rapidly developing with a remarkable expansion of available services online. As of 2020, Uzbekistan was among the top 20% of countries worldwide in terms of online services of e-government according to the United Nationa E-Government Development Index.

To facilitate further development of the e-government, Uzbekistan would need to increase adoption of digital e-government services and further develop its supporting ICT infrastructures. Both areas are outlined in the Digital Uzbekistan 2030 strategy. The Presidential Decree on "Approval of the Strategy Digital Uzbekistan 2030 and measures for its effective implementation" has also been established in 2020.

While Uzbekistan's previous national ICT strategy for the period 2013-2020 focused on e-government and ICT infrastructure, Digital Uzbekistan 2030 is envisioned to be a much broader and comprehensive vision for what digitalization means to Uzbekistan.

The strategic thrusts and key enablers of Digital Uzbekistan 2030 will continue to build on the areas of e-government and ICT infrastructure to achieve broader and more ambitious targets.

Uzbekistan government-led digitalization programs
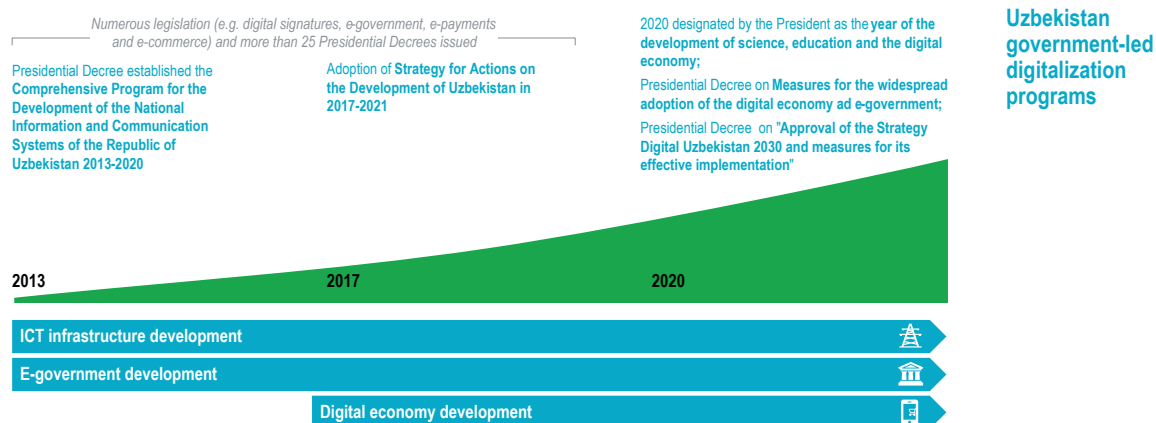
Figure 49: Uzbekistan government-led digitalization programs

The Digital Uzbekistan 2030 strategy will not only aim to accelerate widespread adoption of digital government services across all segments of the economy and society, but also seek to enhance the related cloud and big data infrastructure deployment and relevant operation.

Under the leadership of President Mirziyoyev, the electronic government of Uzbekistan is rapidly developing, significantly expanding the range of available electronic services. As of 2022, according to the United Nations e-Government Development Index, Uzbekistan is among 35% of the countries in the world in terms of the quality of available e-government services.

In Chapter 4.1 and 4.2, the strategic vision for Uzbekistan e-government and its target digital government service portfolio, interface/channel and data architecture will be discussed. Following this, Chapter 4.3 will look into the target infrastructures, including the cloud architectures, cloud data center, as well as the network infrastructures, to support Uzbekistan e-government implementation and delivery. Chapter 4.4 will address the potential operating models for the e-government implementation in the short, mid and long term.

Strategic thrusts and enablers for Digital Uzbekistan 2030
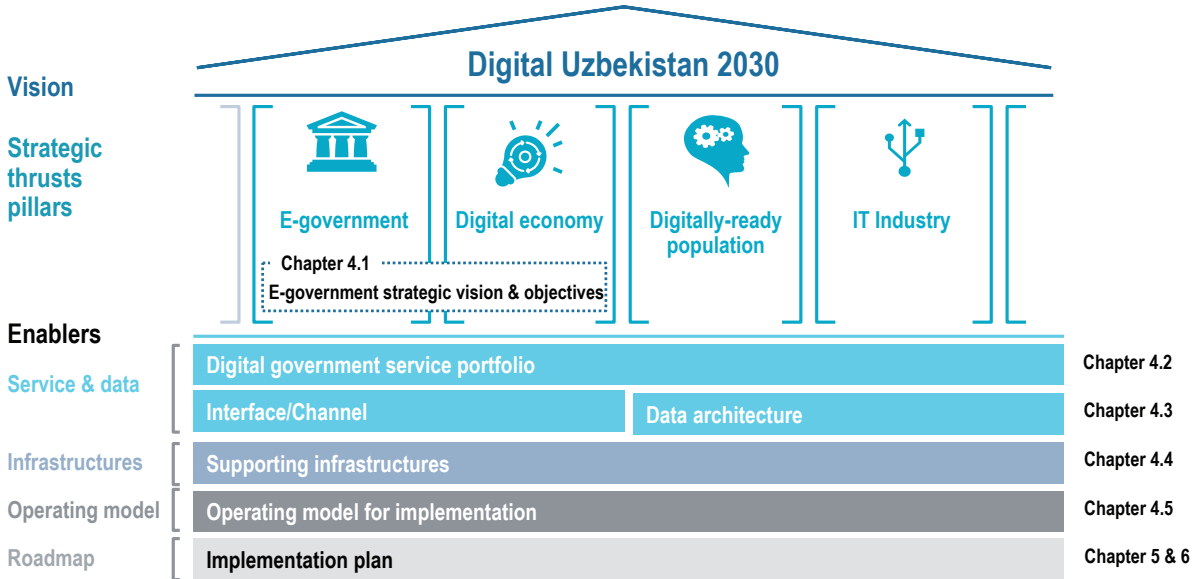
Figure 50: Strategic thrusts and enablers for Digital Uzbekistan 2030

4.1 Strategic vision for Uzbekistan e-government

Under the concept of Digital Uzbekistan 2030, President Mirziyoyev has envisioned a broad and comprehensive vision for digitalization to permeate into every aspect of Uzbekistan as a nation, including but not limited to the government, industry, economy, education, innovation, and people.

The National Digital Uzbekistan 2030 vision is based on the following main principles:

Principles of Digital Uzbekistan 2030

> People's power ensuring citizen's rights and freedoms
> Systemic innovation based market approach
> Decision-making based on quality and accurate data
> Development of digital culture and competencies
> Results based orientation

> Establish a developed digital society
> Improve the quality of life for population

> Efficient and open public administration
> No bureaucratic barriers and corruption
> Increase competitiveness of the country's economy
> Ensure security and welfare of the people
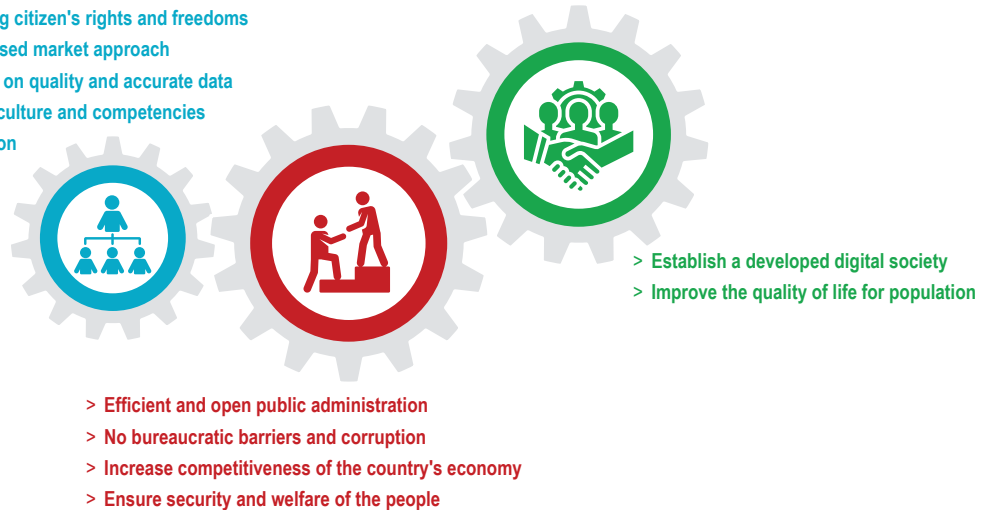
Figure 51: Figure 51. Principles of Digital Uzbekistan 2030

In the coming decade, the national vision for digitalization in Uzbekistan is to achieve widespread adoption of digital technologies across all parts of society, driven by a strong national execution plan and strategy. This represents a strong desire to make e-government a reality for all government agencies, for the digital economy to encompass all economic sectors, and for digital connectivity and skills to be available to all levels of the population.

As a vital part of Digital Uzbekistan 2030 strategy, the e-government has been rapidly developing with a remarkable expansion of available services online. To facilitate further development of the e-government, Uzbekistan would need to increase adoption of digital e-government services and further develop its supporting ICT infrastructures.

The next ambition of the Uzbekistan e-government development is to achieve five key strategic objectives. The first strategic objective is to accelerate digitalization to increase access to self-service e-government services to 90% by 2030. Today, the share of services provided through the Single Portal of Interactive Public Services (SPIPS) is 48% compared to 52% of public services administered through Center of Public Services (CPS) with the assistance of center employees. The second strategic objective is to ride on the progress of the recent ONE ID implementation to accelerate wider adoption of e-government services. Uzbekistan has managed to measurably increase the number of users of e-government services from 1.1% of the population in 2020 to 5% in 2021, and is estimated at 11.1% at the end of 2022. The third strategic objective is to further develop the supporting ICT infrastructures, in particular the related cloud and big data infrastructure deployment and associated operation to support successful implementation of the e-government services. The fourth strategic objective is to increase the rating of Uzbekistan in the UN e-Government Development Index (EGDI) to the level of 0.86, which will allow Uzbekistan to enter the top 50 countries in the world in terms of digital government development by 2030. The fifth strategic objective is to contribute to building a robust ICT landscape in Uzbekistan that supports growth for the local ICT industry (in both human capital and businesses) and improve quality of lives for the country's population.

Uzbekistan ICT and E-Government Cloud Business

Key strategic objectives for Uzbekistan e-government development

E-government development strategic objectives

Accelerate digitization

Increase access to self-service e-government services to 90% by 2030, up from 66%[1] in 2022

Increase adoption

After the introduction of ONE ID, increase the **number of users** of electronic public services to 18% of the population by the end of 2023 compared to the current 15%

Develop supporting ICT infrastructures

Develop/enhance the related **cloud and big data infrastructure deployment and relevant operation** to support successful implementation of the e-government services

Improve international ranking

Advance Uzbekistan's ranking in the United Nations **E-Government Development Index** (EGDI) to a score of 0.86 by 2030

Grow the local ICT industry and **improve quality of lives**

Contribute to building a **robust ICT landscape** in Uzbekistan that supports **growth for the local ICT industry** (in human capital and businesses) and **improve quality of lives** for the population

1) Government services administered through SPIPS (single portal of interactive public services), compared to 34% administered through centers of public services (CPS)

Figure 52: Key strategic objectives for Uzbekistan e-government development

To achieve these strategic objectives for Uzbekistan's e-government development, each of the enablers, namely Service & data, Infrastructures and Operating model, play instrumental roles.

Enablers for Uzbekistan e-government development

Enablers

Service & data
- Digital government service portfolio
- Interface/Channel
- Data architecture

Infrastructures — Supporting infrastructures

Operating model — Operating model for implementation

Roadmap — Implementation plan
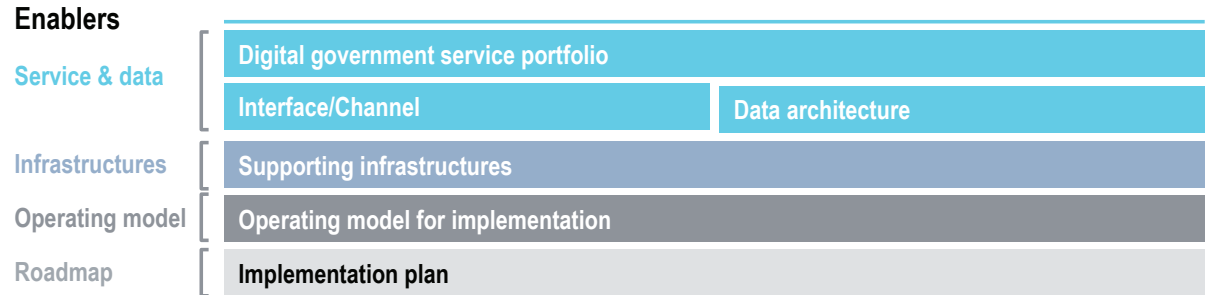
Figure 53: Enablers for Uzbekistan e-government development

Service & data cover the development of the e-government target services portfolio, interface/channel and data architecture. The target services portfolio will define the scope of Uzbekistan's e-government development and involve identifying the list of government services to be digitized which will contribute to Uzbekistan's target of increasing self-service access to e-government services to 90% by 2030. The development of target services portfolio should also consider broadening the e-government target segments beyond

individuals to enterprises, that is to extend from Government-to-Citizens (G2C) services to also encourage higher usage in Government-to-Businesses (G2B) services. In addition, extending e-government offering to data services can be explored in the long term. This portfolio of target services will then need to be prioritized and phased to ensure efficient and effective use of resources in implementing the services. Based on this target services portfolio

and its target segments, the multi-channel/interface approach should be designed to meet their specific needs and preferences for e-government services. With the target services portfolio and its interface/channel defined, the associated data architecture and governance model can be structured to ensure it facilitates enhanced user experience in the delivery of service offerings.

Service & Data enablers
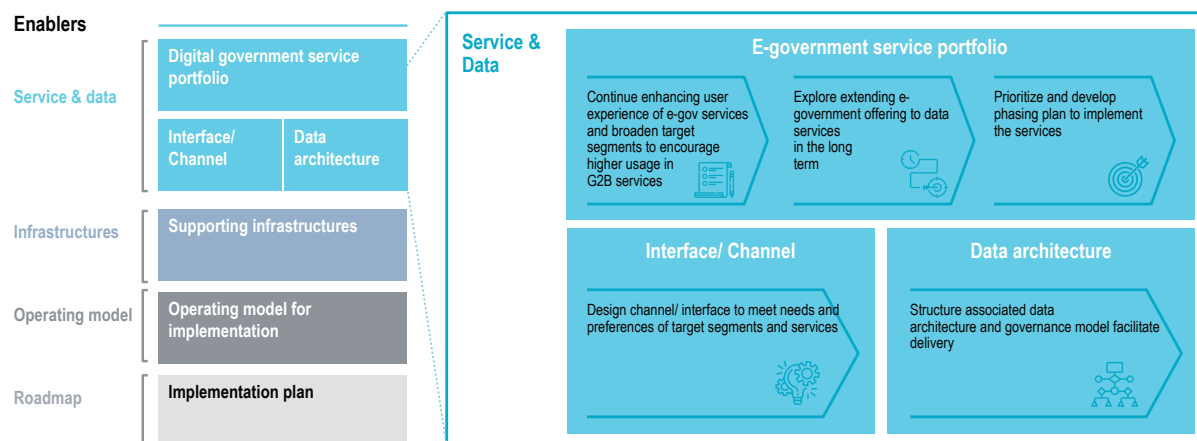
Figure 54: Service & Data enablers for Uzbekistan e-government development

The infrastructures enabler plays a critical role in each phase of the e-government development of a country. Infrastructures development ought to be the foundation on which all e-government services and all other digitalization initiatives are built. To implement all e-government solutions and to be able to achieve the e-government development goals by 2030, Uzbekistan should outline the development of ICT infrastructure as a primary building block.

Operating model covers the definition of key participants contributing to the development of Uzbekistan's e-government and their role and responsibilities in the journey. Given Uzbekistan's ambition for its e-government development, some form of private sector participation could catalyze the implementation efforts. Different operating models involving varying degree of private sector participant should be evaluated to determine the best-fit model to adopt at each phase of Uzbekistan's e-government development.

4.2 Target services portfolio

One of the important first steps in building the enablers is to define the target services portfolio. The target services portfolio, if carefully designed and phased, will bring amplifying effects to increase adoption and serve as the basis for a structured approach in developing the supporting ICT infrastructures. These successes will in turn form key building blocks to uplift Uzbekistan's international ranking in especially in the ICT Development Index and the United Nations E-Government Development Index (EGDI), and to generate growth impetus for the local ICT industry and improve quality of lives for the population.

In this chapter, we will take into account both the key findings from current situation and best practices from benchmarks as the basis to develop a recommendation on the way forward for developing the service & data enabler.

Structure of discussion in this chapter
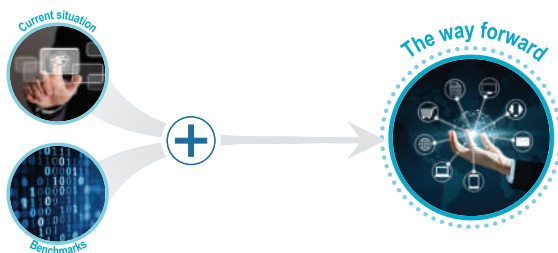
Figure 55: Structure of discussion in this chapter

Current situation

As of the end of 2022, 371 (47%) out of 774 public services in Uzbekistan are available online through the SPIPS portal. The number of available services has grown significantly since 2019 with an average growth rate of +27% per year, which indicates a high level of development of services in Uzbekistan and contributes to its high position in the Electronic Services Development Index (OSI).

Uzbekistan's e-government services cover a wide range of the most vital categories for individuals and enterprises, from tax filing, to business registration, applications for social security, and applications for driving licenses. Services on the portal are grouped into 17 categories. The three most popular categories of electronic public services for individuals are: getting acquainted with the credentials of legal entities and individual entrepreneurs, information on the place of permanent

residence, applying for a child to a preschool educational institution, and for organizations - submitting data on foreign trade contracts to the Unified Electronic information system of foreign trade operations, registration of a cadastral passport, familiarization with the credentials of legal entities and individual entrepreneurs.

Today, individuals use e-government services more often than organizations. In 2022, 18.4 million applications for services were processed, of which 98.2% came from individuals and 1.8% from organizations. It is possible to expand the target portfolio of services in order to increase the level of use of public services for business (G2B) on the SPIPS portal.

Uzbekistan also has some innovative online services unique to the country, for example eJarima, which allows citizens to submit dashcam recordings of traffic violations to the state traffic safety service in return for financial incentives. While the services portfolio includes services of various complexity, ranging from informational, to interactive, transactional, and transformational services, the Uzbekistan e-government does not yet pursue data services such as data analytics and data application services.

To achieve the strategic objective in shifting from offline to online access to reach the target share of 90% of services administered through SPIPS (as compared to offline channel CPS), Uzbekistan would need to develop a targeted approach to expand its service offering on SPIPS. Currently however, there is neither a structured approach to prioritize the list of services in the pipeline nor a phasing schedule planned.

Benchmarks

Across the world, the benchmarked countries adopted strategies that focus on digitization based on the highest user volume and most frequently used e-government services. This is to promote adoption and produce quick wins early in their e-government development journey. The target services portfolios also ensure holistic coverage of both G2C and G2B services to encourage e-government services usage by both individuals and enterprises.

For example, the UK government undertook a 400-days Transformation Program to digitize

25 services with the highest user volume to begin the journey of digitizing its government services. This strategy was impactful as the 20 digital government services covering both G2C and G2B services were used by 10% of the UK population within the first 2 years of launching. A structured approach to define the prioritized services, user-centricity and tangible benefits in addressing current pain points of both individuals and enterprises are key success factors for the UK Transformation Program, setting the stage for wider adoption and broader e-government service implementation in the long term.

In Kazakhstan, the e-government development journey was phased with the target services segmented based on their varying levels of complexity for digitization. Services which are less complex for digitization such as informational queries are implemented early in their e-government development journey. Subsequently, the target services portfolio expanded to interactive, transactional and transformational e-government services, as the supporting infrastructures are developed and adoption went on a strong upward trajectory.

As Uzbekistan progress through the e-government development journey, it can also take reference from various initiatives in more advanced countries which have successfully pursued data services as part of their e-government development. Australia has implemented the Data Integration Partnership program, where data from the Bureau of Statistics is combined with business tax data and data on government programs to provide a better understanding of the performance of Australian businesses and the economy. In Singapore, the Enterprise Data Hub, an inter-agency data-sharing platform that provides public officers with easy access to verified, identifiable business data was created. Embedded within the platform is also a self-service data visualization tool which public officials can use to conduct data analytics.

UK's prioritization of e-government services for implementation

The UK govt. began digitizing its services through a 400-days Transformation Program, focusing on its **25 highest volume services first**:

	Example service	Description	Impact achieved
Govt-to-Citizen	Visas	Online visa application service for visiting the UK	3.4m visas issued/ year
	Digital Self Assessment	Fully digital tax management	10m registered for Self Assessment
	Registered traveler	Apply to use e-passport gates for frequency travelers to the UK	1m journeys/ year
	Student finance	Application and management of student loans and grants	1.3m students supported
	View driving license	View information from record, incl. eligible vehicles & disqualifications	6m enquiries/ year
	Carer's allowance	Apply for financial help from government	3.2m carers in the UK
	Register to vote	Digital service to make registering to vote simpler &faster	37m on new electoral register in 1st year
	Find an apprenticeship	Quick and easy advertisement/ application for an apprenticeship	1.8m apps / year
Govt-to-Business	Your tax account	Tax management for businesses	5.2m SMEs
	Renew a patent	Quick and easy online renewal of patents	380k renewals/ year
	20 new digital services successfully launched with was used by **10% of population in the first 2 years**		

Figure 56: UK's prioritization of e-government services for implementation

Kazakhstan's phasing of e-government service implementation

	Informational	Interactive	Transactional	Transformational
Description	> Electronic government web-portal with various info on govt. agencies and regulations	> Electronic services which require inputs from the user	> Electronic services involving payment transactions	> Combination of interactive and transactional services
Services available for citizens	> Necessary information such as list of documents requirement, sizes of state duties, contact information of state agency etc.	> Services involving sending interactions with government agencies e.g., registrations, applications and licensing etc.	> Services involving payments e.g., taxes, fees, fines and utility services etc. > Government procurement	> End-to-end digital interactional and transactional services e.g., register legal entity, replacement of ID card or driver's license etc.
Requirements	> Information portal > Static data > Skills to develop and maintain portal	> Interactive portal > Dynamic data > Coding skills for interaction with user input > Greater security requirements	> Interactive portal with e-payment gateway > Dynamic data > Coding skills for interaction and processing of info > Greater security needed with higher involvement of user data	> Interactive portal with e-payment gateway > Dynamic data > High complexity coding skills for end-to-end digital services > Greater security needed with higher involvement of user data

Level of complexity

Figure 57: Kazakhstan's phasing of e-government service implementation

Australia's data services through implementation of Data Integration Partnership Program

What is the data integration partnership for Australia?
DIPA is a whole-of-government collaboration between 20 Commonwealth agencies, and includes:

Data infrastructure and integration
The Australian Bureau of Statistics (ABS) and Australian Institute of Health and Welfare (AIHW) deliver the core technical infrastructure to support DIPA. They provide technical tools to integrate and link data, including the production of enduring longitudinal and integrated data assets.

Data assets delivered by the Departments of Social Services (DSS); Health (Health); Education and Training (DET); Finance (Finance); and Office for National Assessments.

Data analytical units led by the Department of the Prime Minister and Cabinet (PM&C); DSS; Health; DET; Environment and Energy; Industry, Innovation and Science; and Finance.

Better communication and engagement about data initiatives, led by PM&C **Technical review and advice** provided by Data61 who perform an assurance and advisory role.

The **Data Integration Partnership for Australia (DIPA)** is a **three-year $130.8 million investment** to maximise the use and value of the Government's data assets. Through data integration and analysis, the DIPA **creates new insights into important and complex policy questions.**

The DIPA will:

> Improve technical data infrastructure and data integration capabilities
> Preserve the privacy of individuals and ensure the security of sensitive data
> Improve data assets in important areas such as health, education and social welfare
> Maximise the use of these assets through data integration and analysis

Analytics 1 Analytical units use integrated data to solve complex, cross-portfolio policy issues

Datasets 2 Whole-of-Government data assets supported by ABS & AIHW infrastructure to link and integrate data

Environment **Business** 3 Data drawn from population, business and physical environment
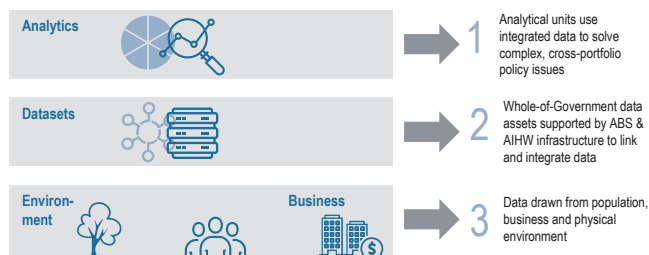
Figure 58: Australia's data services through implementation of Data Integration Partnership Program

The way forward

With strong motivation for e-government development and remarkable progress made so far, Uzbekistan is in a position to scale new heights in accelerating digitization of government services. There are three main thrusts to gain traction in the digitization, namely (1). broaden the target services portfolio beyond Government-to-Citizen (G2C) services to drive higher usage in Government-to-Businesses (G2B) services on SPIPS (unified portal for interactive government services), (2). explore extending e-government offering to data services in the long term, and (3). establish a structured approach to prioritize the list of services in the pipeline hence developing a phasing schedule for implementation.

Service enabler for e-government development

E-government service portfolio

Continue enhancing user experience of e-gov services and broaden target segments to encourage higher usage in G2B services

Explore extending e-government offering to data services in the long term

Prioritize and develop phasing plan to implement the services
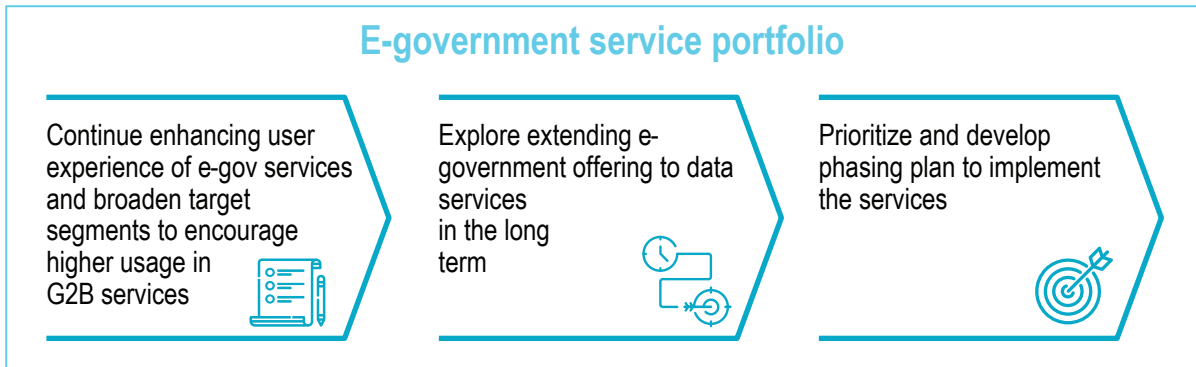
Figure 59: Service enabler for e-government development

Continue enhancing user experience of e-gov services and broaden target segments to encourage higher usage in G2B services

The Uzbekistan government has put in place the Public Service Register[27], which is a single register listing all unique government services offered to individuals and legal entities by the various government bodies. The roll out of this centrally consolidated register of all government services and documenting their mode of delivery (electronic or traditional form) is an important first step in building a structured approach for developing Uzbekistan target e-government services portfolio.

To achieve the strategic objective in shifting from offline to online access for existing government services, two areas should be addressed. First is to continue enhancing the user experience of the existing e-government services, such as application features and intuitive navigation. Second is to transition more government services to electronic delivery. As of the end of 2022, 48% of services from the Register of Public Services are fully or partially provided electronically, while 52% of services are still provided in the traditional form. This indicates the existence of a pool of about 400 services (by the number of unique numbers in the register of public services) that need to be considered for full or partial digitalization in the future.

Services covered in Public Service Register

Uzbekistan Public Service Register

Single register of government services
> List of government services offered to individuals and legal entities by the various government bodies

Services in Public Service Register by the mode of delivery [number of services[1]]

~48% Digitized (fully/partially delivered in electronic form)

~52% Not yet digitized (delivered in traditional form)

Pipeline of government services to be reviewed for full/ partial digitization

Services in Public Service Register which are not yet digitized (delivered in traditional form) [number of services[1]]

	~400	~180	~250
G2C	18%	20%	17%
G2B and G2C	45%	35%	51%
		46%	
G2B	38%		33%

Government services not yet digitized (delivered in traditional form) | No payments involved (free services) | Payments involved (paid services)

■ G2C   ■ G2B and G2C   ■ G2B

1) Based on count of unique public service register number in the Public Service Register

Figure 60: Services covered in Public Service Register

Of these services still delivered in the traditional form, 18% are G2C, 45% are G2B and G2C, and 38% are G2B. Going forward, the next phase of government services digitization should see a broader focus on G2B related services. The Uzbekistan e-government should continue to anchor on the good progress it has made on the digitization so far to continue

Overall, 38% of services still delivered in the traditional form are free government services while 62% are paid services involving some form of payment. Digitizing services involving payment are more complex than that of services not involving payment. Therefore, the latter is likely to be more feasible as digitization quick wins than the former. Within this group services not involving payment, almost half (46%) are

G2B services. This subset of G2B services could be potential quick wins for the next phase of Uzbekistan's e-government digitization and include services such as issuance of certificates or permits, and conclusion of compliance to specific requirements.

The abovementioned is but a preliminary review of the digitization pipeline based on limited information. While it indicates a general direction for the focus going forward, it is imperative to consider a holistic approach for assessing the feasibility and impact of each of these services to prioritize and phase for implementation. The recommended holistic approach for prioritization of Uzbekistan's e-government target services portfolio will be discussed in the next section in this chapter.

Government services by mode of delivery and examples of G2B services not yet digitized

1) Based on count of unique public service register number in the Public Service Register
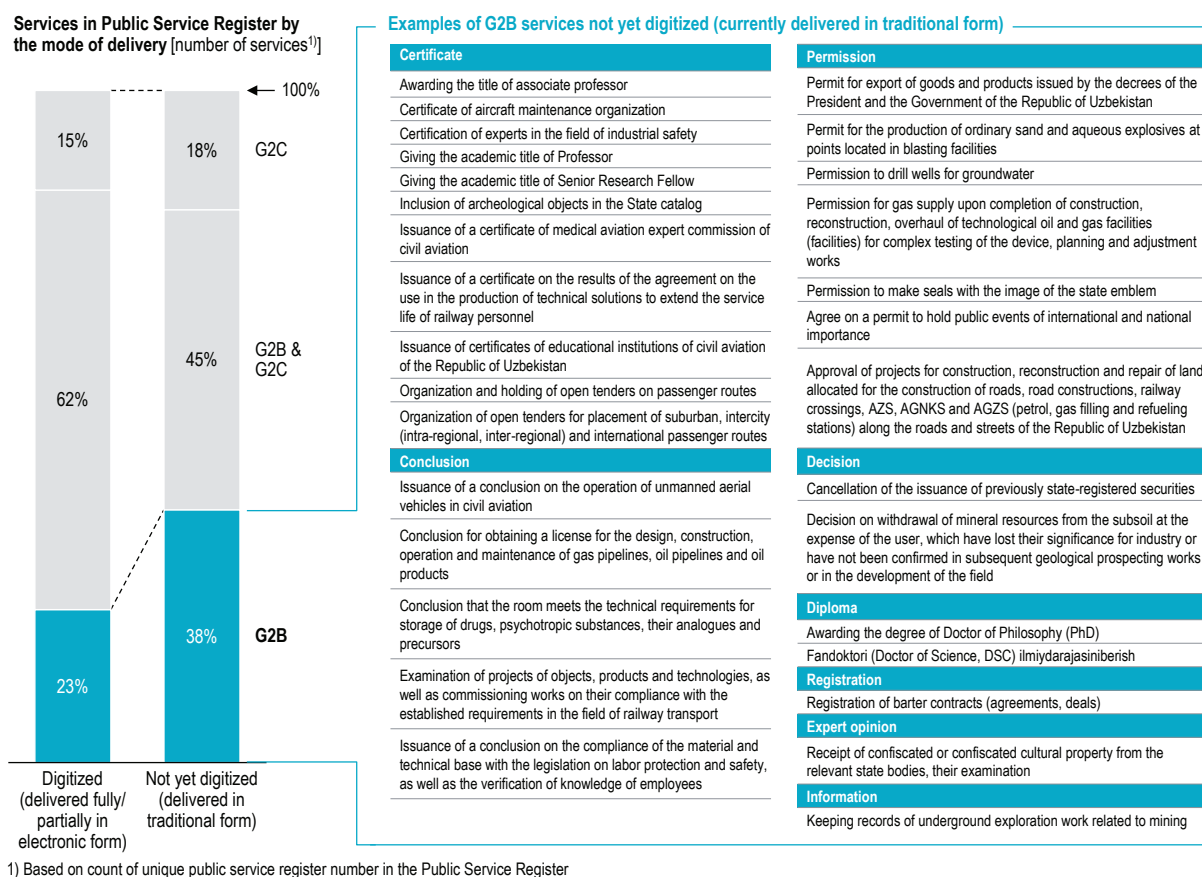
Figure 61: Government services by mode of delivery and examples of G2B services not yet digitized

Explore extending e-government services to data services

In the long term as Uzbekistan matures in its e-government development journey, it can consider emulating more advanced countries which have successfully pursued data services as part of their e-government development. Beyond its current government services, Uzbekistan can explore extending e-government offerings to various data services progress ranging from data warehouse and data governance to more advanced services such as data analytics and smart advisory.

Extension of e-government offerings to data services
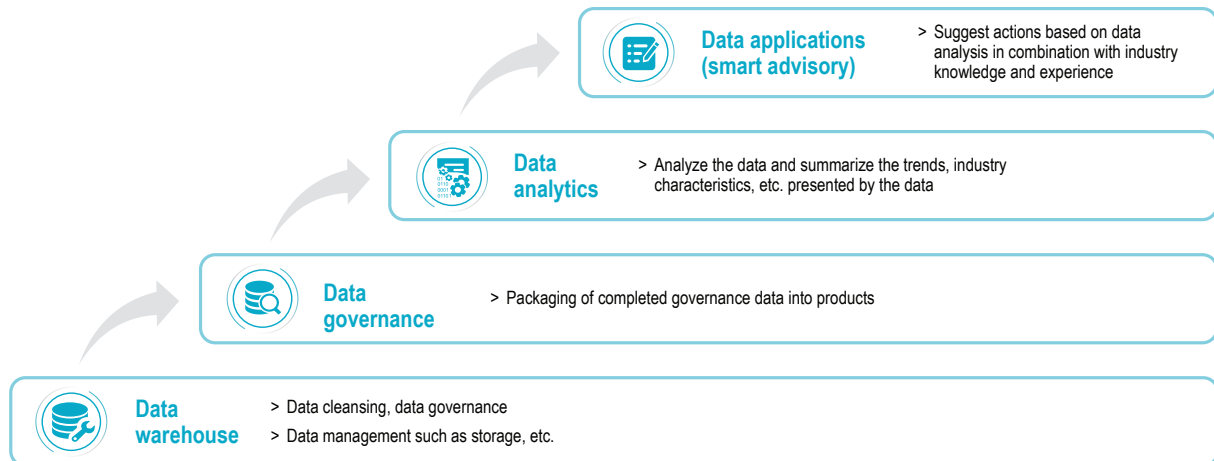
Figure 62: Extension of e-government offerings to data services

There are four areas of big data applications which Uzbekistan can consider focusing on for developing its e-government data service offerings. Based on benchmarks, the four areas of big data application which typically drive the highest domestic demand are namely, public security, healthcare, financial services, and urban transport.

Big data applications for public security revolves around community security enforcement, traffic flow optimizations, and improving efficiency of public security related case detections.

For healthcare, the big data applications are focused on promoting research and development of new drugs, screening of medical cases, and medical resources allocation.

In financial services, big data are increasingly playing pivotal roles in managing credit, fraud, operational and market risks, as well as customer acquisition and retention.

Big data applications for urban transport are commonly seen in city operation status display, rapid response to traffic incidents, and predictive models to prevent and warn of specific events.

Overall, extending e-government services to these data services will set the foundation to support the development of the broader digital economy while further advancing e-government developments.

Typical areas drive highest domestic demand for big data applications
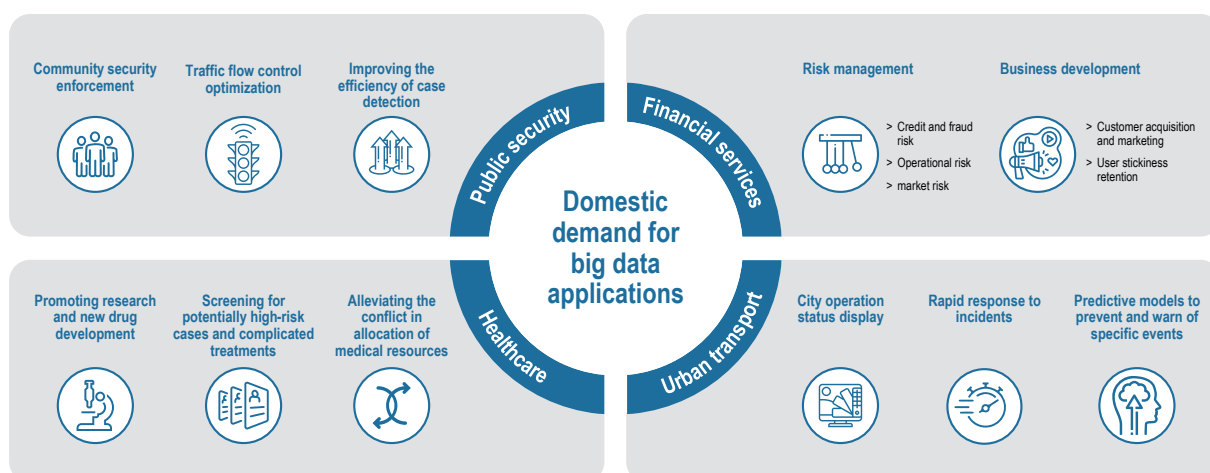
Figure 63: Typical areas drive highest domestic demand for big data applications

Examples of services catering to the typical areas of big data applications

Big Data Applications for Public security

Community security enforcement

Each community police officer is responsible for the information of hundreds of thousands of households, and with the help of big data to supervise the movement of people can quickly and accurately **gain insight into the dynamics of each household and understand the potential risks**

Traffic flow control optimization

Real-time **signal adjustment** based on city camera data, Internet data (e.g. navigation) and traffic police intersection duty data **to optimize road traffic efficiency**

Improving the efficiency of case detection

With comprehensive external data, you can accurately grasp the current and past behavior of the target group, location and other important information, **providing important clues for case detection**

Big Data Applications for Healthcare

Promoting research and new drug development

Raw data can provide more realistic and valid case information for the R&D process, **improve experimental accuracy and drive the R&D process**

Screening for potentially high-risk cases and complicated treatments

Complete data on past visits **provides** health care workers with **the information necessary to** make professional medical judgments and to take prompt medical action

Alleviating the conflict in allocation of medical resources

With the help of big data to identify regional patient characteristics and surrounding medical resources, **medical resources can be allocated** more **efficiently, alleviating the problem of medical resource allocation**

Big Data Applications for Financial services

Risk management

Credit and fraud risk
Guarantee the accuracy of credit evaluation rating and information matching through comprehensive credit investigation to reduce credit risks; involving credit evaluation for enterprises and credit cards, P2P, and consumer finance for individuals

Operational risk
Use financial big data as a core technical tool to **screen for non-compliant business operations**, such as illegal fund raising, financial fraud, irregular fund operations, etc.

Market risk
More accurate asset valuation and pricing through comprehensive analysis of multi-dimensional data of enterprises, e.g. valuation & pricing of insurance assets & credit assets

Business development

Customer Acquisition and Marketing
Precision marketing for high potential customers with the help of big data, mainly involving banking and insurance business

User stickiness retention
Tap into user preferences for consumption, lifestyle, etc., and **regularly push activities to enhance user stickiness**

Big Data Applications for Urban transport

City operation status display

Information such as re**al-time traffic congestion** in the city, gathering of large groups, etc.

Rapid response to incidents

Notify the Public Security Police of any fights in public places to maintain public safety

Predictive models to prevent and warn of specific events

If a large number of outsiders return to a neighborhood during an epidemic, alert the relevant epidemic prevention staff to increase control

Figure 64: Examples of services catering to the typical areas of big data applications

Prioritize and develop phasing plan to implement the services

Given the goal of Uzbekistan to bring the share of self-service in public services to 90% by 2030, compared with 66% of applications served through the SPSI portal at the end of 2022, it is necessary to use resources effectively for implementation in order to achieve the greatest effect. Due to potential constraints on available resources in the near term, not all government services can be provided online immediately. Digitization should be phased with priority for government interactions with the highest impact and feasibility.

A potential approach to consider for the prioritization of Uzbekistan's target services portfolio comprises 4 steps.

Potential approach for prioritization of Uzbekistan's target services portfolio for e-government
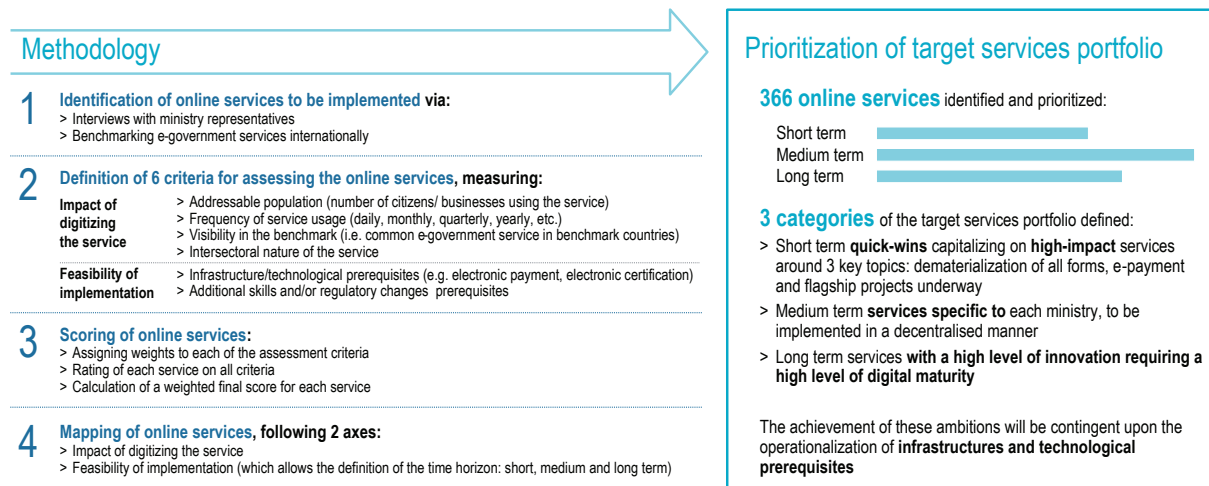
Figure 65: Potential approach for prioritization of Uzbekistan's target services portfolio for e-government

Step 1 is to identify the long list of services for digitization through discussions with ministries and benchmarking of e-government services globally.

Step 2 is to define the criteria to assess and prioritize the list of services identified in step 1. The assessment criteria should cover two areas, namely the impact of digitizing the service and the feasibility of implementing the service.

Suggested criteria for assessing the impact of digitizing the service include:

i.   iaddressable population (number of citizens/ businesses using the service),

ii. frequency of service usage (daily, monthly, quarterly, yearly, etc.),

iii. visibility in the benchmark (i.e. common e-government service in benchmark countries),

iv. intersectoral nature of the service. Suggested criteria for assessing the feasibility of implementing the services include:

v. infrastructure/technological prerequisites (e.g. electronic payment, electronic certification),

vi. additional skills and/or regulatory changes prerequisites.

Criteria to assess and prioritize the list of services identified
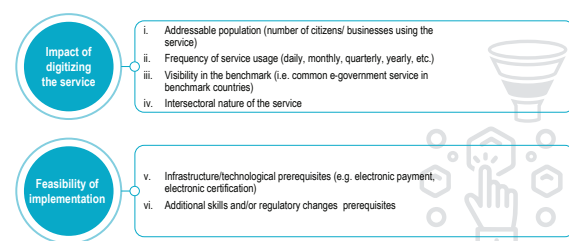
Figure 66: Figure 66. Criteria to assess and prioritize the list of services identified

Step 3 is to score the identified target services based on these defined assessment criteria. This will involve, first assigning weights to each of the assessment criteria, then rating of each

service on all criteria, followed by calculating a weighted final score for each service.

Step 4 is to map the identified services onto the two axes, namely the impact of digitizing the service and the feasibility of implementing the service.

The results of this prioritization approach is the classification of the target services to be digitized into 3 categories and tiered priorities:

(a). Short term quick-wins capitalizing on high-impact services around 3 key topics: dematerialization of all forms, e-payment and flagship projects underway,

(b). Medium term services specific to each ministry, to be implemented in a decentralized manner,

(c). Long term services with a high level of innovation requiring a high level of digital maturity.

This classification follows a systematic approach to phase the implementation of identified target services across 3 time horizons, in order to facilitate efficient deployment of resources while generating tangible impacts early which will in turn serve as adrenaline for subsequent implementation phases.

It is imperative to note that the achievement of these ambitions will be contingent upon the operationalization of infrastructures and technological prerequisites. Nevertheless, carefully planned phasing would facilitate the timely operationalization and successful service implementation.

Phasing and prioritization of Uzbekistan's target services portfolio for e-government
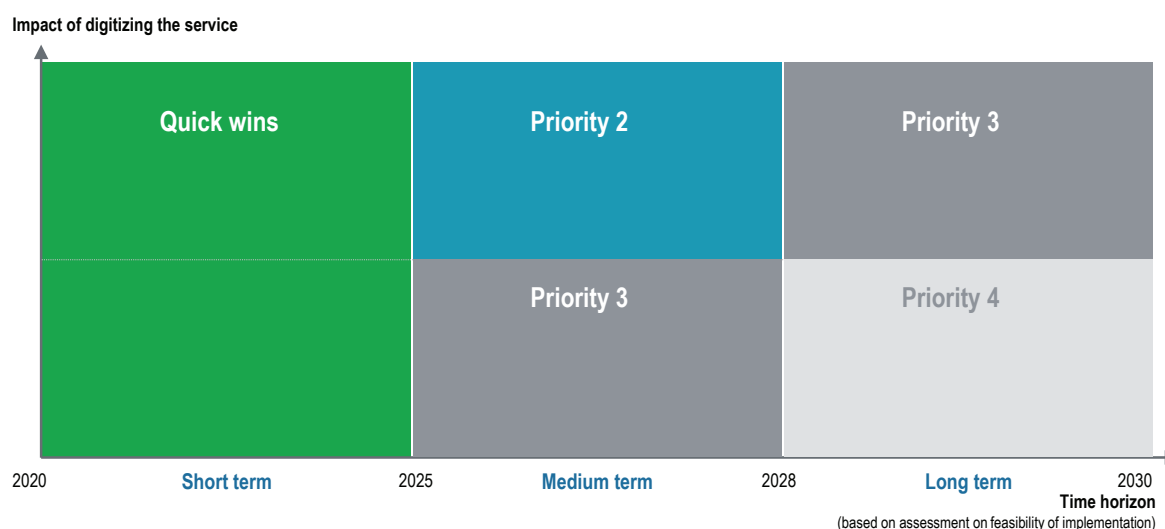
Figure 67: Phasing and prioritization of Uzbekistan's target services portfolio for e-government

4.3 Target segments and interfaces/ channels prioritization

The e-government interfaces/channels is an important element of the Services & Data enabler as it is the key to reach the target segments and increase adoption of e-government services. Based on the target services portfolio and its target segments, the multi-channel/interface approach should be designed to meet their specific needs and preferences in accessing e-government services. With the target services portfolio and its interface/channel defined, the associated data architecture and governance model can be structured to ensure it facilitates enhanced user experience in the delivery of service offerings.

In this chapter, we will take into account both the key findings from the current situation and best practices from benchmarks as the basis to develop a recommendation on the way forward for developing the interface/channel enabler.

Structure of discussion in this chapter
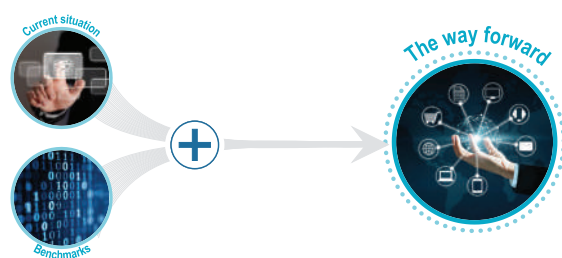
Figure 68: Structure of discussion in this chapter

Current situation

The main digital channels include the Single Portal of Interactive Government Services (SPIPS), where 371 services are available, and the MyGov mobile application, with 157 services available. Both SPIPS and MyGov offer online self-services for individual and enterprise users. While both SPIPS portal and MyGov mobile app are positioned as primary digital channels, the latter still lags in services coverage. Higher urgency to close the gap

is pivotal to the success of the mobile first approach, which has seen increasingly strong results in benchmarked countries with similar demographic and geographical characteristics as Uzbekistan.

Structure of SPIPS portal allows users to access services in different ways. Users may either choose the most popular services for individuals or enterprises from a quick access menu or navigate to services by category, life event (e.g. birth of a child, reaching retirement age, etc.) or an organization, providing the service (e.g. Ministry of Economy and Finance, State tax committee, etc.). While the portal targets both individual and enterprise users, the current design has a strong inclination for G2C services. There is opportunity to develop interfaces/channels such as RSS feed and API to better meet the needs of G2B and G2B2C services.

Primary physical channels are Center of Public Services (CPSs) providing a single window for assisted access to government services to individuals and enterprises in physical locations. CPS are present in 207 locations throughout the country. Users of CPS are offered access to 774 government services. In addition, CPSs offer access to semi-digitized services, when the request is started online, and the result received as a physical document. The strategic objective is to bring down the share of services administered by CPSs down to 10% by 2030 by shifting CPS users to online channels, that is the SPIPS portal and MyGov mobile app.

For citizens living in remote areas and abroad government services are also offered through supplementary physical channels – over 800 postal offices throughout the country and consulates on foreign countries. Postal offices are mainly targeted at regions with low level of ICT infrastructure development or regions with aging population. Postal offices offer around 30 vital government services. In future, self-service counters are planned to be introduced in the postal offices.

Government services interface/channels and planned transition

From **predominantly offline interface/ channel**, along with **some new digital** interface/ channel…

… to **highly digitized interface/ channel** supported by some partially digitized and few physical counters
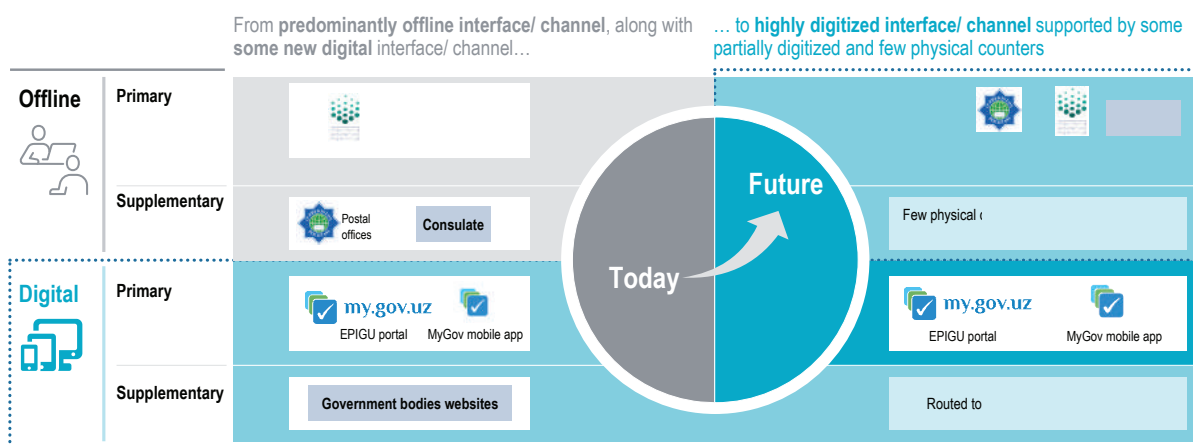
Figure 69: Government services interface/channels and planned transition

Benchmarks

In most developing countries where e-government is developing rapidly, the development is strongly connected to the constantly improving online access. This is especially true in mobile-first online communities that have long struggled with traditional fixed broadband connections due to financial or infrastructure restrictions but enjoy the advantages of affordable mobile broadband connections.

Examples include China and India where the huge geographical land area poses a challenge to provide quality fixed broadband but mobile data accessibility has risen, and serve as the catalyst for majority of the populace to be digitally connected.

In the region, Turkey, Kazakhstan and Russia who have all placed strong focus on the e-government mobile app, ranking ahead of Uzbekistan in the United Nation's E-Government Development index (EGDI) survey. Turkey's mobile app has over 2,500 services, out of 5,200+ services on its web portal. Kazakhstan placed such importance on the mobile app that it has revamped its award- winning mobile app and thereafter launch a newly improved version in 2019. In Russia, it is mandatory to have the Gosuslugi mobile pre-installed in all mobile phones sold.

Integrated digital government service platforms

	Mobile platform	Key initiatives to push adoption
Turkey	**E-devlet mobile app**	> Mobile app has **over 2,500 services**, out of 5,200+ services on its web portal > **Connected** to hundreds of local **municipalities**
Russia	**Gosuslugi web mobile app**	> Mandatory to have the **Gosuslugi mobile pre-installed in all mobile phones sold** > Mobile app relaunched in 2020 in the new format with newly available "**super services**"
Kazakhstan	**e-Gov mobile app**	> **Award-winning mobile app** revamped and launched as a newly improved version in 2019 > **Authentication by face-ID** available

Figure 70: Integrated digital government service platforms

To reach out to rural communities, benchmarked countries also leverage existing institutions which are already deeply embedded in local communities to provide digital resources in accessing e-government services. Malaysia set up Telecentres in villages to provide internet-connected devices for accessing e-government services at highly subsidized rates, catering to rural folks who do not have internet access. Another leading example is the use of public libraries in United Kingdom, which have taken up the role as the 'go-to' provider of digital access, training, and support for local communities.

Telecentres in villages in Malaysia providing access to e-government services

Background

In order to ensure rural populations are not left behind in the digital age, governments in many developing countries such as Malaysia and India have established information and communication resource centers in villages. These are known as 'Telecenters' in Malaysia.

Overview

The Malaysia government started established Telecentres in villages from 2000. Telecentres are a onestop digital resource center where internet-connected devices are provided for use to the local population at highly subsidized rates, catering to rural folk who do not have internet access. Telecenters also provide training and advice on accessing various aspects of the digital economy, such as e-government, internet banking and ecommerce.
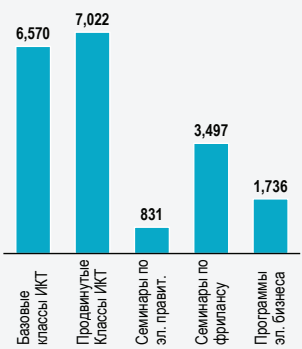
Telecentres can be set up under various alternative management structures

• Owned and managed by the government
• Set up under the Corporate Social Responsibility (CSR) programs of large companies, especially ICT companies such as Dell, Microsoft, Maxis and Celcom
• Set up as entrepreneurs on a for-profit basis

Results

• ~2,000 telecentres across all states of the country
• ~20,000 participants in courses run by telecentres in 2018

No. of participants in Telecentre programs, 2018
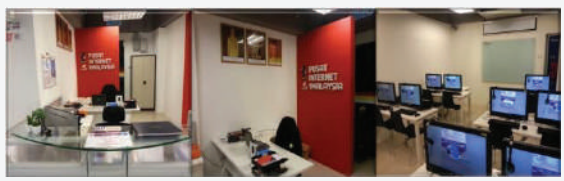
Photo: Celcom

Figure 71: Telecentres in villages in Malaysia providing access to e-government services

Libraries in UK providing access to e-government services

Overview

In the UK, more than half of all residents have a library card and 35.8% of people living in the most disadvantaged areas visit their library. The large reach of libraries into local communities makes them an ideal platform to leverage to promote digital inclusion.

Libraries in the UK remove the barrier of access by providing Wi-Fi, computers, and other devices at convenient and accessible locations. With over 14,000 trained library staff, and supported by many more volunteers, libraries offer digital skills training to help residents understand the benefits of using the internet and accessing online services, and increase residents' confidence in navigating the digital world.

Results

• Annually, about 200,000 people are supported by half a million digital skills sessions across the library network

• 20 Public libraries have established partnership with charities and private partners such as Halifax, BT, and Barclays to support the most socially and digitally excluded communities

• Libraries have also moved on to helping residents develop higher level digital skills, such as by providing latest technologies such as 3D printers and laser cutters available to everyone, and by hosting makerspaces ('FabLabs') where people can learn new skills, and collaborate on projects

Photo: Richmond Public Library Computer Basics for Seniors

Figure 72: Libraries in UK providing access to e-government services

The way forward

Uzbekistan's e-government interfaces/ channels have made commendable progress with the enhancements on the SPIPS portal, expanding service coverage on MyGov mobile app, and setting up of the Application Programming Interface (API) for data sharing between departments and agencies. However, one of the barriers to wider adoption lie in accessibility due to the structural challenges in the geographical distribution of the population. Therefore, the target interfaces/channels should seek to address these challenges while meeting the specificities of the target services portfolio.

To achieve the strategic objective to increase adoption, three key priority areas should be

explored and pursued by Uzbekistan, namely (1) adopt a mobile-first approach – continued service coverage expansion on MyGov mobile app, (2). bring self-service e-government access to rural and remote areas, and (3). design interfaces/channels targeting G2B and G2B2C services.

While Uzbekistan adopts the approach to first launch the e-government service on SPIPS portal before extending to MyGov mobile app, there is potential to accelerate the service coverage expansion on MyGov mobile app by setting the target to close the gap of mobile-to-web coverage with benchmarked countries. For example, if Uzbekistan were to bring the service coverage on MyGov mobile app to similar levels as Turkey has on its E-devlet mobile app, the

number of services on MyGov mobile app would have to grow from 157 today to 200, moreover, all of the 371 e-government services available on the SPIPS portal must also be available on the MyGov mobile application. Increasing service coverage on MyGov mobile app enables access to more government services by users who struggled with traditional fixed broadband connections due to financial or infrastructure restrictions but enjoy the advantages of affordable mobile broadband connections.

E-governent service coverage on mobile app and web portal
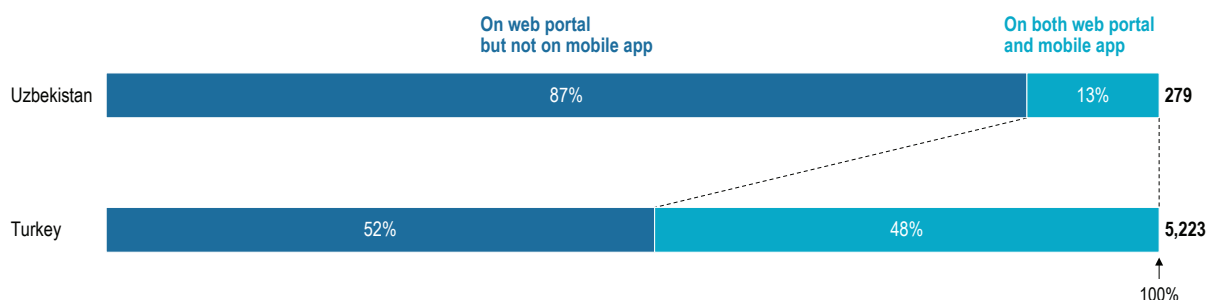
Figure 73: E-government service coverage on mobile app and web portal

In bringing self-service e-government access to rural and remote areas, Uzbekistan's plan to introduce self-service counters in the postal offices providing government services is a major step. In addition to postal offices, schools and Mahalla halls may possibly be considered as additional locations to provide digital resources in accessing e-government services. These locations bring the additional benefits of a setting to provide training and advice on accessing not only e-government services but also possibly various aspects of the digital economy, such as internet banking and e-commerce.

In line with the potential initiative discussed in Chapter 4.1 to extend the target services portfolio to encourage higher usage in G2B services, it is important to design the interfaces/channels to also target the needs of enterprise users. There is opportunity to develop interfaces/channels such as RSS feed and API to better meet the needs of G2B and G2B2C services. Building the API to support 'open data' for the enterprise and public sets the foundation for pivoting towards offering data services in the longer term. As the e-government development matures, open-source technologies and streaming processing will become mainstream in the data technology space, technology frameworks will mature, and data architecture and technology selection will be expected to gradually become unified.

Envisioned future data architecture for Uzbekistan (API supporting 'Open data')
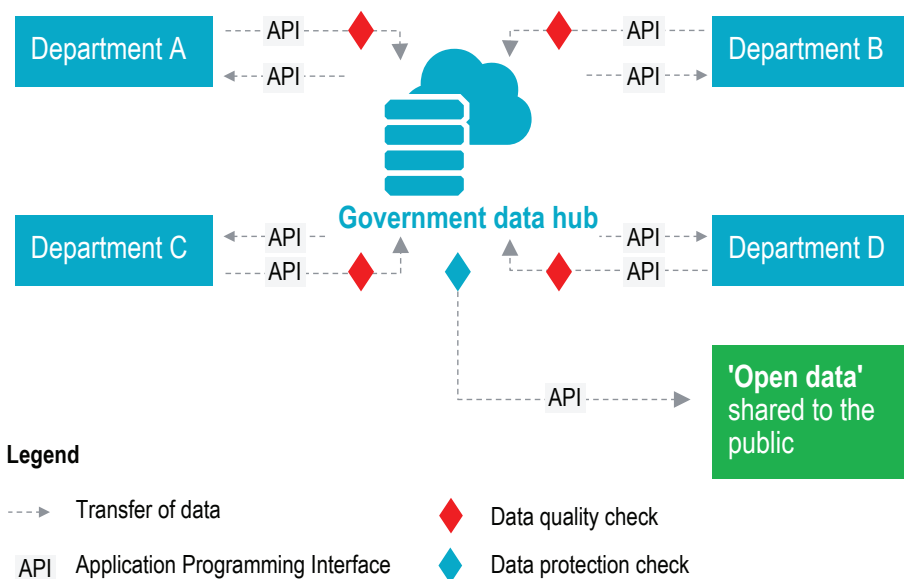
Figure 74: Envisioned future data architecture for Uzbekistan (API supporting 'Open data')

4.4   Target infrastructures

In Chapter 4.1 and 4.2, we addressed important topics such as the strategic vision for Uzbekistan e-government and target services portfolio, as well as target segments, interfaces/ channels and data architecture. However, all the above will promptly lose their intended worth in the absence of a developed ICT infrastructure.

If a population does not have access to the Internet, they will not be able to use the e-government portal. In order to create a full-fledged unified government portal or a modern and innovative digital economy backed by a successful e-government development, the critical infrastructure pieces such as connections, data centers & cloud, international connectivity, security and regulation & licensing will need to be built as the program's foundation.

Infrastructure development plays a critical role in each phase of the digitalization of a country. Infrastructure ought to be the foundation on which all other digitalization initiatives are built. To achieve the strategic objectives laid out for Uzbekistan's e-government development

by 2030, the development of IT infrastructure should be outlined as a primary building block.

The infrastructures enabler comprises five building blocks: (1). Connection, (2). Data center & cloud, (3). International connectivity, (4). Security, and (5). Regulation and licensing.

In this chapter, we will take into account both the key findings from current situation and best practices from benchmarks as the basis to develop a recommendation on the way forward for developing the infrastructures enabler.

Structure of discussion in this chapter
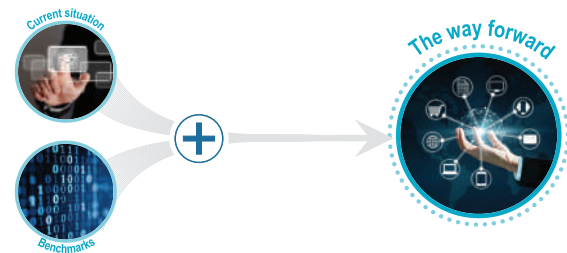
Figure 75: Structure of discussion in this chapter

Infrastructure enablers for e-government development
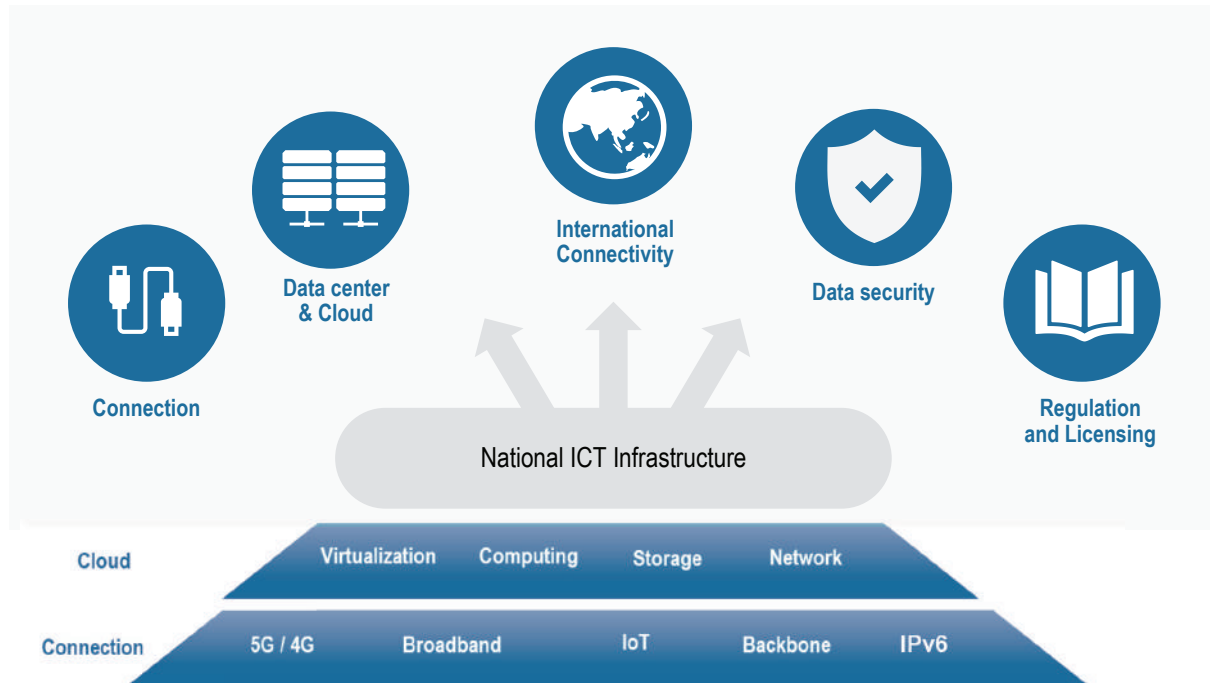
Figure 76: Infrastructure enablers for e-government development

Current situation

The development of ICT infrastructure in Uzbekistan was one of the strategic pillars of the Comprehensive Program for the Development of the National Information and Communication Systems 2013-2020, which has driven a visible increase in network coverage and the number of data center facilities in Uzbekistan.

Connection

The proportion of the population covered by at least 3G network has increased from 74% in 2019 to 97% in 2022. Fixed broadband subscriptions increased from 6 per 100 people to 25 per 100 people between 2015 and 2022, while mobile broadband subscriptions increased from 42 to 99.8 per 100 people over the same time. Despite the progress, internet availability is still behind other countries. There is still room to increase network coverage and hence accessibility to e-government services, especially in rural/remote areas. The IPv6 deployment is also lagged behind the world average level. Actions are expected to prepare the connection infrastructure for the future network evolution.

Data center & cloud

A government integrated data center is planned to be introduced by the end of 2022. Currently, data stored by government bodies is managed in a hybrid model, where some entities have their own capacities, while others procure third party data center services. Two major data center service providers are state-owned Uztelecom and public-private UZINFOCOM. Government bodies may also procure services from fully private players, but historically have not done so. The rationale behind inhouse data management for some government bodies is the sensitive data contents. Other government bodies may use their own infrastructure due to availability of spare capacities and costs of data migration to integrated government data center. While sustainable at this stage, this decentralized database model is likely to face considerable strain as data volume and complexity rise rapidly with the expanded target services portfolio and wider adoption.

International connectivity

Ministry of Digital Technologies currently has a monopoly over the country's international gateway, which it operates through Uztelecom. Prices for IP transit in Uzbekistan is among the most expensive in the world today as well as a country bandwidth that is critically low on a per capita basis. Currently, Uzbekistan has only about 170,000 km of fiber optic communication lines, which is not enough for a country of this size. The Digital Uzbekistan 2030 strategy have set KPIs aiming at addressing these challenges and improve length of fiber optic infrastructure and internet coverage, both fixed and mobile.

Data security

Uzbekistan has signaled a desire to establish a strong data protection regime by the passing of landmark legislation.

According to personal data protection legislation enacted in 2019, which establishes the basic principles and conditions for the processing of personal data of Uzbekistan citizens, personal information about the citizens of the country can be collected only with their knowledge and consent. The processing of personal data without the consent of the individuals or their legal representatives is not allowed, except in special circumstances provisioned for by the law. For example, access to data about the nationality, religious and political beliefs, personal life or criminal records of individuals can only be provided in criminal cases or in money-laundering investigations. The State Center for Personalization under the Cabinet of Ministers was further designated as the state body responsible for the protection of personal data.

Further, to ensure that all government data is protected, Uzbekistan's Government Center for Cybersecurity was established in 2020.

As Uzbekistan's e-government continue to develop, the amount of data collected by governments increases, the need for ICT and data security intensifies. There will be increasing pressing need to ensure adequate security measures are put in place in terms of technology, governance and regulations.

Regulation & licensing

Currently, there are five registered operators, excluding virtual mobile operators: Beeline Uzbekistan, Perfectum, Ucell, Universal Mobile Systems, Uztelecom ("Uzmobile"). Exclusive control over international telecommunication networks was granted to state operator Uztelecom, who is also the only fixed network operator, and Internet Service Providers (ISPs) and retailers of broadband services rent from it.

Benchmarks

Connection

In benchmarked countries, government plays a key role in extending broadband availability to rural areas due to the high capital requirements and low commercial attractiveness. In Pakistan, grants from the Universal Service Fund (USF) attracted many operators for its broadband deployment project in rural and underserved areas. In Guizhou Province, China, innovative technologies from global technology players are leveraged through partnerships to extend broadband availability to rural areas. In Ghana, the Ghana Investment Fund for Electronic Communications partnered with Huawei to deploy the RuralStar solution. Governments also play an important role in promoting IPv6 for the next-generation network. Major countries, such as the US, France, China all published policies to accelerate the IPv6 transition in both public and private sectors.

Data center & cloud

In many of the world leaders in e-government development, an important lever to transition government agencies onto digital platforms is the setting up of an integrated government data center (GIDC) which provides data center services to all government departments. While migration to a central government data center can be onerous and time consuming, especially for countries where each agency had already developed their own data centers, such as in the case of Korea, migration to a central government data center has proven to be the most cost effective option in the long run.

International connectivity

Common among many leading e-governments is a liberalized international gateway market. For example, Estonia, Denmark, UK, Singapore, and China are connected by numerous international links today. In Singapore and China, the liberalization of the international gateway market has lowered the cost of broadband services while improving service quality. Reduced cost of international bandwidth enabled more affordable and accessible internet for a larger proportion of the population, which in turn pave the way for wider adoption of e-government services in both countries. As a result of the competition in a liberalized international gateway market, quality service for end users also improved.

Data security

As the amount of data collected by governments increases, the need for ICT and data security intensifies. Benchmarked countries typically adopt three categories of ICT security measures: Technology, Governance and Regulations. Data security through technology involves advanced technologies such as data centers as seen in Korea, and blockchain as seen in Estonia. Governance involves the appointment of a governing body to oversee and manage risks and issues related to data security. Data security governance examples to emulate include Singapore and UK. Meanwhile, regulations involve drawing up of laws to minimize and manage risk involved, as is observed in Russia and Kazakhstan.

Data security measures in benchmarked countries

Technology

Advanced technologies such as scalable **blockchain** and **integrated data center** to ensure **integrity and authenticity** of data and **protect national IT resources from cyber threats**

Benchmark examples (as discussed in Chapter 3)

3 pronged measures to safeguard data security

Regulation

Drawing up of laws to **minimize and manage risk** involved e.g. detect/ prevent/ resolve cyber attack issues, protect electronic information resources/ systems/ networks

Benchmark examples (as discussed in Chapter 3)

Governance

Appointment of a **governing body** to **oversee and manage risks and issues** related to data security

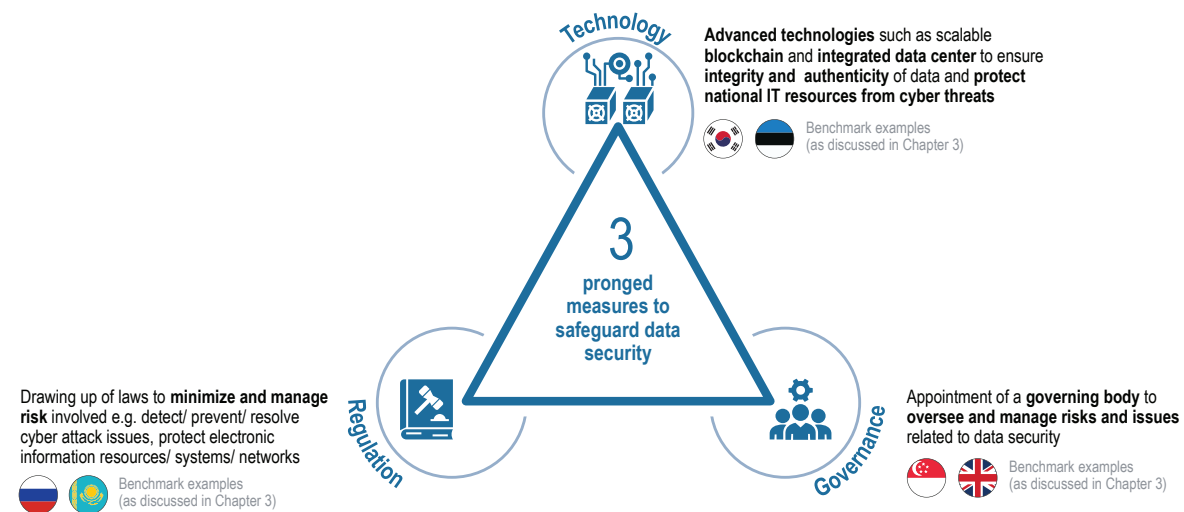Benchmark examples (as discussed in Chapter 3)

Figure 77: Examples of data security measures in benchmarked countries

Regulation & licensing

Communication technologies are one of the fundamental enablers of digital economy and e-government development. In deploying large-scale and widescale investments in ICT, spectrum technology policies and licensing are fundamental to achieving the ambitious goals of enabling the benefits of digital economy e-government development can potentially reach as many people as possible,

To promote adoption of e-government services and manage the exponential increase in government data volume and complexity, there are four regulations and policies which are common in benchmarked countries. First is the Electronic Government Act, as seen in Korea, to facilitate the successful implementation of electronic government, as well as enhance productivity, transparency and democracy in the public administration. Second is the cybersecurity legislations to support the enhancement and enforcement of data security and protection. Third is data privacy policies to promote transparency. Fourth is mandating the use of e-ID at government agencies, as observed in Estonia, Spain, and Malta, which ultimately increases the convenience of using e-government services.

The way forward

Connection

As important as it is to develop adequate ICT infrastructures for enabling e-government, the goals for ICT infrastructures development need to be practical, achievable and measurable to sustain e-government and digital economic growth in the long run.

As such, the infrastructures development plan should be carefully phased and set with milestones that are measurable so that citizens and the government can assess progress between the actual and planned schedule. In line with the design of target services portfolio as discussed in Chapter 4.1, the infrastructures development plan can be phased according to the e-government services planned for rollout in the specific periods. For example, during phases of implementing the less advanced e-government services such as informational and interactive services, infrastructures readiness can focus on 3G/4G connection, IPv6 and data storage and

governance capabilities of data center. As more advanced e-government services are rolled out, ICT developments on 5G, cloud, IoT and IPv6 Enhanced innovations such as segment routing (SRv6) becomes important prerequisites.

Data center & cloud

Building the data center needs to consider three broad areas, namely the design and deployment, the data center offerings, and the operations & maintenance model.

Data center design and deployment has several key features: characteristic digital hub, cloud computing-based, multiaccess edge computing enablement, and elasticity/ flexibility of modular design. Other deployment considerations are the data center energy efficiency, and the data centers geographical distribution, which is especially relevant to landlocked Uzbekistan. In terms of data center energy efficiency, it is important to design the data center to follow global data center standards and obtain certification policy, which may authorize and apply this principle to all national data center projects. To plan the data center geographical distribution, it is recommended that Uzbekistan conduct an assessment on the distribution and competitiveness of data center server rooms serving different tier cities and rural/remote areas. The assessment should consider four elements: (1). Data proximity requirements, (2) Costs, (3). Network quality, (4). Operations and maintenance resources.

Example of data center geographical distribution assessment

		Government data proximity requirements	Cost/price	Network delay	Operations and Maintenance Technology Resources
	First-tier city	★ ★ ★	★	★ ★ ★	★ ★ ★
	Around Tier 1 Cities	★	★ ★	★ ★ ★	★ ★
	Remote area	★	★ ★ ★	★ ★	★

★ ★ ★ ──→ ★ Competitive advantage from large to small   ★ ★ ★ Advantages of IDC server rooms in first-tier cities

Figure 78: Example of data center geographical distribution assessment

For data center offerings, Uzbekistan can consider two main types of offerings, namely the basic data center services and the value-added data center services.

Basic services provide the leasing and hosting services around Integrated data center (IDC) hardware infrastructure, such as service

colocation, bandwidth rental, web hosting, VIP zone rental, etc. Basic service offerings entail a certain degree of homogenization of services, with low profitability and high investment in infrastructure.

On the other hand, the value-added services include more advanced services such as network security, data application, operation and maintenance provided to customers on top of IDC basic business products, etc. Value added service offerings is a more differentiated suite of service offerings, with higher profit margins, and no/limited infrastructure investment required.

For operations and maintenance of the data center, three main capabilities are required, namely the low level operations and maintenance such as inspection, the high level operations and maintenance such as network and electricity maintenance, and the integrated management of server room resources and related operations and maintenance staff. While integrated management and high level operations and maintenance are typically in house, the low level operations and maintenance can be outsourced due to low variability in technical capacity.

Potential data center offerings

Basic services

Provide leasing and hosting services around **IDC hardware infrastructure**, such as service colocation, bandwidth rental, web hosting, VIP zone rental, etc.

Type of service	Colocation		Provide customers with a carrier-grade IDC environment, where customers place their equipment in the IDC room and operate and maintain it themselves, which can be divided into per-rack rental (/rack) and per-space (/U) rental
	Bandwidth rental		Services that provide customers with different forms of port access and different bandwidth to access Internet links, which can be divided into two types of shared and exclusive rental services
	Virtual Hosting		A host logically divided into a number of virtual machines for customers to rent, each virtual host has a separate domain name and address and complete Internet server functions
Distinction	A certain degree of homogenization of services, **low profitability and high investment in infrastructure**		

Value Added Services

All kinds of value-added services **such as network security, data application, operation and maintenance** provided to customers on top of IDC basic business products

Type of service	IDC Network Security Products		Including firewall, intrusion detection and prevention, vulnerability scanning, traffic cleaning, virus prevention, system hardening, security management services, server authentication certificate, etc.
	IDC Data Application Products		Including content distribution (CDN), cache acceleration, website mirroring, load balancing, self-service website building, domain name registration, enterprise email, website behavior analysis, etc.
	IDC Operations Maintenance Products		Includes traffic monitoring, operation monitoring, KVM remote management, customer equipment maintenance, service quality assurance (SLA), etc.
Distinction	Differentiated service offerings, **higher profit margins, no infrastructure investment investment required**		

Figure 79: Potential data center offerings

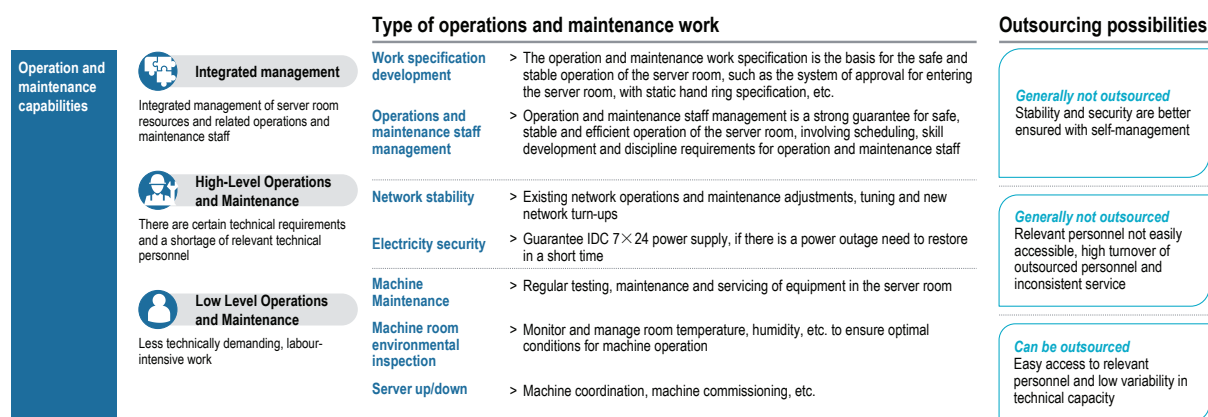## Data center operations and maintenance model

Figure 80: Data center operations and maintenance model

International connectivity

Uzbekistan's unique geographical location and its status as a doubly landlocked country create the basis for becoming the core of the Central Asian region. Deeper interconnection and cooperation with neighboring countries, provision of diversified transit services, and the creation of a transport hub in Central Asia are the basis for the development of economic and trade exchanges.

Data security

Given the paramount importance of data security especially with the foreseeable rising volume and complexity of e-government services as Uzbekistan progress in the e-government journey, it is imperative that Uzbekistan considers defining a shift-left security strategy so that security issues are addressed early and well-embedded in the development process.

To further strengthen trust from the public, Uzbekistan should provide the assurance to users of e-government services that their personal and sensitive data is held securely and treated with appropriate respect for privacy. Any failure to guard trust will severely threaten public support for the adoption of digital government services and erode citizen willingness to share personal information. Uzbekistan should consider implementing data protection policies, including adoption of ISO 27001 standards on information security management and ISO 27701 on privacy information management. It should additionally seek to adopt best practices in guiding government interaction with citizens when collecting data. Examples of best

practices observed in benchmarked countries include "ask only once", "be transparent", "be open", "prepare for contingencies".

Best practices in guiding government's interaction with citizens when collecting data

Figure 81: Best practices in guiding government's interaction with citizens when collecting data

As the development of e-government and the broader digital economy advances, the data center infrastructure needs in Uzbekistan will expand. Uzbekistan is likely to see interest from more local and international players to set up data centers in the country. Having multiple data center operators could help to develop the data center sector in Uzbekistan and in turn improve service quality and user experience. To continue enforcing data security in the foreseeable evolving data center landscape, Uzbekistan needs to reinforce its legislation on personal data security by requiring all personal data, including those collected by international data center players, be stored within Uzbekistan.

Regulation & licensing

Spectrum technology policies are fundamental to improve access to communications and internet, especially in emerging economies like Uzbekistan where far-reaching access to communications must remain mobile.

To achieve higher mobile broadband coverage for driving e-government adoption in Uzbekistan, a spectrum reallocation to achieve more efficient spectrum usage is essential. By 2023, the 900/1800/2100 MHz spectrum in Uzbekistan will be transferred to a technical neutrality basis to allow network operators to deploy 4G and 5G coverage.

As discussed in the Digital Uzbekistan 2030 white paper, there are six key areas Uzbekistan should focus on in its ICT regulations to support e-government and digital economy development. The policies should ensure that:

(1). Spectrum is released quickly, in sufficient quantities to avoid excessive fragmentation, and at the right price. The unused spectrum and delay in releasing it represent a wasted resource for society.

(2). Spectrum licenses are technologically neutral so that operators can make the most efficient use of the spectrum. With each generation of mobile technology evolution, spectrum efficiency is improving. To achieve spectrum efficiency, the latest technology should ideally be put into operation as soon as it becomes available.

(3). Mobile spectrum licensing conducted at the national level to avoid unnecessary complexity and segmentation.

(4). License validity period of at least 15 years to encourage certainty and investment.

(5). Clear spectrum road map that describes the government's spectrum strategy. This reduces uncertainty by allowing assessment on the long-term value of infrastructure investments.

(6). Reasonable spectrum prices and coverage obligations are set to spectrum licenses to encourage operators to invest in networks and ensure that the spectrum is not idle.

In addition, due to structural and geographical characteristics of the country, expanding coverage in remote/rural areas is one of the core focus of raising e-government adoption. Nevertheless, as ICT infrastructures development are highly capital intensive, Uzbekistan needs to ensure well-defined policies, including grants and subsidies, are put in place to incentivize rural coverage.

As the data center landscape in Uzbekistan evolve attracting interests from more local and international data center operators, Uzbekistan needs to strike the delicate balance between a high standard of data security and enabling the data center sector to develop. Licensing regulations and policies governing the number of data center operator license issuances and the stringent process of awarding the licenses should be established.

Further, as Uzbekistan progresses along the e-government development journey, emerging technologies such IoT will also come into play in the near future. Regulations and policies governing the licensed and unlicensed usage of IoT in e-government services and the broader digital economy activities should be institutionalized early on as well.

4.5 Target operating model

Operating model covers the definition of key participants contributing to the development of Uzbekistan's e-government and their role and responsibilities in the journey.

Given Uzbekistan's e-government ambition to accelerate digitization, increase adoption, develop supporting ICT infrastructures, and in turn improve Uzbekistan's international ranking and grow the local ICT industry and improve quality of lives for the population, a well-defined operating model needs to be established to operationalize the target state.

In this chapter, we will take into account both the key findings from current situation and best practices from benchmarks as the basis to develop a recommendation on the way forward for developing the operating model enabler.

Structure of discussion in this chapter
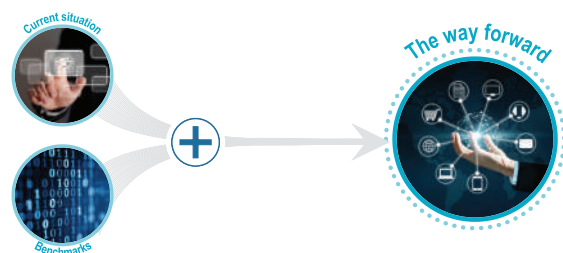
Figure 82: Structure of discussion in this chapter

Current situation

Uzbekistan has made good progress in recently setting up the E-Government Projects Management Center as an overarching central government body to oversee all e-government initiatives. Additionally, there are plans to have CDOs appointed in most government agencies.

The e-government services implementation in Uzbekistan today is fully inhouse. The full value chain of e-government services implementation is undertaken by public entities. Six government entities are involved in e-government services implementation, with no private contractors taking part in the process.

Initiative to digitize a service may come from ministries, the E-Government Projects Management Center or the Cabinet of Ministers. Implementation is managed by the E-Government Projects Management Center with no support from private contractors. Prior to service launch, there were no KPIs set on

service usage. After launch, technical support is provided by UZINFOCOM, the sole public operator.

Given the current operating model, the vast number of target services Uzbekistan aims to digitize within the 2030 timeline may put pressure on implementation efforts. The limited resources, which are fully inhouse today, may accentuate the pressure and potentially risk hindering rollout speed.

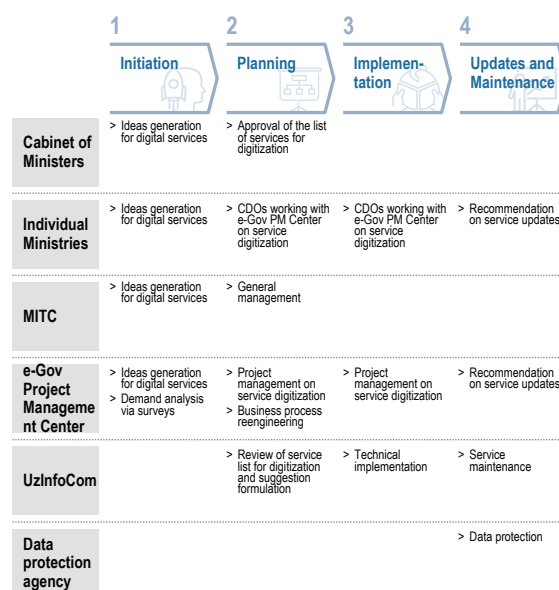### E-government service implementation today

Figure 83: E-government service implementation today

Benchmarks

In many of the e-government development in other countries, most implementations involved some form of partnership between government agencies and private sector, where government usually are involved in operations and management while private companies provide the technology and solutions.

While governments are key to investment and to building the right infrastructure, benchmarked examples have shown that collaboration with private sector is necessary to leverage the best solutions and data available in the market. For example, in Denmark, the digital ID implementation is a collaboration between the state, municipalities/regions, the financial sector and a private contractor. Similarly, Estonia, the ex-Soviet state that is now a world leader in e-government, has been strategically partnering with the private sector to improve its e-government service offerings.

In addition, most solutions today utilize cloud processing, pointing to the strategic importance of a strong digital infrastructure such as mobile data connectivity, data center and cloud model as a key enabler, which will to large extent be a prerequisite for implementation of especially the end-to-end, fully automated and transformative types of e-government services.

Some form of public-private collaboration in the e-government services implementation will be pivotal to foster innovation, drive technological evolution and contribute to building a robust ICT landscape fueled by the success of Uzbekistan e-government development.

Public-private collaboration in Denmark's e-government services implementation

Description of the service and the public-private partnership implementation

> **NemID'**: a single electronic signature service providing secure access to a wide range of public and private services on the Internet (banking, real estate, insurance, pension funds, etc.).

> **NemLog-in'**: single *sign-on* solution for citizens

Organization and governance :
> NemID' is the result of a **collaboration** between the **state, municipalities/regions, the financial sector and a private contractor**
  – NemID is managed by the Nets DanID A/S company
  – The "Agency for Digitalization" is responsible for e-government strategies and the development of NemID
  – More broadly, the Ministry of Finance is the main initiator of e-government strategies, while a **steering committee** (STS) ensures the coordination of the various ministries

Legal framework of NemID :
> Act on Electronic Signature (2000)

Implementation dates

Year	
2007	Creation of a single government portal
2010	Launch of the NemID e-signature service
2011	Launch of an e-learning video on how to use NemID
2012	1st legislation on self-service obligation
2014	Launch of the mobile version of NemID
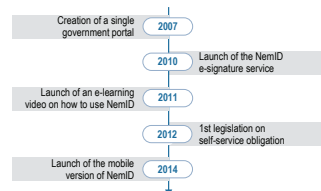
Results
> **NemID:** 96% of residents have a NemID number, with 88% satisfaction rate
> **Nem log-in**: 31 million login in 2012 (+40% vs 2011 - increase mainly due to the increase in the number of utilities available on the solution (130 utilities)

Key lessons
> **Implemented** through **public/private partnerships**
> **Implementation of** the unique identifier in **conjunction with the implementation of unique portals**
> **High utilization rates** due to
  – The increasing availability of **online services**
  – The gradual transition to the obligation of **digital self-service** for relations with the administration
  – Support through **awareness and communication campaigns**

Figure 84: Public-private collaboration in Denmark's e-government services implementation

Public-private collaboration in Estonia's e-government services implementation

Overview

Like Uzbekistan, Estonia is an ex-Soviet state that achieved independence in 1991. By starting its e-government journey early in the late 1990s, Estonia has now become internationally recognized as one of the world's leaders in e-government. Today, 99% of Estonia's government services are available online, and nearly one third of its citizens vote via the internet. Over time, the use of digital technologies has become a key differentiator for Estonia and a pillar of Estonia's national economy. Estonia's example shows that highly-successful e-government is possible for smaller and less wealthy countries

Key features
• **Digital ID**: All residents of Estonia aged 15 or over have electronic ID cards which can be used in all aspects of life, ranging from healthcare to shopping. It allows individuals to sign contracts, encrypt email, get tram tickets and even vote. It is a mandatory program delivered at a reasonable price via public-private partnerships
• **Citizen-centric design**: Design of online services is citizen-centric to maximize adoption and usage. For example, taxes can be filed online in under five minutes. Data analytics is also used to predict user behavior and enhance service delivery
• **Capacity-building**: The government organized digital training, focused especially in rural areas, to teach the elderly to use online public services
• **Shared platforms**: Estonia has adopted the government-as-a-platform model, with digital services built upon shared platforms and common data across the public service (government data-sharing platform X-road has 2,773 services)
• **Strong leadership**: Each ministry has its Chief Information Officer (CIO), which works with the overall government CIO office to set rules and adopt new technologies

Lessons learnt
• Leadership support at the highest level is crucial (e.g. President)
• Adopt shared platforms early
• Invest in capacity-building for citizens
• Laws and regulations must be enablers, rather than barriers
• Cybersecurity is vital (Estonia suffered a large cyber-attack in 2007)
• Partner with the private sector to improve offerings

Figure 85: Public-private collaboration in Estonia's e-government services implementation

The way forward

The target operating model for Uzbekistan e-government services and the broader digital economy should consider two key aspects. Firstly, adopting the service implementation model and defining clearly the corresponding scope activities undertaken by stakeholders along the implementation value chain is imperative to achieve the ambitious goals of digitization of government services. Secondly, developing the e-government operating system architecture on a layer-basis is fundamental to the sustainable operation of e-government services and the broader digital economy in Uzbekistan in the long run.

Key aspects to consider for target operating model of Uzbekistan e-government
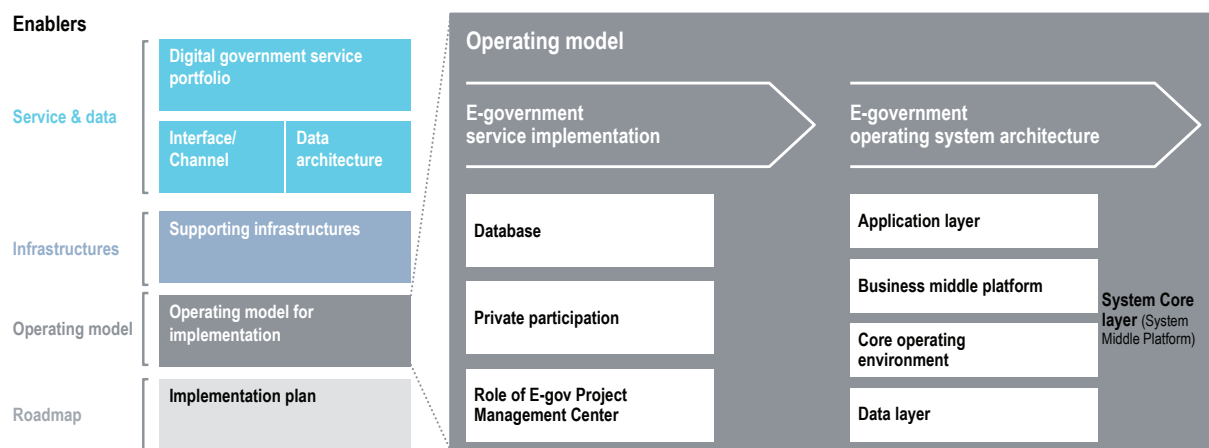
Figure 86: Key aspects to consider for target operating model of Uzbekistan e-government

E-government service implementation

Given the multitude of skills and capabilities required for the e-government operations, some form of private sector participation could catalyze the implementation efforts. To achieve the ambition for Uzbekistan's e-government development, the government should augment its inhouse capabilities by considering tapping on the expertise of the private sector via partnerships. In addition, the presence of technology champions as mentioned in Chapter 2, for example Sberbank and Yandex in Russia, Zerde in Kazakhstan, and EPAM in Belarus, can fuel an added sense of energy and conviction in the ICT sector and accelerate Uzbekistan's e-government development.

The potential future models involve potentially pivoting to varying degree of private participation to be better positioned in meeting Uzbekistan's ambitions for its e-government development. Different public-private operating models involving varying degree of private sector participation need to be evaluated to determine the best-fit model for Uzbekistan to adopt at each phase of its e-government development journey.

Two potential future models with varying degree of private participation for e-government digital service implementation could be considered: (1). Hybrid model, (2). Ecosystem model.

Expected benefits of private participation in e-government service implementation
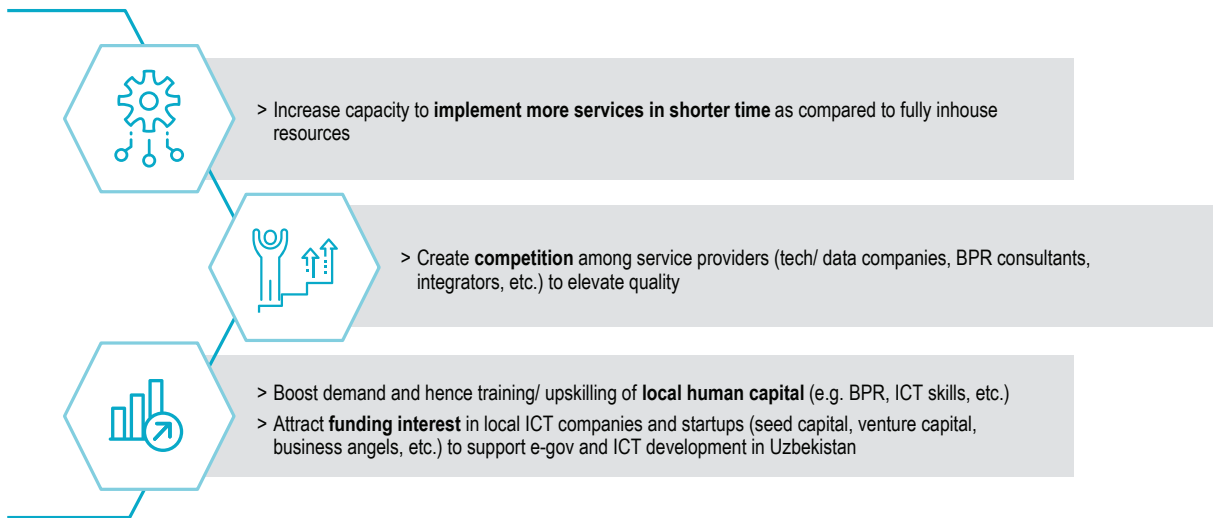

> Increase capacity to **implement more services in shorter time** as compared to fully inhouse resources

> Create **competition** among service providers (tech/ data companies, BPR consultants, integrators, etc.) to elevate quality

> Boost demand and hence training/ upskilling of **local human capital** (e.g. BPR, ICT skills, etc.)
> Attract **funding interest** in local ICT companies and startups (seed capital, venture capital, business angels, etc.) to support e-gov and ICT development in Uzbekistan

Figure 87: Expected benefits of private participation in e-government service implementation

E-government service implementation value chain and potential future models
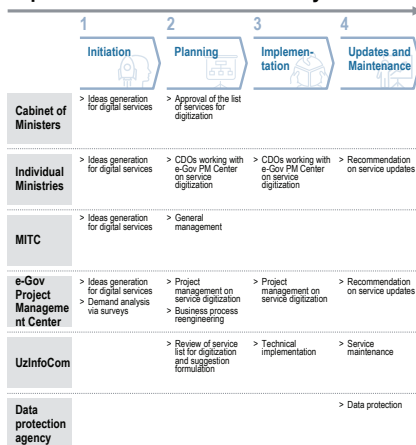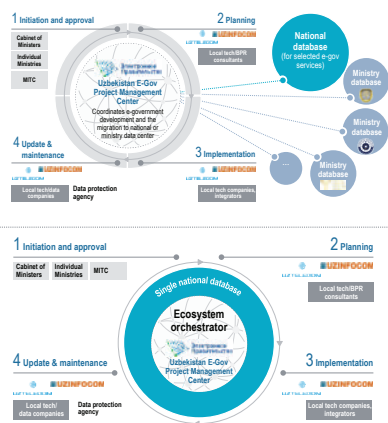
Figure 88: E-Government service implementation value chain and potential future models

In the hybrid model, the operating model is built around a national database, along with ministry databases (for hosting more sensitive data). A small network of mature local private contractors is procured to support in selected activities for planning, implementation and updates & maintenance. The E-Government Projects Management Center coordinates the migration to national or ministry data base, partly leveraging private contractors. The E-Government Projects Management Center is the Central oversight coordinating (i). interactions with Cabinet of Ministers, individual ministries and Ministry of Digital Technologies to initiate, review & approve digital services for implementation, (ii). partnerships with public sector agencies and state-owned organizations in planning, implementation, and updates & maintenance activities/ services, (iii). procurement of local technology/ data/ Business Process Reengineering (BPR) companies to collaborate in selected activities of the e-government services implementation.

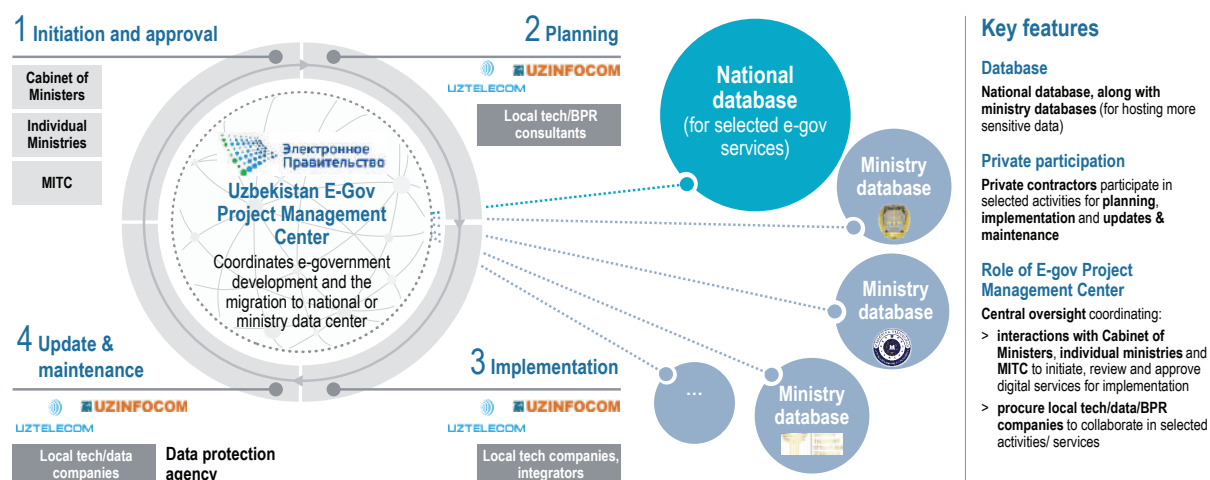## Hybrid model for e-government service implementation

Figure 89: Hybrid model for e-government service implementation

In the ecosystem model, the operating model is built around a single centralized database. A large number of local private contractors join the ecosystem as partners to participate in selected activities for planning, implementation and updates & maintenance. The E-Government Projects Management Center orchestrates interactions with public and private complementors orchestrator at the core of the ecosystem facilitating (i). interactions with Cabinet of Ministers, individual ministries and Ministry of Digital Technologies to initiate, review & approve digital services for implementation, (ii). onboarding local technology/ data/ Business Process Reengineering (BPR) companies into ecosystem to participate in selected activities of the e-government services implementation, alongside partnerships with public sector agencies and state-owned organizations.

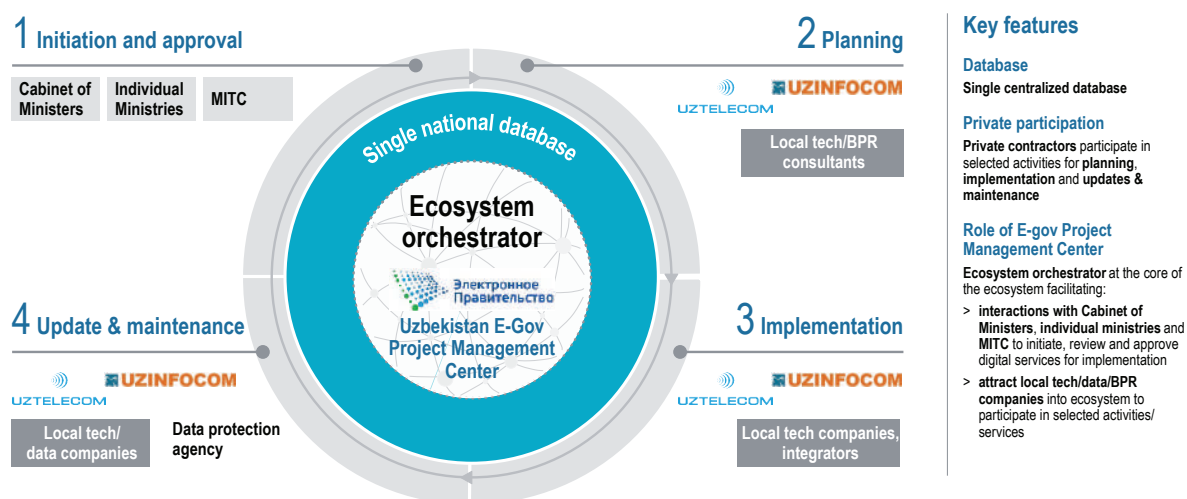## Ecosystem model for e-government service implementation

Figure 90: Ecosystem model for e-government service implementation

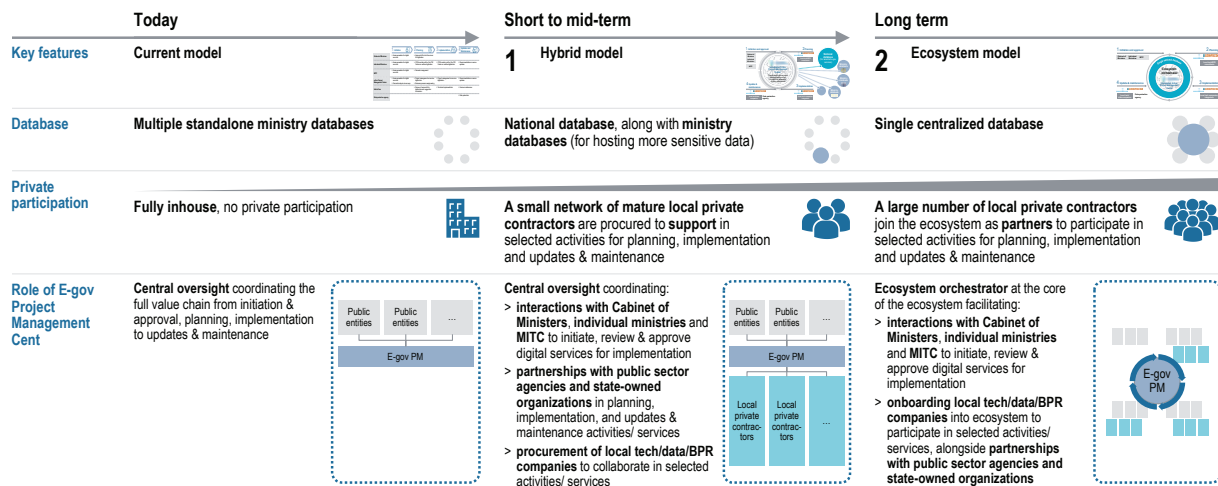## Comparison of current, hybrid and ecosystem models for e-government service implementation

	Today	Short to mid-term	Long term
Key features	**Current model**	**1** **Hybrid model**	**2** **Ecosystem model**
Database	Multiple standalone ministry databases	**National database**, along with **ministry databases** (for hosting more sensitive data)	**Single centralized database**
Private participation	**Fully inhouse**, no private participation	**A small network of mature local private contractors** are procured to **support** in selected activities for planning, implementation and updates & maintenance	**A large number of local private contractors** join the ecosystem as **partners** to participate in selected activities for planning, implementation and updates & maintenance
Role of E-gov Project Management Cent	**Central oversight** coordinating the full value chain from initiation & approval, planning, implementation to updates & maintenance	**Central oversight** coordinating: > **interactions with Cabinet of Ministers**, **individual ministries** and **MITC** to initiate, review & approve digital services for implementation > **partnerships with public sector agencies and state-owned organizations** in planning, implementation, and updates & maintenance activities/ services > **procurement of local tech/data/BPR companies** to collaborate in selected activities/ services	**Ecosystem orchestrator** at the core of the ecosystem facilitating: > **interactions with Cabinet of Ministers**, **individual ministries** and **MITC** to initiate, review & approve digital services for implementation > **onboarding local tech/data/BPR companies** into ecosystem to participate in selected activities/ services, alongside **partnerships with public sector agencies and state-owned organizations**

Figure 91: Comparison of current, hybrid and ecosystem models for e-government digital service implementation

The evaluation of the potential future models should consider key factors including the relative expected benefits of adopting each model, as well as Uzbekistan's readiness to adopt the model.

Assessing the benefits and disadvantages of each model covers the extent to which the model generates benefits in 3 areas: (i). Increase capacity to implement more services in shorter time (vs inhouse), (ii). Further elevate quality of delivery with persistently innovative solutions, (iii). Provide impetus for growth in local technology industry.

Readiness to adopt the model covers the (i). ability of Uzbekistan's current/ planned infrastructures to support the selected model, and (ii). availability of prospective private partners, given the nascent stage of ICT development in Uzbekistan today.

Impact evaluation of potential future models for e-government service implementation

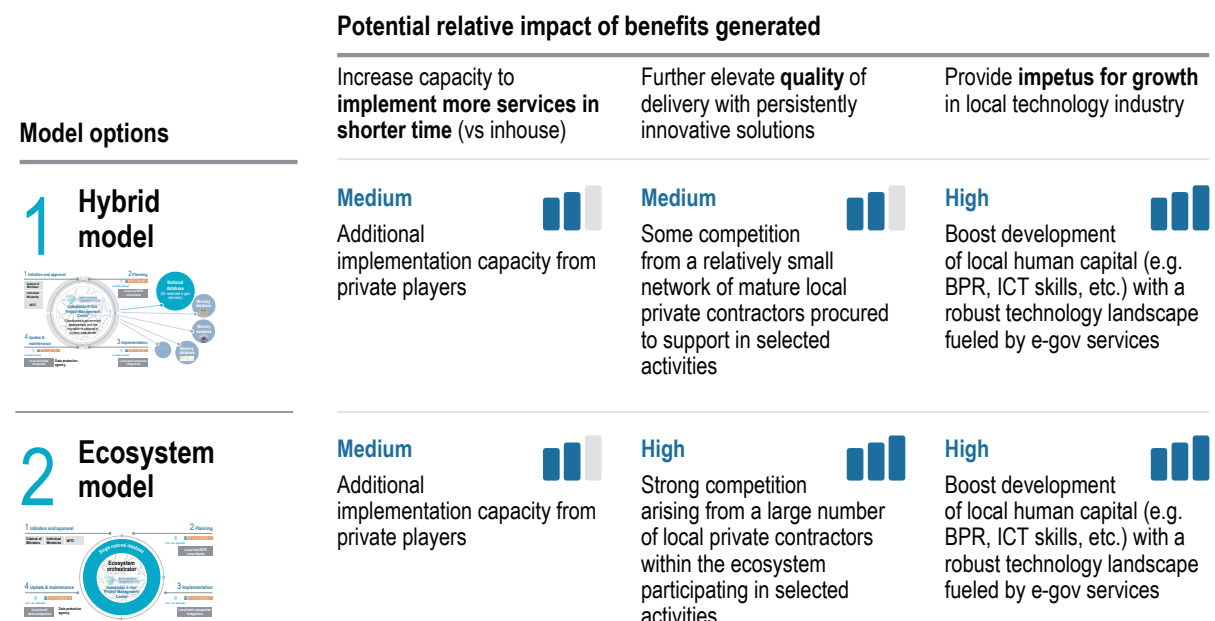| Model options	**Potential relative impact of benefits generated**		
	Increase capacity to **implement more services in shorter time** (vs inhouse)	Further elevate **quality** of delivery with persistently innovative solutions	Provide **impetus for growth** in local technology industry
1 Hybrid model	**Medium** Additional implementation capacity from private players	**Medium** Some competition from a relatively small network of mature local private contractors procured to support in selected activities	**High** Boost development of local human capital (e.g. BPR, ICT skills, etc.) with a robust technology landscape fueled by e-gov services
2 Ecosystem model	**Medium** Additional implementation capacity from private players	**High** Strong competition arising from a large number of local private contractors within the ecosystem participating in selected activities	**High** Boost development of local human capital (e.g. BPR, ICT skills, etc.) with a robust technology landscape fueled by e-gov services

Figure 92: Impact evaluation of potential future models for e-government service implementation

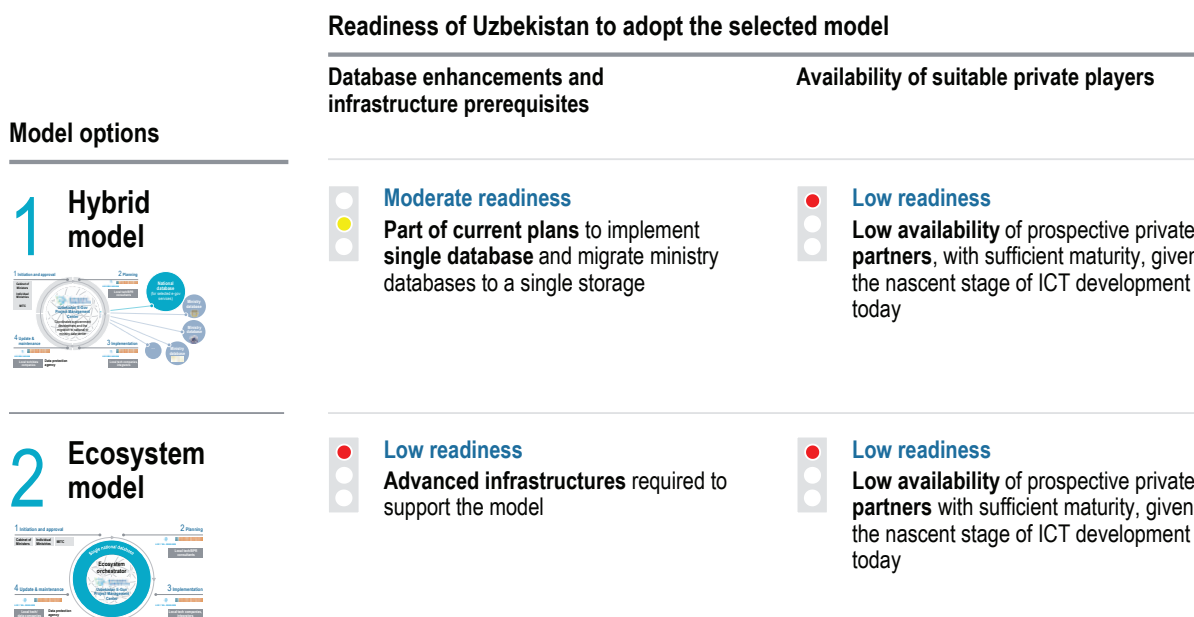## Readiness evaluation of potential future models for e-government service implementation

Readiness of Uzbekistan to adopt the selected model

Model options	Database enhancements and infrastructure prerequisites	Availability of suitable private players
1 Hybrid model	**Moderate readiness** **Part of current plans** to implement **single database** and migrate ministry databases to a single storage	**Low readiness** **Low availability** of prospective private **partners**, with sufficient maturity, given the nascent stage of ICT development today
2 Ecosystem model	**Low readiness** **Advanced infrastructures** required to support the model	**Low readiness** **Low availability** of prospective private **partners** with sufficient maturity, given the nascent stage of ICT development today

Figure 93: Readiness evaluation of potential future models for e-government service implementation

Comparing the potential relative impact of benefits generated from each model and the readiness of Uzbekistan to adopt the selected model, it is recommended that Uzbekistan consider shifting to the hybrid model in the short to medium-term while gradually transitioning to the ecosystem model in the long term.

While the ecosystem model is poised to generate the highest potential benefits, the current readiness to shift to the ecosystem model is relatively lower than the hybrid model. This is mainly due to room for further development of supporting ICT infrastructures and the current nascent stage of ICT development in Uzbekistan resulting in limited availability of prospective private partners today.

Shifting to the hybrid model in the short to medium term can help to set the stage for the transition to ecosystem model in the long term as infrastructure developments build up and the local ICT industry becomes more mature.

Evaluation of potential future models for e-government service implementation
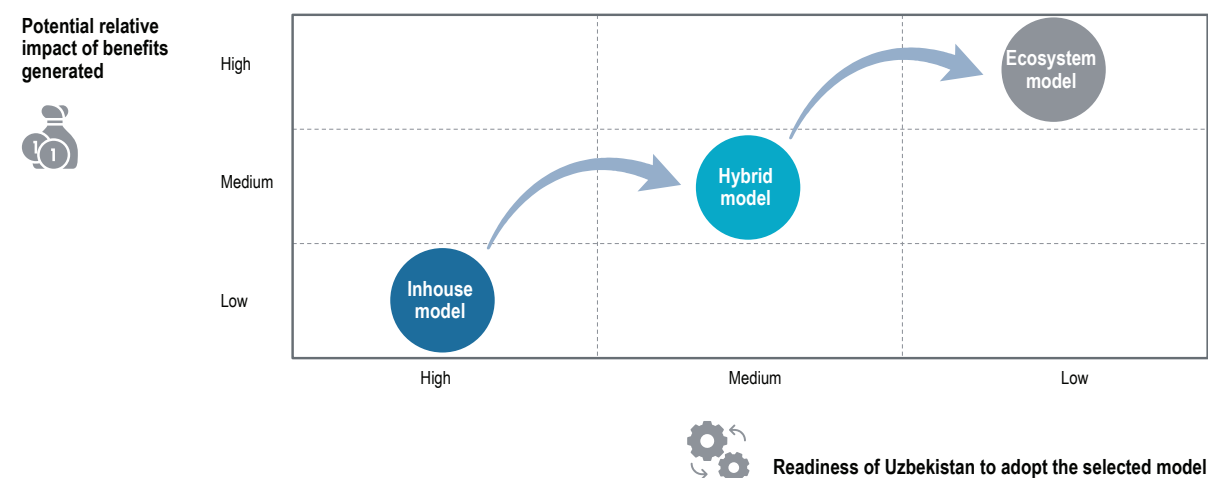
Figure 94: Evaluation of potential future models for e-government service implementation

Potential transition to future model for consideration
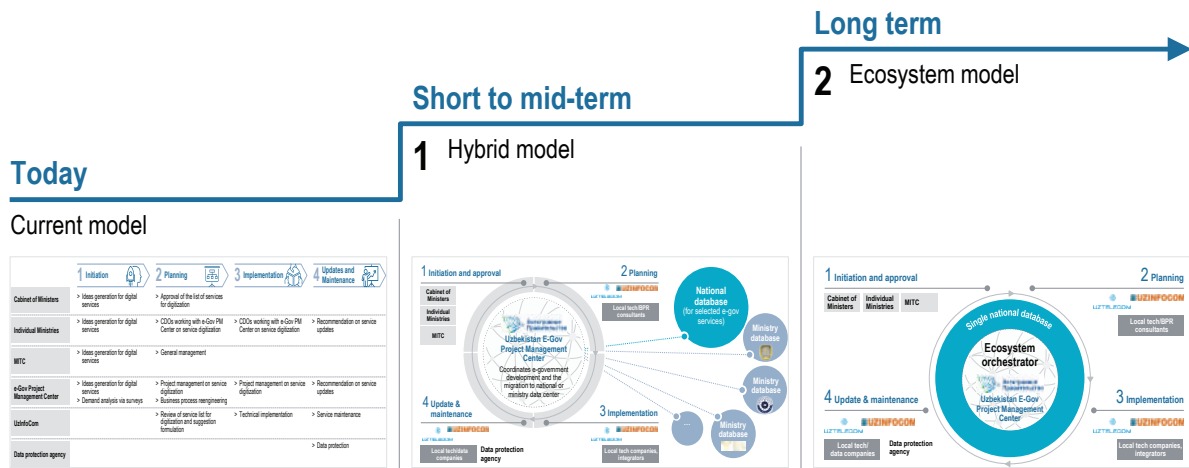
Figure 95: Potential transition to future model for consideration

E-government operating system

The target e-government operating system architecture should comprise at least four layers: (1). Basic infrastructure layer, (2). Data layer, (3). System core layer, (4). Application layer. Each of these layers covers a multitude of activities requiring varying skills and technical capabilities. For example, within the core operating environment, there is technical support for IoT, AI, blockchain, and other aspects of the middle platform, and also the provision of system administration tools to provide the necessary operating environment for the middle platform.

E-government Operating System Architecture
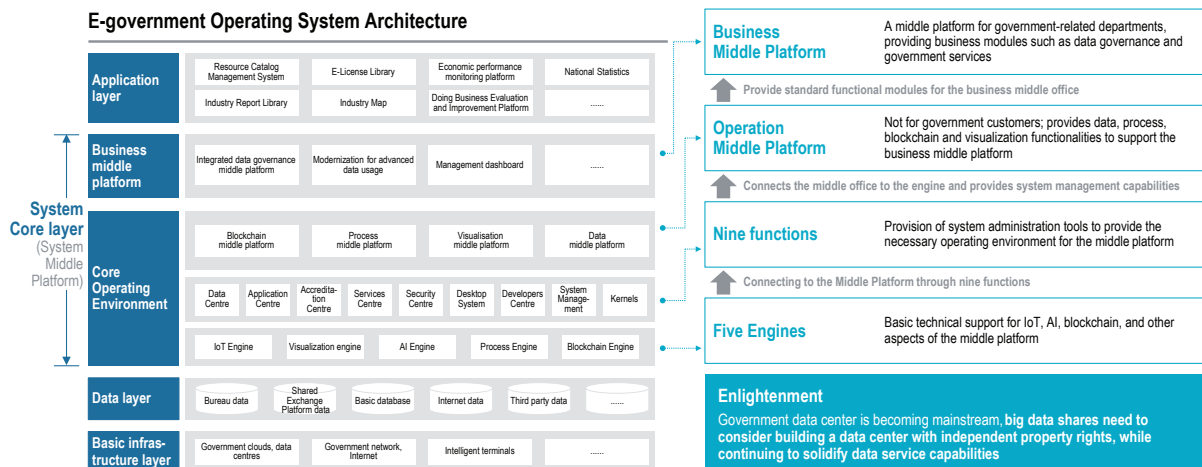
Figure 96: E-government Operating System Architecture

System core layer of the e-government operating system

System core layer of the e-government operating system
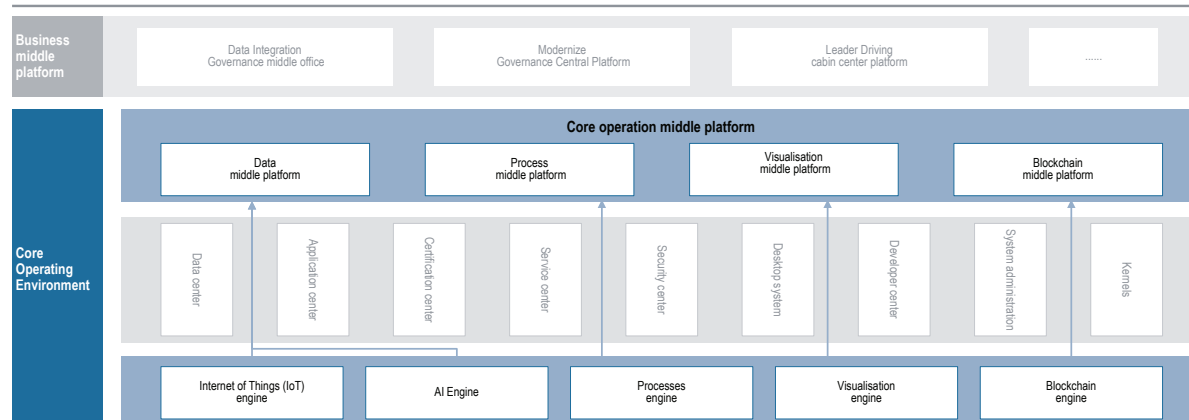
Figure 97: System core layer of the e-government operating system

System core layer and functions of the e-government operating system

System core layer of the e-government operating system
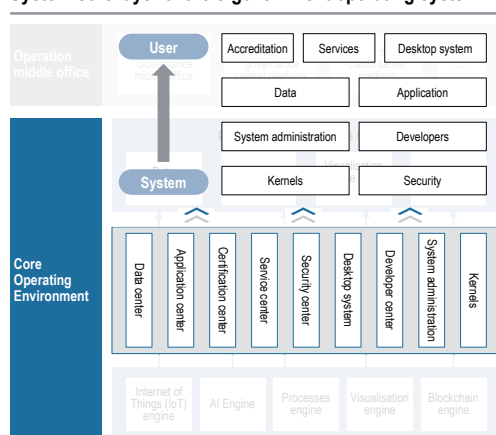
Nine functions provide managers with essential system management applications

Authentication center: Integrated management of users, organizations, roles and external account systems, including privilege control, authorization policies, authentication and other functions

Data center: Provides users with the ability to view, search, and manage all accessed data resources, allowing users to understand the status and details of specified data

Service center: Covers four categories of service management: data, system, application, and driver

Security center: Hard-core security control, providing data authentication, identification, traceability, as well as illegal behavior interception, alarm and other functions

Application center: Unified application management, covering the whole process of application access, tagging, authorization and other management

Desktop systems: Block out all data, configuration, and underlying system complexity, allowing users to focus on functionality and results

System management: System installation, system monitoring, log center, image repository, code hosting and other daily settings, management

Developer platform: Dedicated to building a one-stop cloud-to-end solution for APP development/testing/operation and O&M

Kernel: Management and services covering the functions of driver management, component management, resource management, task scheduling and other sections

Figure 98: System core layer and functions of the e-government operating system

Engines of system core layer of the e-government operating system

The Five Engines		Responding to government application needs
1	**Artificial intelligence engine** — With GPU + deep learning algorithm module and **self-developed algorithm operator graphical drag-and-drop call platform**, supporting multiple development languages, cross-language call	Fast processing of unstructured data such as images/speech to improve the efficiency of city operations
2	**Blockchain engine** — **Blockchain underlying platform** with **independent intellectual property rights + unique hard link technology stack**, supporting Js, Java, C++ and other mainstream contract development languages, supporting more than 1 million nodes synchronization	The government has extremely high requirements for data security and quality to meet the business application of depositing/tracing/auditing/authorization
3	**Visualization engine** — Data visualization profiling and effect display, no programming to quickly build a large screen, component drag-and-drop free layout, support third-party component access	Meet the needs of real-time visualization and updates on large screens such as city operations
4	**Process engine** — Support flexible process creation and automated execution, trackable and traceable management process, traceable work, multi-member information interaction, and one-to-many management mode	Make government processes and approvals fast and efficient
5	**IoT engine** — With self-developed "ultra-low-power, edge computing, chip - EPU" to achieve burden-free intelligent computing	Enables data collection/analysis of IoT devices related to city operations such as street lights/meters

Figure 99: Engines of system core layer of the e-government operating system

Uzbekistan ICT and E-Government Cloud Business

Summing up Chapter 4, the Uzbekistan e-government target and vision entails thoughtfully building the key enablers for the further development of e-government and in realizing the much broader and comprehensive vision for what digitalization means to Uzbekistan, as embeded in the Digital Uzbekistan 2030 strategy.

The Uzbekistan e-government target and vision discussed in this chapter covered 4 key components, namely the strategic vision for Uzbekistan e-government, target digital government service portfolio, target interface/ channel & data architecture, target infrastructures, as well as target operating models for implementation and operation.

Summing up Uzbekistan e-government target and vision – E-gov. strategic vision & objectives

E-government strategic vision Target state

E-gov development strategic objectives	Accelerate digitization	Increase access to self-service e-government services to 90% by 2030, up from 66%[1] in 2022
	Increase adoption	Based on the implementation of ONE ID, increase the number of users of electronic public services to 18% of the population by the end of 2023 compared to the current 15%
	Develop supporting ICT infrastructures	Develop/enhance the related cloud and big data infrastructure deployment and relevant operation to support successful implementation of the e-government services
	Improve international ranking	Advance Uzbekistan's ranking in the United Nations E-Government Development Index (EGDI) to a score of 0.86 by 2030
	Grow the local ICT industry and improve quality of lives	Contribute to building a robust ICT landscape in Uzbekistan that supports growth for the local ICT industry (in human capital and businesses) and improve quality of lives for the population

1) Government services administered through SPIPS (single portal of interactive public services), compared to 34% administered through centers of public services (CPS)

Figure 100: Summing up Uzbekistan e-government target and vision – E-government strategic vision & objectives

Summing up Uzbekistan e-government target and vision – Service & Data enabler

Enablers		Target state
Service & Data	Digital government service portfolio	1. Continue enhancing user experience of e-government services and broaden target segments to drive higher usage in Government-to-Businesses (G2B) services on EPIGU (unified portal for interactive government services)
		2. Explore extending e-government offering to data services in the long term
		3. Establish a structured approach to prioritize the list of services in the pipeline hence developing a phasing schedule for implementation.
	Interface/ Channel	1. Adopt mobile-first approach – continued service coverage expansion on MyGov mobile app
		2. Bring self-service e-government access to rural and remote areas
		3. Design interfaces/channels targeting G2B and G2B2C services
	Data architecture	1. Build the API/ RSS feeds to support 'open data' shared to enterprises and public
		2. Set up provisions to ensure the quality of data being stored
		3. Establish governance to protect the vast amount of data held by the Government

Figure 101: Summing up Uzbekistan e-government target and vision – Service & Data enabler

Summing up Uzbekistan e-government target and vision – Infrastructures enabler

Enablers		Target state

Infrastruc-tures

Supporting infrastructures

Connection
> Phase infrastructures development plan according to the e-government services planned for rollout in the time period

Data center & cloud
> Design and deployment
– Design the data center to follow global data center standards and obtain certification policy
– Plan the data center geographical distribution including conducting assessments on the distribution and competitiveness of potential locations for server rooms etc.
> Data center offerings
– Define scope of basic services and value-added services to offer, in the short, mid and long term
> Operations & maintenance model
– Decide on the level of outsourcing for the less technical/ low level operations and maintenance

International connectivity
> Explore deeper interconnection and cooperation with neighboring countries, provision of diversified transit services, and the creation of a transport hub in Central Asia

Security
> Adopt shift-left security strategy
> Implement data protection policies, including adoption of ISO 27001 standards on information security management and ISO 27701 on privacy information management
> Adopt best practices in guiding government's interaction with citizens when collecting data
> Reinforce legislation on personal data security by requiring all personal data collected by data center operators be stored within Uzbekistan

Regulation and licensing
> Review spectrum allocation to support e-government and digital economy development
> Define policies, including grants and subsidies, are put in place to incentivize rural coverage
> Plan for institutionalization of regulations and policies governing the licensing of data center operators, as well as the licensed and unlicensed usage of IoT in e-government services and the broader digital economy activities

Figure 102: Summing up Uzbekistan e-government target and vision – Infrastructures enabler

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Summing up Uzbekistan e-government target and vision – Operating model enabler

Enablers		Target state
Operating model	Operating model for implementation	1. Plan for transitioning from current operating model to hybrid model for e-government digital service implementation and explore long term transition to ecosystem model 2. Define roles and responsibilities for the four layers of target e-government operating system architecture: basic infrastructure layer, data layer, system core layer, and application layer

Figure 103: Summing up Uzbekistan e-government target and vision – Operating model enabler

05

CHAPTER

Uzbekistan implementation dimension and associated plan

5 Implementation plan for Uzbekistan

Development of an internationally acclaimed e-government and the broader digital economy for Uzbekistan is a long-term endeavor involving significant resources and strong execution. An undeniable key determinant of success is implementation. One of the pitfalls seen in many countries failing to achieve their desired goals is an unimpressive implementation lacking in energy and conviction. Up to this point in the white paper, we have assessed Uzbekistan's current e-government development, identified best practices and global trends across key dimensions, as well as laid out the vision and target state for Uzbekistan's e-government. In this chapter, we will now delve into developing a clear and actionable implementation plan to advance Uzbekistan e-government development. The implementation plan will cover five key initiatives for implementation consideration which are key in advancing digital government and services development in Uzbekistan, namely regulations and policies, operating model, infrastructure, human capital and financing.

Regulations and policies: Regulations should be periodically reviewed and updated. Policies to consider enacting include those supporting the developments of infrastructure, human capital and digital ecosystem, and the promotion of e-government services usage.

Operating model: The existing operating model of Uzbekistan follows best practices with the development of a Project Management Center and appointment of CDOs. However, capabilities of the government can be enhanced through partnerships with the private sector, by first transitioning a hybrid model and exploring long term transition to an ecosystem model.

Infrastructure: Connectivity in Uzbekistan needs to be improved for vital stakeholders, and this can be especially targeted at connectivity in public sector buildings, households and commercial buildings. The overall connectivity improvements should be phased according to e-government services planned for rollout.

To cater to demands of increasing data usage, it is vital Uzbekistan work towards developing a "world-class" data center with certification policy. Adopting cloud platforms will also offer benefits including agile operations and reduced costs

In terms of international connectivity, Uzbekistan should explore deeper interconnection and cooperation with neighboring countries, provision of diversified transit services, and the creation of a transport hub in Central Asia by expanding the quantity and capacity as well as upgrade its international gateways (IGWs).

To strengthen data security, technology and expertise need to be constantly upgraded, including adoption of international standards and the shift-left strategy. In terms of regulation and licensing, internet service providers and technology operators (e.g., IoT) should be regulated, and operators assessed to ensure efficiency within the telecommunications market in Uzbekistan.

Human capital: According to the operating model, clear roles and responsibilities have been defined, each with specific skills requirements. Digital skills development can be done through training programs or partnership.

Financing: Various funding models are available for different purposes, but selection on which to adopt requires a case-by-case analysis.

Key initiatives for implementation consideration

Regulations and policies	Operating model	Infrastructure	Human capital	Financing

> **Periodic review and update** of regulations

> **Adoption of policies** supporting infrastructure, human capital and digital ecosystem development as well as policies promoting usage of e-government services

> Existing model follows best practices

> Enhancement of capabilities through **partnerships with private sector** by transitioning to **hybrid model** and potentially **ecosystem model** in the long-term

> **Improve connectivity** of public across various locations

> Develop **"world-class" data centers**, obtain certification, explore adoption of **cloud tech**

> Grow quantity & capacity and upgrade **international gateway**

> Improvement of **data security** expertise & tech and adoption of standards

> **Regulation and assessment of operators** to ensure an efficient telco market

> Definition of **clear roles and responsibilities** with specific skills requirements

> Development of **digital skills** through training or partnerships

> Explore **various funding models** for different purposes

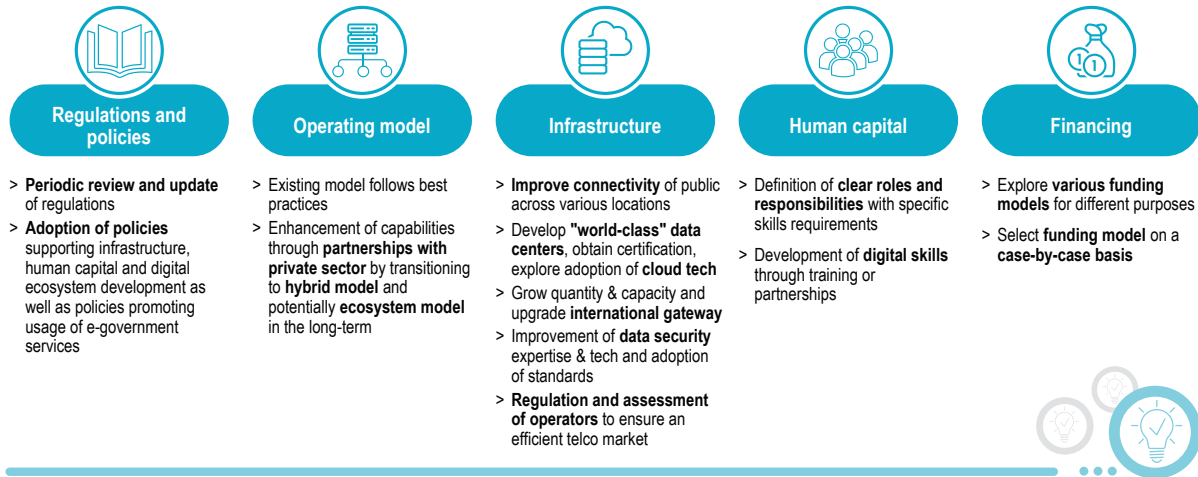> Select **funding model** on a **case-by-case basis**

Figure 104: Key initiatives for implementation consideration

5.1 Policies, legal environment, and communication considerations

Regulations and policies play key roles in supporting the development of an e-government. With growing scale of services and data collected and used today, regulations are required to ensure the proper usage of data and systems. Regulations can be used to govern the rights, maintain standards, and enhance data security among others. Meanwhile, policies can be used to create a favorable environment that promote the provision and adoption of digital government services. To date, Uzbekistan has adopted several regulations and policies to support its e-government development.

5.1.1 Regulations

Uzbekistan's current e-government regulations are considerably comprehensive, with several important legislations adopted to support e-government development (Figure 101).

Regulations relevant to e-government development in Uzbekistan[28]

Figure 105: Regulations relevant to e-government development in Uzbekistan

Examples of key legislations include:

Law on e-government: Adopted in 2015, this law regulates relations in the field of e-government, such as the main tasks and principles of e-government, promotion of digital government services for business and citizens, unified portal, infrastructure, e-governance structure and financing among others.

Law on electronic document management: Aims to ensure the widespread use of electronic document circulation, protecting the rights and legitimate interests of participants in electronic document circulation, developing standards, norms, and rules for the use of electronic documents.

Law on electronic digital signature: Regulates the use of electronic digital signature, its power and representation of the individual.

Law on personal data protection: Regulates the collection, storage, use and processing of personal data, protecting the rights of relevant personnel.

Although Uzbekistan has adopted several key legislations, they should be periodically reviewed and updated as new technologies emerge and more digital services are provided. This is to ensure a comprehensive regulatory environment is maintained and remains "fit-for-purpose" to continue supporting the development of its e-government.

On the other hand, policies also play a huge role in the implementation of e-government. The development of e-government in Uzbekistan requires further development of telecommunications infrastructure and human capital. Policies play a key role in supporting these developments. In addition, policies are important for promoting the usage of digital

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services. Policies on digital ecosystem are also key to support the implementation of infrastructures and human capital, and the adoption of digital services.

Relevant policies to promote e-government services and the current status in Uzbekistan

Policy category	Example policies/ initiatives	Current status in Uzbekistan
Enable extensive coverage and access from remote/ rural areas	Partnership to develop ICT infrastructure in rural areas	✗ Not adopted – No/ Few partnerships with private sector so far
Policies/ communication campaigns to encourage user involvement	Promotional campaigns to raise awareness	✗ No known promotional campaigns to promote adoption of digital services
Promote usage and confidence	Policy on electronic ID/ digital signature	✓ Regulation on use of digital signature current adopted
	One-window service portal	✓ Regulation on providing digital services in one window currently adopted
	Policy on data privacy	✓ Regulation on data protection
	Mobile-first policy	✗ No known policy in place to enforce offering services on mobile app
Develop IT talents	ICT skills development program for civil servants	✓ Measures to improve ICT qualifications of civil servants in place
	Programs to develop ICT skills of population	✓ Program to improve ICT skills of population in place (e.g., "Kamolot")
	Subsidies/ grants for private sector in developing digital human capital	✗ No policy in place to encourage ICT skills development from private sector
	Partnership with private sector in developing human capital	✗ No/ Few partnerships with private sector
Encourage ecosystem build up	Subsidies/ grants for digital start-ups	✗ No/ Few subsidies/ grants for private sector

Figure 106: Relevant policies to promote e-government services and current status in Uzbekistan[29]

5.1.2 Policies for infrastructure development

Uzbekistan has been making progress in its infrastructure development in recent years. However, further development is required to advance the development of its e-government and policies play a key supporting role. Specifically, improvements can be made in enhancing access to broadband in rural and urban areas, updating and reallocating spectrum for mobile broadband (4G and 5G) development and enhancing the backbone infrastructure of Uzbekistan.

Enhancing rural and urban broadband access

Broadband access is important for citizens to have access to digital services. Several policies can be adopted to improve access to broadband and internet in rural areas. Firstly, as it is commercially unattractive for telco companies to develop infrastructure in rural area, grants and subsidies are required to encourage telco companies to develop broadband infrastructure in rural areas. Grants and subsidies can also be used to encourage development of telecenters in rural areas.

Alternatively, the government may adopt policies to encourage collaboration between broadband and utilities companies. Access to the existing energy infrastructure for fiber and broadband deployment provides telecom operators with the opportunity to reduce associated costs and time required for deployment while potentially attracting additional investments. Below we provide some references to policies and regulations used in Germany (Case study 1). This policy decision may not be completed by one government department and may require collaboration between several government departments. Business models which are suitable for both the operator and the infrastructure owner are important for this collaboration to succeed. Having said this, it

is better for the government to legislate and regulate open access to existing infrastructure, especially from the utility industry, to facilitate the deployment of fiber optic networks.

Additionally, policy to promote non-discriminatory access to public infrastructure can also be used to enhance development of broadband infrastructure in rural areas. Public infrastructure such as government buildings, roads, railways, and canals for public services play an important role in the cost and speed of network expansion projects. Operators should be given access to state-owned facilities to establish base stations. Such access if put in place can significantly speed up the network deployment process. For example, under the UK Rural Shared Network project: "Public Mobile Infrastructure built as part of the emergency services network will also be available to all four operators, taking full advantage of public assets." This is expected to contribute to the coverage target by providing an additional 2% geographic coverage per operator in some of the most remote rural areas[30].

Another option to increase rural broadband coverage is to apply policies for spectrum assignment with coverage obligations. Theoretically, coverage commitments are effective mechanisms for ensuring rural coverage. Setting realistic commitments in terms of targets and timetables and including these commitments in spectrum licenses can be an effective means of guaranteeing coverage. This policy has been adopted by several regulators to ensure that the spectrum is not idle and is effectively used to achieve national broadband objectives.

Meanwhile to enhance broadband access in urban areas, grants and subsidies can also be used to further encourage telecommunications companies to expand their broadband infrastructure to provide faster and more stable connectivity. Apart from this, policy of last-mile fiber pre-installation involving collaboration between operators and real estate developers can also be adopted to promote infrastructure development in urban areas. Last-mile pre-installation of fiber can alleviate the difficulties and prevents challenges of laying the "last mile" to existing buildings (Figure 107), hence providing an efficient way to accelerate optical fiber rollout. In new buildings, fibers must be pre-installed to facilitate FTTH construction while in existing premises and homes, the same codes, regulations, and standards can be

applied to renovation work and fiber optic cable installation. These policies have been practiced with effect in various countries including China (Case study 2) and Saudi Arabia (Case study 3). To enhance the effect of the "last-mile" policy, a neutral and open access to all licensed operators and internet service providers should be adopted. High administrative fees for connecting the "last mile" should also be prohibited.

Case study 1 – DigiNetzG Act, Germany

Background: In 2017, Germany launched the Gigabit Initiative, which aims to create a convergent gigabit network covering the entire country by 2025. The German Federal Government plays a crucial role in facilitating the deployment of VHCN networks. In addition to permanent subsidies for network construction, the German government has also issued a decree on the adoption of the DigiNetzG Act in order to optimize the conditions and efficiency of network construction.

Proposed measures: The DigiNetzG Act requires that traffic projects using public investment support the deployment of fiber optic networks under certain conditions. In order to implement broadband, it will be necessary to make available and harmonize existing infrastructure, such as electricity, water and sewage networks, gas and heat supply, roads and railways, etc. The municipal government should ensure that new residential areas are equipped with passive fiber optic network infrastructure. The Right of Way (ROW) should be completed within three months to avoid lengthy and unnecessary bureaucratic approval procedures.

Results: This law certainly provides a very favorable legal framework for the long-term deployment of fiber optic networks
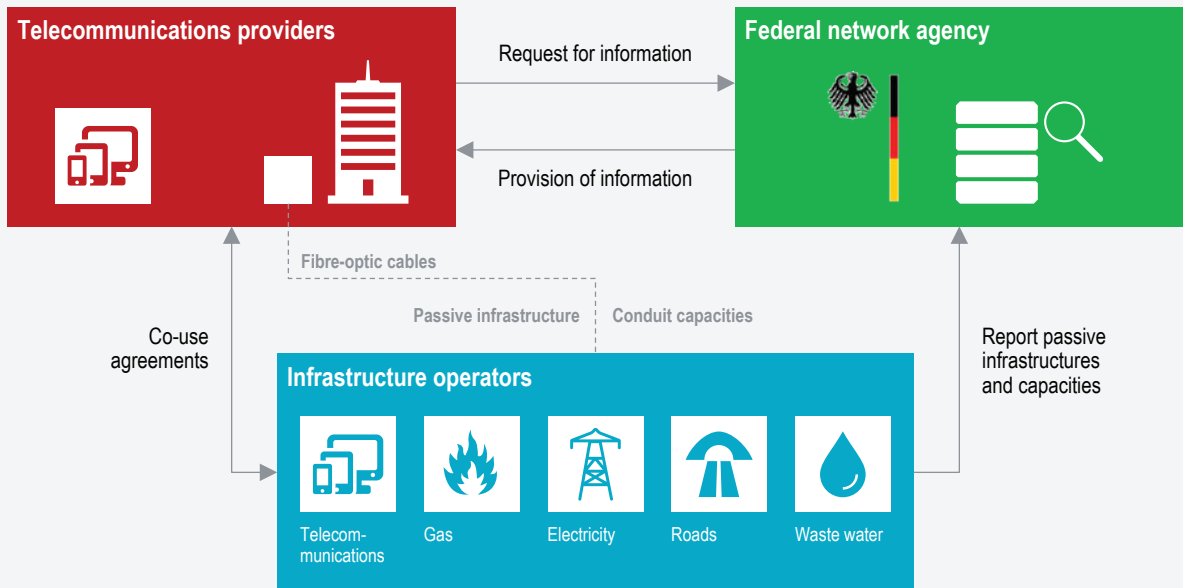
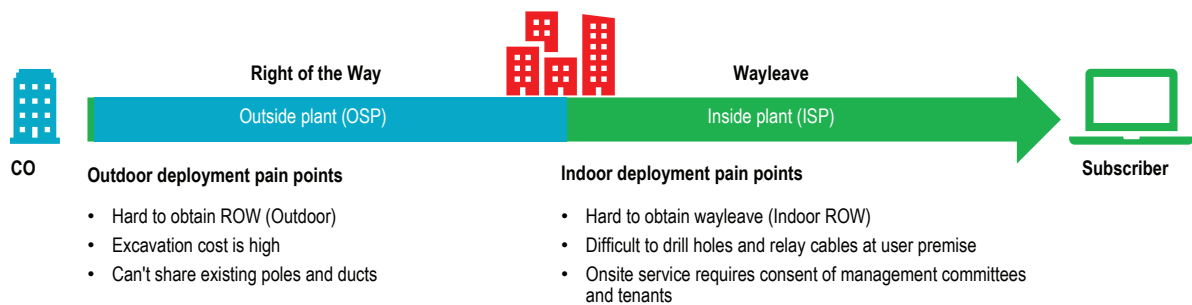### Challenges of laying last mile fiber in existing buildings

Figure 107: Challenges of laying last mile fiber in existing buildings

Case study 2 – Construction and Acceptance Code for Fiber-to-Home Engineering in Residential Areas and Residential Buildings, China

Background: In 2012, the Chinese Government issued the "Construction and Acceptance Code for Fiber-to-Home Engineering in Residential Areas and Residential Buildings" and put it into effect in 2013

Proposed measures: Through the joint efforts of the Ministry of Industry and Information Technology (MIIT) and the Ministry of Housing and Urban Development (MOHSD), the state authorities are entitled to demand that builders lay fiber optic cable in a residential building as the last communication mile. There are seven chapters, which define codes and directives for prelaying fiber optic cables. By standardizing construction and acceptance, a government agency can easily pre-install fiber in new residential buildings.

Results: With strong law enforcement, connecting the "last mile" is no longer a problem in the deployment of broadband infrastructure in China, and this has incredibly accelerated the development of broadband services over the past five years. Today, there are 423 million fixed broadband subscribers in China, and more than 90% of them use fiber for home or office; 312 million subscribers provide services with a bandwidth of more than 100 Mbps in the downlink.

Case study 3 – Rules for ICT infrastructure provision in Saudi Arabia

Rule 1 - Regulations for the provision and deployment of ICT infrastructure in new developments. The Saudi Arabia Commission (SA) for Communications and Information Technology (CITC) has published a rule entitled "Regulations for the provision and deployment of ICT infrastructure in new developments" to regulate the provision and deployment of ICT network infrastructure in new developments. New developments include real estate to be built by developers, including planning and preparation of land, construction of buildings for residential, commercial, industrial, government, or any other purpose, and vary considerably in size and nature. They may include preparation and completely new construction (Greenfield), the overhaul of existing buildings (Brownfield), or construction in existing developed areas.

The objectives of this rule are primarily to create high-speed, off-the-shelf infrastructure for broadband services, prevent repeated excavations, and reduce the cost of deploying ICT infrastructure. Thus, CITC regulates the rights and obligations of developers and service providers based on facilities for the provision and construction of the external plant and internal physical infrastructure (ISP) in new developments.

Rule 2 - Technical Standards for Physical Infrastructure of Buildings (TIE) for apartment buildings. These standards allow all developers and licensed service providers to design and deploy telecommunications network infrastructure in new public and private buildings. Although the definition of "high-speed availability" is a minimum speed of 100 Mbps, fiber optic cable (FOC) is preferred for indoor cabling. Below are some key points:

• Each unit should have at least four connections to the building distribution frame (BDF). For business customers, more connections can be designed if demand is expected. BDF means the distribution element between the outdoor installation and the indoor physical infrastructure of the building.

• Each living room (except for wet rooms such as bathrooms and laundries) or office space must be equipped with at least one network terminal (NT). The power source must be available near the Optical Network Terminal.

• The internal physical infrastructure must be able to provide at least four fiber optic connections per unit from the access point to the telecommunications room. From the Telecom Room, there are at least four connections (fiber, coax, or Ethernet twisted pair) to a Block Distributor (UD). From UD, there is one connection to each NT.

Key takeaways from legislation benchmarking

Next steps		Case studies	
	Issue a legislation which will oblige developers to install high-quality digital infrastructure from the outset and make it a part of the building from time the first brick is laid	Construction and Acceptance Code for Fiber-to-Home Engineering in China	**Case study # 2**
	Issue a code that will provide technical standards and regulations and rules of information society services for dwelling units and premises	Rules for ICT Infrastructure Provision and Development in Saudi Arabia	**Case study #3**

Figure 108: Key takeaways from legislation benchmarking

Update and reallocation of spectrum to support mobile broadband (4G and 5G) development

In the area of frequency spectrum usage and regulation of mobile broadband development (4G and 5G), neutral licenses have been updated and 1800 MHz has been added to the 900/2100 MHz spectrum. Spectrum licenses currently support deployment of 2G/3G/4G/5G networks in the 700/850/900/1800/2100/2300/2600/3600 MHz frequency bands Technology-neutral licenses mean that operators can update the spectrum without potentially long regulatory delays, thereby increasing spectrum efficiency (Figure 105) and dynamism in Uzbekistan's mobile market and ultimately uplift mobile broadband usage. Ideally, all operators should be able to switch to LTE.

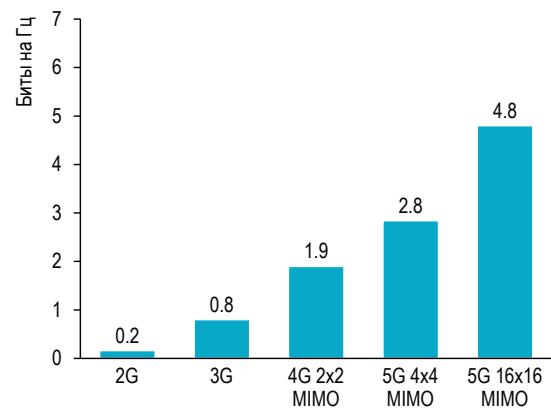### Average spectrum efficiency by technology

Figure 109: Average spectrum efficiency by technology

In order to provide an opportunity for fair competition between operators in the middle radio frequency range, the fourth operator Uzmobile has been allocated the required amount of spectrum in 2300 MHz to eliminate imbalance between the operators Unitel, Ucell, UMS in the 2600 MHz band. Taking into account the interference situation in the border areas of Uzbekistan and inter-operator interference within the republic, in the 850 MHz band, the spectrum is allocated for the CDMA operator to transfer the interference section. Currently, in the 900 MHz band, there are no radio interference in the border regions of Uzbekistan and inter-operator interference within the republic

> **Case study 4 – Zoom in: 800 MHz spectrum allocation in the UK**
>
> **Background:** OFCOM (Office of Communications) decided to include a coverage obligation in one of the 800MHz licenses.
>
> **Proposed measures:** It required the licensee to provide users with mobile broadband services for indoor reception in an area that is home to 98% of the UK population. In addition to the above requirement, in terms of UK-wide coverage, OFCOM also decided to require the same licensee to provide the same service in an area where at least 95% of each country's population resides.

Enhancement of backbone infrastructure

Backbone infrastructure refers to the route through which data is transferred, often through a network of fiber cables. Enhancement of backbone infrastructure will ultimately improve connectivity within a country. Several policies can be adopted to enhance backbone infrastructure for Uzbekistan.

Firstly, policies promoting liberalization of international gateway can be adopted to enhance backbone infrastructure. As we have observed in the benchmarking chapter, digitally advanced countries with leading e-government often have a competitive international gateway market. In Uzbekistan, Uztelecom currently has a monopoly over the country's international gateway leading to prices for IP transit in Uzbekistan being among the most expensive in the world as well as a country with bandwidth that is critically low on a per capita basis. In contrast, expansion of international connectivity has often been found to benefit digitalization within a country through increased bandwidth hence allowing enhancement in backbone infrastructure and ultimately making internet connectivity accessible to a larger population. Therefore, Uzbekistan should consider adopting policies on liberalization of its international gateway market. For the purpose of inter-connection with other countries, the IP backbone should be deployed with the latest open International standards including IPv6, SRv6, etc.

Besides this, in the rollout of fiber infrastructure, operators might face challenges in obtaining right of the way (ROW). ROW could be difficult to restore for several reasons (Figure 106) such as time-consuming approvals, disparity in regulations and obstacles in obtaining road wayleave. Additionally, local administrative authorities and/or developers require high administrative fees for construction work such as road construction and excavation work on private property.

Right of the Way (ROW) and Wayleave challenges

	Long timing	The flow of applications and/or approvals is very time consuming and poorly regulated
	Disparity of construction rules with fibre installation	Trench construction specifications and rules are not suitable for fibre optic installation. Not only does this complicate the use of the ROW, but it also increases the cost of construction work and extends the construction period
	Road wayleave	The right-of-way inside the building can be defined as a wayleave. The road wayleave is the main obstacle to turning on the last mile

Figure 110: Right of Way main challenges

Therefore, policy on optimization of the ROW regulations should be considered to accelerate deployment of broadband infrastructure. In most countries, the rules for using ROW to deploy

fixed broadband were adopted a few decades ago when the telephony system was deployed. Today, fiber optic cable is becoming the primary medium for ultrabroadband communications, so legacy rules do not fit into a fiber deployment scenario. In addition, inefficient and bureaucratic regulations and codes need to be updated as soon as possible.

5.1.3 Policies to promote usage of digital services and communication considerations

Consider policies and communication to encourage user adoption. Specifically, policies that can promote usage of digital services include those promoting electronic ID usage as it provides additional convenience through unified access to various online services. Policies that enhances data protection and governance can increase citizens' confidence in using online services. Meanwhile, awareness campaigns can help to raise attention to the services and their benefits.

As Uzbekistan aims to increase share of self-service access to e-government services to 90% by 2030 and increase adoption of its digital services, it needs to encourage users to adopt online services by providing convenience and address any concerns they may have, for instance on the safety of using digital services. Policies can be utilized to address such concerns and provide convenience to the citizens. Among them, one policy to provide additional convenience to the citizens and ease the transition towards using digital services could be mandating the use of electronic ID by the citizens to provide a unified and seamless verification method to access a large range of services. This policy has been adopted by various countries such as Estonia, Spain, Pakistan (Figure 107).

Approaches to the introduction of electronic ID in other countries/ territories

1 **Mandate the conversion of the current paper based National ID into e-ID**	Chile	> Mandated the discontinuation of the old paper based ID card to enforce adoption of e-ID; ~60% adoption within 3 years and expecting >90% in 2020
	Hong Kong	> Mandated the discontinuation of the old paper based ID card to enforce adoption of e-ID with up to 90% adoption since 2003; A fine of HKD 5,000 will be imposed for the failure to convert within the prescribed time frame
	Pakistan	> Mandated the discontinuation of the old variation of the ID card and required all citizens to obtain the new e-ID within a prescribed short timeframe
2 **Mandate the use of the e-ID at government agencies**	Estonia	> Mandated that all government digital services are to use the e-ID for verification; resulted in adoption of up to 95% since 2002 with 10% adoption in its first year
	Malta	> Shifted government services online and mandated the use of e-ID as the sole identifier in 2004 to access the e-government services; The government ensured and made 90% of the government services available online since 2005
	Spain	> Mandated the use of the e-ID for accessing e-government services and opening bank accounts; resulted in the adoption of ~30% within 3 years of launch
3 **Mandate the need to obtain an e-ID at the eligible age**	Estonia	> Mandated that any citizens who reach the age of 12 must apply for the e-ID card and invoke a penalty of USD 675 to 4,500 or jail term of up to 3 years if the citizen does not carry or possess the e-ID
	Malaysia	> Mandated that any citizens above the age of 15 must carry the e-ID if they are outside of their homes

Figure 111: Approaches to the introduction of electronic ID in other countries/ territories

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The experience of developed countries which were early adopters of e-government has shown that one of the biggest impediments to a smooth and hassle-free user experience for citizens when accessing digital government services is online identity verification. As the vast majority of government services are moved online, individuals may find themselves having more than ten different login credentials for various government services. There is hence a need to develop a single digital identity for citizens and business which will be universally recognized by all government agencies. This singular digital identity will be used to access government services which are already integrated onto a common platform, as well as those which remain on standalone platforms. Additionally, whenever a citizen updates his/her basic information such as residential address, records with all government agencies will be automatically synchronized, without the need to update every other government agency. Developing countries have championed it as the most cost effective way to provide a secure identity and accessible government services to large populations. India is one of the key success stories, where 1.15 billion digital identities were provided to residents under the biometric-based Aadhaar digital ID program. The Uzbekistan government has announced that national ID cards will be issued to all residents of Uzbekistan systematically in a national exercise from 2021 to 2030. In preparation for a future where most government transactions will be conducted online, this national ID issuance exercise should be leveraged to provide all residents with a digital identity at the same time. This can be achieved by ensuring the national IDs issued are electronic IDs (e-IDs), which are fitted with electronic chips and can be read by computer-connected smart readers. Additionally, biometric information can also be stored in these ID cards to facilitate transactions which require a higher level of security, such as request for hospital treatment or signing of high-value contracts.

Additionally, with mobile connections significantly dominating connectivity in Uzbekistan, the government should adopt a mobile-first policy to mandate that services be offered in the mobile app format first. Currently, Uzbekistan's mobile app offers 157 services. In contrast, Turkey's mobile app has over 2,500 services. At the lower percentile, Kazakhstan's app has 400 services, twice the number of services offered by Uzbekistan's unified government services mobile app. In Russia, it is mandatory to have the Gosuslugi mobile preinstalled in all mobile phones sold. Kazakhstan placed such importance on the mobile app that it has revamped its award-winning mobile app and thereafter launch a newly improved version in 2019.

Next, with the increasing amount of data collected and used by government, data privacy and security are increasingly being discussed. Appropriate data protection legislation is necessary to create confidence in citizens that their personal data and privacy are securely held by government. This requires appropriate data protection legislation and policies to be put in place, including adoption of international standards such as ISO 27001 and 27701 on info security and privacy info management. At a time when data about individuals are being collected at an unprecedented scale, it is essential for governments to establish data protection frameworks that are not only secure but transparent and accountable towards citizens. Case examples of governments abusing information or failing to protect the information securely demonstrate the potential harmful misuse that could occur in handling massive data. In this context, governments must earn and retain the trust of citizens by providing the assurance that their personal and sensitive data is held securely and treated with appropriate respect for privacy. Any failure to guard trust will severely threaten public support for the adoption of digital government services and erode willingness to share personal information.

Best practices in gaining citizens' trust when collecting data

Best practice to gaining citizen's trust through data policies

Ask only once

Data should not be collected unnecessarily or too many times in a way which would be perceived as intrusive for citizens.

Be transparent

Citizens want to know what their data is used for. The government should make clear to citizens why it is asking for their data, and the benefits to them for sharing this data.

Be open

Data should be open where possible as a sign of reciprocal trust between the government and citizens. Data shared via such open data initiatives should always be anonymised.

Prepare for contingencies

If any unintended data breaches occur, the government must notify affected citizens at the first instance and undertake thorough investigation and remedial action to retain the trust of citizens.

Figure 112: Best practices in gaining citizens' trust when collecting data

Another method which can be used to increase user adoption is to run communication campaigns. Communication campaigns can help to promote usage of the services, by raising citizens' awareness of the digital services and their benefits.

Singapore, UK, Turkey, Latvia, UAE and others (Figure 109) have caried out communication campaigns promote usage of their e-government services successfully. In Turkey, SMS and email notifications were sent to citizens, alongside paid advertisements on TV, post offices and government offices to publicize the launch of key e-government services. These public service announcements highlighted the potential time savings factor of using e-government services. A few key services which attracted users and

drove up the adoption of e-government portal usage includes social security, tax and legal queries.

After citizens received their passwords and downloaded the e-government portal application to their smartphones, they also started checking and using other available services like online doctor appointments, ID/ driving license/ passport applications. This proves that promotional campaigns can be effective in increasing adoption of digital services across the government. Therefore, Uzbekistan should consider running such promotional campaigns as well.

Objectives and examples of communication campaigns to promote digital government services
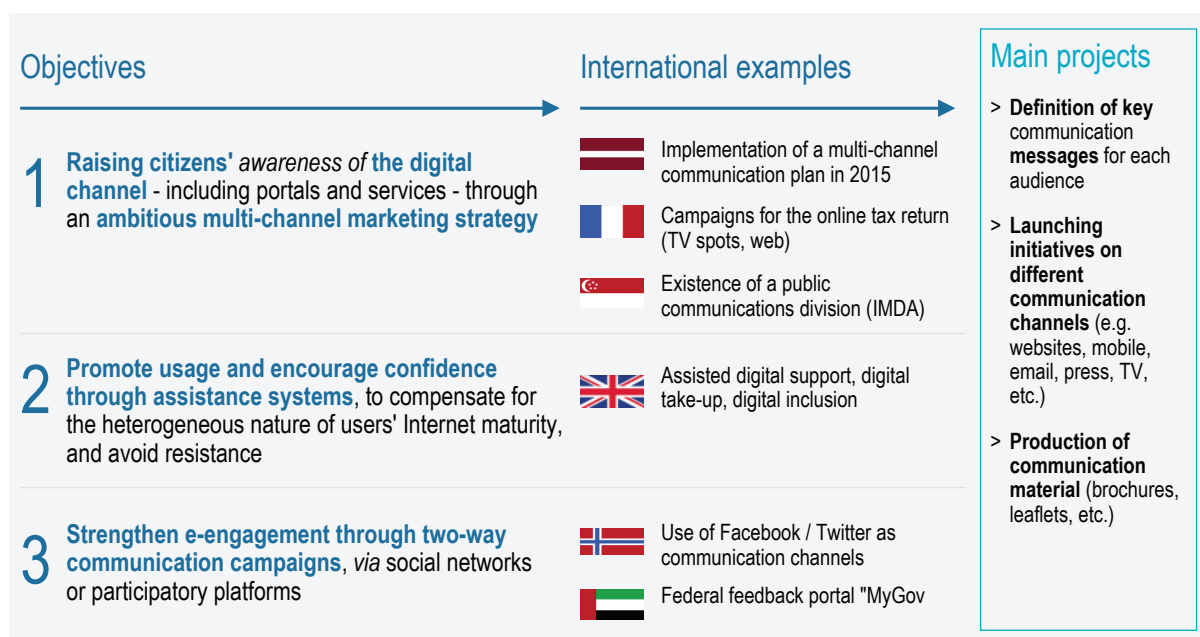

Objectives	International examples	Main projects
1 Raising citizens' *awareness of the digital channel* - including portals and services - through an **ambitious multi-channel marketing strategy**	Implementation of a multi-channel communication plan in 2015 Campaigns for the online tax return (TV spots, web) Existence of a public communications division (IMDA)	> **Definition of key** communication **messages** for each audience > **Launching initiatives on different communication channels** (e.g. websites, mobile, email, press, TV, etc.) > **Production of communication material** (brochures, leaflets, etc.)
2 Promote usage and encourage confidence through assistance systems, to compensate for the heterogeneous nature of users' Internet maturity, and avoid resistance	Assisted digital support, digital take-up, digital inclusion	
3 Strengthen e-engagement through two-way communication campaigns, *via* social networks or participatory platforms	Use of Facebook / Twitter as communication channels Federal feedback portal "MyGov	

Figure 113: Objectives and examples of communication campaigns to promote digital government services

5.1.4 Policies to develop human capital

As mentioned, digital human resource is a crucial enabler for the development of digital services, especially with the emergence of new technologies and increasing number of services being offered digitally. The government of Uzbekistan should consider adopting policies that support continuous professional digital training to civil servants and company employees, as well as continue to adopt policies in digitalization in education.

Digital upskilling of civil servants will uplift the digital capabilities within the government. Currently, digital training is already offered to civil servants, with Presidential and Ministerial decrees on improving qualifications for employees in the state, economic management bodies and government authorities in ICT. As new technologies emerge however, familiarity with technology requires practice and civil servants should be sent for periodical trainings or refreshers to continuously learn and familiarize with the latest technologies.

Meanwhile, government may also offer policies such as grants and tax exemptions to encourage companies to invest in digital upskilling of employees. This will increase the overall digital literacy of the population and increase adoption of both G2C and G2B services.

Additionally, given the technology expertise and competency of some private sector companies, especially technology companies, the government of Uzbekistan may consider developing policies to encourage private sector participation in professional digital training.

On the other hand, the government of Uzbekistan should continue adopting policies in digitalization of education to continue driving the digital literacy of the population and nurture digital talent from a young age, an initiative currently done by Singapore. Currently in Uzbekistan, the Ministry of Preschool and School Education is implementing a program to create educational computer classes in secondary schools. Over the past three years, the number of personal computers in general education schools has grown by 1.11 times and reached 59.4 thousand units. In colleges and lyceums their number have almost doubled. Educational institutions are being connected to the national data transmission network, including the Internet. The public youth movement "Kamolot" is implementing a program to create points of collective access to the Internet in the republic. The number of Internet cafes in the country has grown more than 20 times over the past three years and reached 493.[31] This is a good initiative and should be continued.

5.1.5 Policies to develop digital ecosystem

Beyond human capital, the development of a digital ecosystem within a country can significantly benefit the development of e-governments. As we have seen, the private sector can play key roles in e-government development, for example through innovating digital services, policymaking or developing digital human capital as mentioned above. However, development of a digital ecosystem does not occur overnight and policies and incentives are required to encourage companies to set up within a country and among them are, improving the open data systems in Uzbekistan and policies to promote growth of digital ecosystem.

In terms of open data, the United Nations has compiled a list of top 12 most in-demand open data categories. Of these, data.gov.uz only provides two for now, with one more in Beta mode. The nine other open data categories such as weather forecasts, election results, national boundaries, government procurement and company registration information are not yet provided. These should be prioritized for inclusion in the next stage of the open data program.

Meanwhile, the government of Uzbekistan should also consider adopting policies to promote growth of digital ecosystem in Uzbekistan. Policies may include financial and labor incentives and simplification of business processes such as business set up and reporting. Uzbekistan has made progress in this aspect through its decree of improving investment climate and business environment and more freedom for entrepreneurship but opportunities to offer additional policies exist.

Overall, Uzbekistan has the necessary regulations in place to promote its e-government development but can still improve by adopting policies that promote the provision and adoption of digital government services.

Key steps and indicative timeline

1. Regulations: As digital transformation is an ongoing process that challenges regulations in place and creates new regulatory needs, periodic review and updates of the regulations are required.

2. Discussion and implementation of policies to support infrastructure development: Broadband access, spectrum for mobile broadband and backbone infrastructure.

3. Discussion and implementation of policies to promote usage of digital services: Electronic ID, mobile-first policy, data protection/privacy.

4. Discussion and implementation of policies to promote development of digital human capital: Continuous professional digital training, digitalization in education.

5. Discussion and implementation of policies to promote development of digital ecosystem: Continuation of open data program, subsidies, incentives

Indicative timeline for key steps in regulation and policies

	Activity	2022 Q1	Q2	Q3	Q4	2023 Q1	Q2	Q3	Q4
Regulations	**Review and update regulations (continuous/ iterative process)**	←———————————————————————————————→							
Policies to encourage infrastructure development	**Implement financial policies (subsidies etc.)**		▬▬▬▬				▬▬▬▬		
	Implement policies to encourage collaboration between broadband and utilities companies	From Q1 2021 as per 'Digital Uzbekistan 2030'							
	Implement policies to promote non-discriminatory access to public infrastructure	From Q1 2021 as per 'Digital Uzbekistan 2030'							
	Implement policies of spectrum assignment with obligations			←——————————————————————————→					
	Implement policies of last-mile fiber pre-installation	From 2020 as per 'Digital Uzbekistan 2030'							
	Update of 900/2100 MHz spectrum neutral license	From Q2 2020 as per 'Digital Uzbekistan 2030'							
	Allocation of more spectrum (700/800/2300 MHz)	From Q4 2020 as per 'Digital Uzbekistan 2030'							
	Implement policies on optimization of the Right of Way regulations	From 2020 as per 'Digital Uzbekistan 2030'							
Policies to promote usage of digital services	**Implement electronic ID policy**					←————————————————→			
	Review and enhance policy on data privacy/protection and governance, including adoption of standards on info security and privacy info mgmt.	←————————————————————————————————→							
Policies to promote digital ecosystem development	**Continue open data program**	←————————————————————————————————→							
	Implement policies to attract business set up (e.g., incentives etc.)	←————————————————————————————————→							

Figure 114: Indicative timeline for key steps in regulation and policies

5.2   Operating model

The existing operating model follows the best practices and is well-positioned to lead development of its e-government. However, for future progress, it should also consider partnering with the private sector to leverage the skills and competencies for further advancement of the e-government.

Operating model describes the organizational structure to conduct the operations of a digital government. It outlines structured roles and responsibilities needed to drive, coordinate and implement policies and projects.

Uzbekistan has recently set up an overarching central government body to coordinate and

lead the nationwide digital transformation effort. Arising from the April 2020 Presidential Decree "On measures for the widespread adoption of the digital economy and e-government", the E-Government Projects Management Center has been set up in Uzbekistan to oversee all e-government initiatives. Additionally, there are also plans to have CDOs appointed in selected government agencies.

Uzbekistan's operating model aligns with the recommended best practices model. Operating models can be described along two dimensions: supporting structure and departmental affiliation (Figure 111).

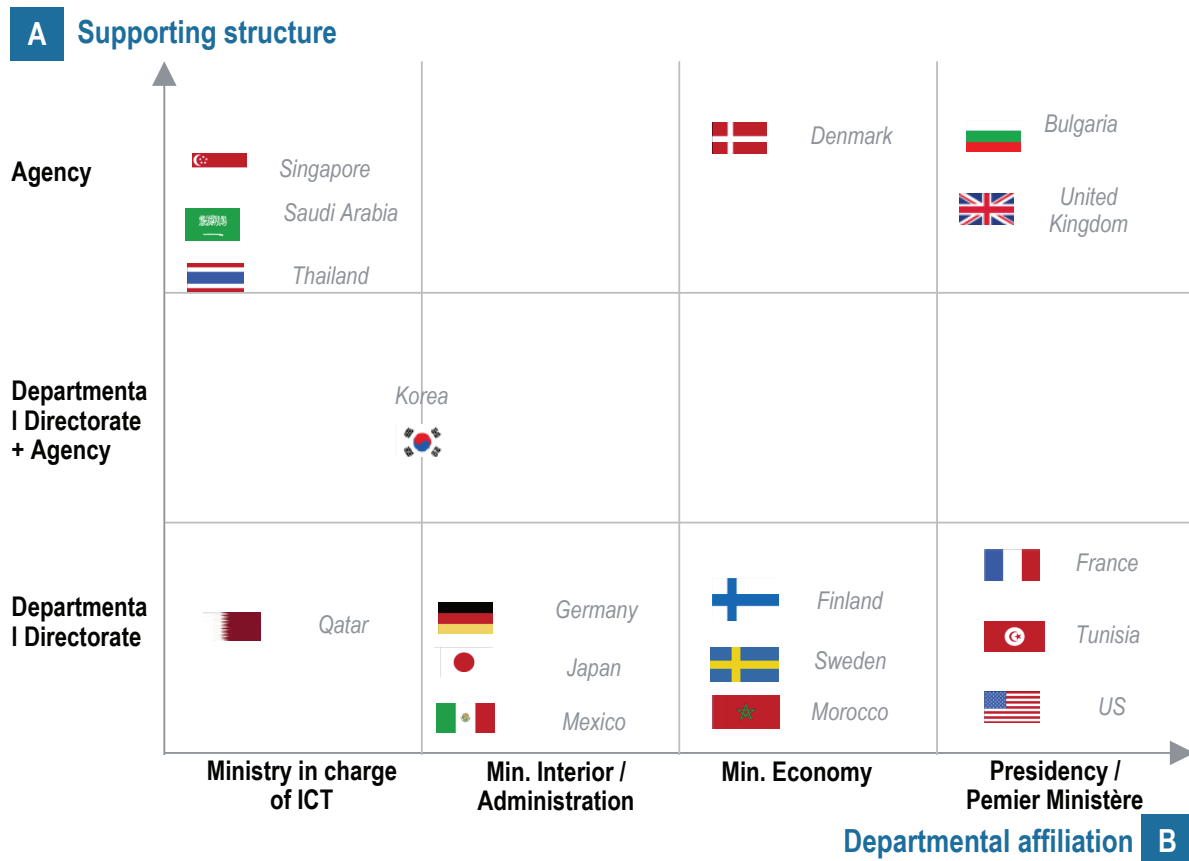### Overview of operating models adopted by countries

Figure 115: Overview of operating models adopted by countries

In determining which option Uzbekistan should pursue, the pros and cons of each supporting

structure model needs to be first considered (Figure 112).

Pros and cons of supporting structure models

Model	Country examples	➕ Benefits	➖ Disadvantages
Agency	> United Kingdom	> Possibility of benefiting from resources from outside the State > Facilitation of the recruitment of specific skills > Increased professionalism due to specialization > Effective instrument for partnership with local authorities or private/civil society actors	> Difficulty for the government to control and evaluate the agency (means, results), particularly in terms of budget > Potentially longer set up time
Management + Agency	> Korea	> Strong political impetus from departmental management > Flexibility provided by the agency and acceleration of policy implementation	> Potential confusion over the policy role between agency and administration > Difficulty for the government to control and evaluate the agency (means, results), particularly in terms of budget
Direction	> France	> Full departmental control over policy and budgets > Easy to create the structure and recruitment	> Rigidity of the administrative structure (staff status, budget) > Potential for slowing design and implementation

Recommended model

4 criteria for using an agency

> **Efficiency**: usefulness of specialization in large-scale tasks

> **Expertise**: need for expertise separate from the State's competences

> **Partnership**: the importance of partnerships in the implementation of the policy

> **Neutrality**: the need to avoid blockages in day-to-day decisions through neutral processes

Figure 116: Pros and cons of supporting structure models

There are three supporting structure models, namely agency, management, and a combination of both. Overall, the agency model offers more opportunity to utilize resources from outside the State including recruitment of specific skills and partnerships which will potentially provide more specialization hence this model is encouraged if efficiency, expertise, partnerships and neutrality are needed. However, it may be more challenging for governments to control and evaluate the agencies and have a potentially longer set up time. Meanwhile, the management and agency model benefits from having stronger political impetus from departmental management. However, with both management and agencies in place, clear roles and responsibilities need to be identified and the challenge of evaluating the agencies still exist. On the other hand, the sole departmental directorate model is easy to create and departments can have full control over policy and budgets. However, it suffers from rigidity of administrative structure, potentially slowing down design and implementation.

Meanwhile, pros and cons of various departmental affiliations also need to be considered (Figure 113). By attaching to the President/ Prime Minister (policy coordination model), the supporting structure can benefit from high-level strategic impetus and political weight to facilitate project coordination which could accelerate implementation. However, it needs to overcome a potential lack of technical expertise for coordination and implementation. Meanwhile, by attaching to financial ministries (Budgetary coordination), the supporting structure will have direct control over funds required by departments for implementation. However, it may still lack technical expertise for coordination and implementation, as well as interdepartmental legitimacy. On the other hand, attaching to the ministries of administrative/ interior (Administrative coordination) will benefit from integrating administrative simplification to e-government objectives. However, it will also lack technical expertise for coordination and implementation and financial expertise to set priorities. Alternatively, the supporting structure can also be attached to the ministry of ICT (Technical coordination) and it will benefit from the availability of technical teams and non-governmental stakeholder access, such as from private companies. However, the supporting structure could suffer from excessive focus on technology at the expense of coordination with administrative reform and reduced interdepartmental legitimacy.

Pros and cons of departmental affiliations

Model	Country examples	➕ Benefits	➖ Disadvantages
Policy coordination *Presidency or Prime Minister*	> Bulgaria, United Kingdom, United States, France	> High-level strategic impetus > Political weight to facilitate project coordination	> Lack of technical expertise for coordination and implementation
Budgetary coordination *Financial Ministries*	> Australia, Canada, Denmark, Finland, Kenya	> Direct control over funds required by departments for implementation > Alignment of e-Government issues / budgetary objectives	> Lack of technical expertise for coordination and implementation > Reduced interdepartmental legitimacy
Administrative coordination *Ministries of Administrative Reform, Interior...*	> Germany, Japan, Mexico	> Facilitates the integration of administrative simplification into e-government objectives	> Lack of technical expertise for coordination and implementation and financial expertise to set priorities
Technical coordination *Ministry of Technology, Industry and Communications...*	> Korea, Qatar, Saudi Arabia, Romania, Singapore, Thailand, South Africa	> Guarantees the availability of technical teams > Non-governmental stakeholders access (companies, ...)	> Excessive focus on technology at the expense of coordination with administrative reform > Reduced interdepartmental legitimacy

  Recommended models

Figure 117: Pros and cons of department affiliations

Analysis of the various models show that an agency model attached to the President or Ministry of ICT is recommended, which aligns with the existing model adopted by Uzbekistan. Currently, the Cabinet of Ministers, individual ministries, Ministry of Digital Technologies and E-Government Projects Management Center work together as a committee to formulate initiatives on new services for consideration in the Cabinet of Ministers meeting. After the list of services for digitization is approved, the E-Government Projects Management Center assumes responsibility to manage implementation, conduct business process reengineering for government services subject to digitization and prepare technical scope of work for UZINFOCOM. In this task E-Government project management is supported by CDOs of the ministries and other government entities, whose services undergo digitization. Based on the inputs from E-Government Projects Management

Center and ministries, UZINFOCOM conducts technical implementation and maintenance of service after the launch.

We recommend that Uzbekistan maintains its current operating model. However, an option to consider for improving its implementation and rollout speed is partnering private contractors in the digital service implementation process. Private companies have specialized technologies skills and expertise that can help innovate the digital services and assist in digital training. Estonia and Singapore have done this to improve its implementation and rollout speed. As mentioned in Chapter 4, there are two models with different level of private sector participation. Evaluation of potential benefits and readiness of the Uzbekistan government recommends that the government of Uzbekistan should shift towards the hybrid model in the short to medium term while transitioning towards the ecosystem model in the long term (Figure 114).

Potential transition to future model for consideration
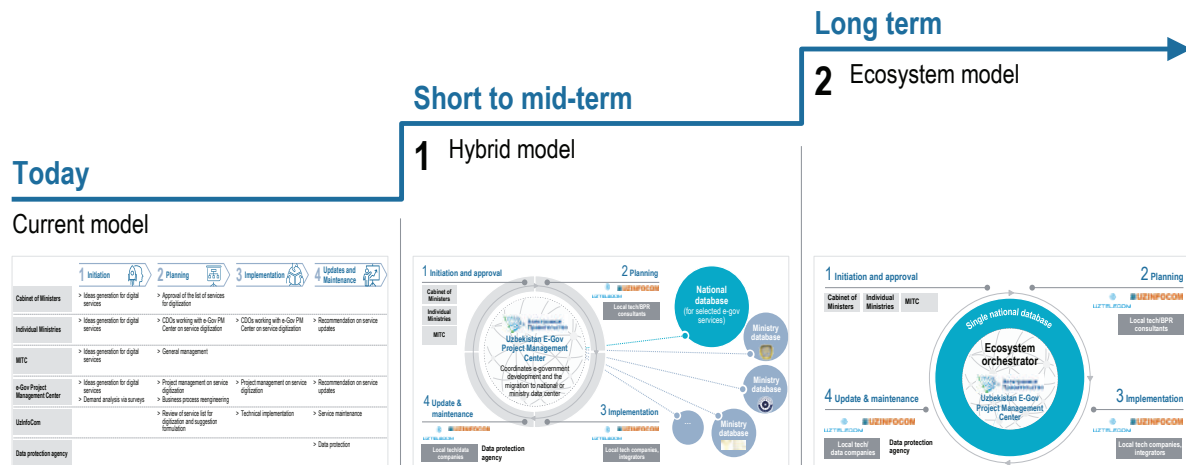
Figure 118: Potential transition to future model for consideration

Key steps and indicative timeline

1. Shift towards hybrid model in the short to medium term

2. Transition towards ecosystem model in the long term

3. Regular meetings between various stakeholders for review of progress and make improvements in case of any issues

Key steps and indicative timeline for operating model

Activity	2022	2023	2024	2025	2026
Shift towards hybrid model					
Transition towards ecosystem model					
Regular meetings between various stakeholders to review progress of projects and policies development and make improvements in case of any issue					

Figure 119: Key steps and indicative timeline for operating model

5.3 Infrastructure

Infrastructure development plays a critical role in each phase of the digitalization of a country and ought to be the foundation on which all other digitalization initiatives are built, including e-government. Fundamentally, governments need to first expand fixed and mobile broadband to enable wider access to the internet as well as e-government services. To support and improve digital service offerings, governments should develop more advanced infrastructure such as 5G and Internet-of-Things. Besides, with the advancement of data centers and its role in offering e-government services, world-class data centers should be developed and further steps to adopt cloud

technology and edge computing should also be taken as well to enable faster data processing. International connectivity should also be increased to enable a broader access to the internet and digital services which will ultimately benefit advancement of e-government and the digital economy. Consequently, with the increasing amount of data in use which enables the growth in amount and advancement of services, security and regulation and licensing should be considered as well (Figure 120). We have highlighted the importance of digital infrastructure in the provision and adoption of e-government services. Therefore, in this module we will assess the needs of Uzbekistan for each of these infrastructure and the various implementation plans.

Key elements of National ICT infrastructure
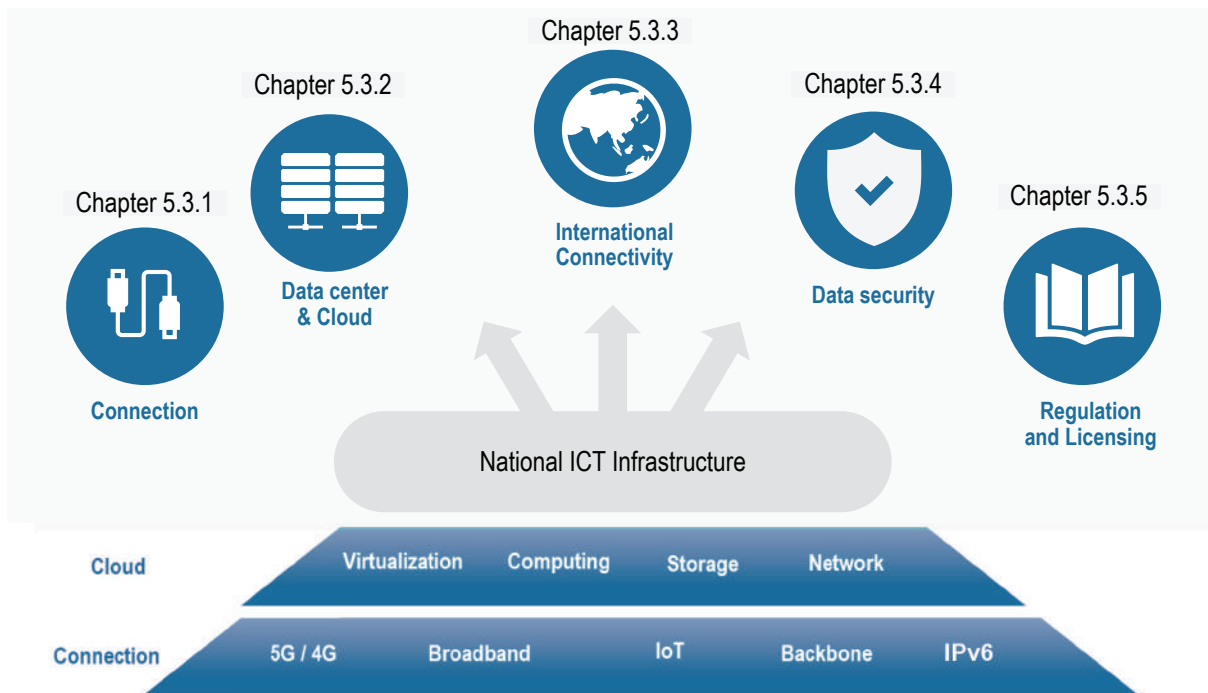
Figure 120: Key elements of National ICT infrastructure

5.3.1 Connectivity

In terms of connectivity, the government of Uzbekistan should work towards achieving "everywhere connected". To achieve this, the government of Uzbekistan will need to accelerate broadband access in urban and rural areas, improve wireless coverage such as 4G, 5G and IoT and enhance backbone infrastructure development with IPv6 support.

In previous chapters, we learnt that broadband access in Uzbekistan is on the rise but there

remains room for improvement. To advance development of e-government and increase adoption of digital services, broadband connectivity needs to be significantly improved. In alignment with the "Digital Uzbekistan 2030" program, connectivity of public sector buildings, households and commercial buildings should be improved through a phased approach according to the digital services planned for rollout, with the following indicative milestones and objectives:

A. Connectivity of public sector buildings. It is envisioned that all municipal buildings must be connected via ultra-fast broadband with IPv6 support.

Phase 1 (by 2023)	Phase 2 (by 2026)	Phase 3 (by 2030)
At least one provincial and municipal public sector building must have a PoI (Points of Connection) built that is connected by a fiber optic transmission network over a full or partial mesh topology where the PoI will be used as a node to provide public sector connectivity. The bandwidth of each connection between PoIs should be Nx10Gbps or 100 Gbps. depending on public services in the particular area. At least two Points of Presence (PoPs) must be built in a state and city with a population exceeding 200,000. The connections should support IPv6 traffic.	All city halls and administrative buildings should have at least 10 Gbps connected with redundant lines and IPv6 support.	Connectivity between major public sector buildings. such as the court building, library. public security or law enforcement buildings, and other judicial buildings. should be at least 1 Gbps. Targeted buildings will be further defined by local authorities. All newly built networks should support IPv6-only and IPv6 Enhanced technologies such as SRv6.

B. Connectivity of households. In 2020, the population of Uzbekistan was approximately 34.23 million people. According to the household sampling surveys conducted in 2018, covering more than 50 thousand people, the average size of one household in Uzbekistan is 5.2 members. As a result, we can estimate the total number of households to be 6.6 million. The national broadband plan is to have 700,000 coverage by fiber connections (PON, FFTH). It is also recommended that all the newly built broadband networks should support IPv6. Based on the split of households by the number of people in a household, we can set objectives across 3 phases:

Phase 1 (by 2023)	Phase 2 (by 2026)	Phase 3 (by 2030)
An additional 1,8 million households should be covered by access to new generation networks with actual download speeds of at least 100Mbps, which can be upgraded to 1 Gbps. At the same time, 1 million existing subscribers should be able to get at least 100 Mbps capacity, which can be upgraded to 1 Gbps. The deployment project should be launched no later than the end of 2022. All additional broadband households should support IPv6 and be distributed with IPv6 addresses. The IPv6 adoption rate should reach 10%.	The remaining 2,5 million households should be covered with access to new generation networks of a download speed of at least 100 Mbps, which can be upgraded to 1 Gbps. According to estimates, there are already around 3 million existing subscribers that can be upgraded to 1 Gbps. The broadband users should have IPv6 access and backbone shall support IPv6 Enhanced technologies such as SRv6. The IPv6 adoption rate should reach 50%.	Approximately 1,3 million households should be covered by any technology (PON, FTTH, etc.) in the network with a download speed of at least 100 Mbps by 2030. By the end of 2030, 5 million households (an estimated 80% of the population) should be covered by at least 100 Mbps, which can be upgraded to 1 Gbps; all households will be covered by at least 100 Mbps. The backbone network should be migrated to IPv6-only networks with full support of SRv6. The IPv6 adoption rate should reach 80%.

C. Connectivity of Commercial buildings and industrial parks. To stimulate digital economic growth and attract investment, entrepreneurs, businesses, and start-ups require an environment of better connectivity and ICT development. For example, registered commercial buildings and industrial parks should provide Internet access at speeds of 1 - 10 Gbps. Expected target milestones could include the following:

Phase 1 (by 2023)	Phase 2 (by 2026)	Phase 3 (by 2030)
At least one registered commercial building and industrial park in each province and municipality should have Internet access at 1 Gbps and with Wi-Fi 6 coverage.	At least 25% or five nominated commercial buildings and industrial parks in each province and municipality must have a 1 Gbps connection. Each province and municipality must have at least one Internet connection at 10 Gbps for each commercial property and with Wi-Fi 7 coverage.	All commercial buildings and industrial parks should have access to the internet at 1 Gbps. At least 50% of the connections should be at 10 Gbps with the latest Wi-Fi technology coverage (Wi-Fi 7 or later).

In general, the recommended download speed objective setting to be used comes in three levels: (i) A minimum of 100 Mbps, which can be increased to 1 Gbps.; (ii) 1 Gbps; (iii) 10 Gbps. The latest WiFi technologies, such as WiFi-7 should be provided. One point of reference is the direction of the development of ultrafast broadband communication between the European Union and European countries. For a gigabit society in 2025, the European Commission and regulatory Body of European Regulators for Electronic Communications (BEREC) have set three targets (i) Access to 1 Gbps for all schools, transportation hubs and major public service providers and digitally intensive businesses; (ii) Access to a download speed of at least 100 Mbps, which will be increased to 1 Gbps for all European households; (iii) Uninterrupted 5G wireless broadband coverage for all urban areas and major highways and railways. In conclusion, it can be assumed that the rapid development of gigabit broadband will take place in many countries, which underlie our recommendation for these 3-tier goals.

5.3.2 Data center & cloud

In Uzbekistan, data of government bodies is managed in a hybrid model and most government agencies do not yet have well-developed data centers. The government of Uzbekistan aims to develop an integrated data center by the end of 2022. With multi-access edge computing (MEC) gradually becoming critical in an era of ultra-fast broadband access, combined with the maturity of cloud computing enabling higher rack densities and IT hub and digital node becoming the backbones of the digital economy leading to increasing demand for flexible computing power and storage, the government of Uzbekistan needs to build world-class data centers. "World-class" data centers can be defined as one that has: (i) a purpose-built facility with robust infrastructure, (ii) best-in-class equipment, (iii) high-performance computing capability, (iv) the human factor (Figure 121). Therefore, to develop a "world-class" data center, the government of Uzbekistan needs to continue improving its facility and equipment as well as continue developing its people. To validate its world-class data center, the government of Uzbekistan should work towards obtaining international certification for its data centers.

Elements of a world-class data center
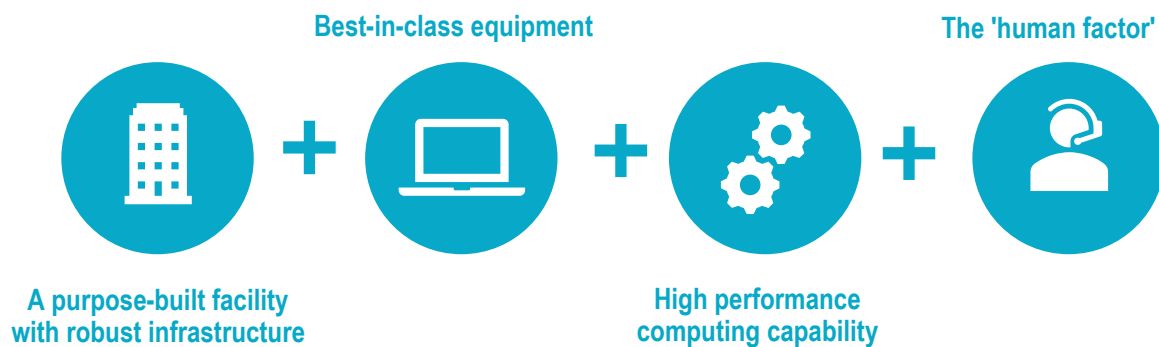
Figure 121: Elements of a world-class data center

Taking a further step in infrastructure development, the government of Uzbekistan should adopt cloud technology as it has various benefits. For instance, cloud platform will eliminate the additional cost requirements for capacity upgrades of data centers, software upgrades and maintenance. Besides, cloud computing enables applications to be up and running faster, with improved manageability and less maintenance. It enables IT teams to adjust resources to meet fluctuating and unpredictable demand more rapidly and provide burst computing capability. The network infrastructure

shall be also adapted to meet the fast-changing nature of the cloud model. The energy-efficient, autonomous-driven and hyper-converged data center networks shall be adopted. Overall, the cloud model is a convenient tool for transforming the processes of developing, providing, and consuming IT services, and is very suitable for implementing the technological basis of the e-government (Figure 122).

E-government cloud applications

Figure 122: E-government cloud applications

The market for cloud services (provided based on data centers located in the Republic) is still in its rudimentary state. In fact, only two commercial data centers are actively developing cloud services: DC Uztelecom and Beeline Datacenter. DC "UZINFOCOM" and DC of Inha University in Tashkent are focused only on providing colocation services. For example, DC UZCLOUD offers V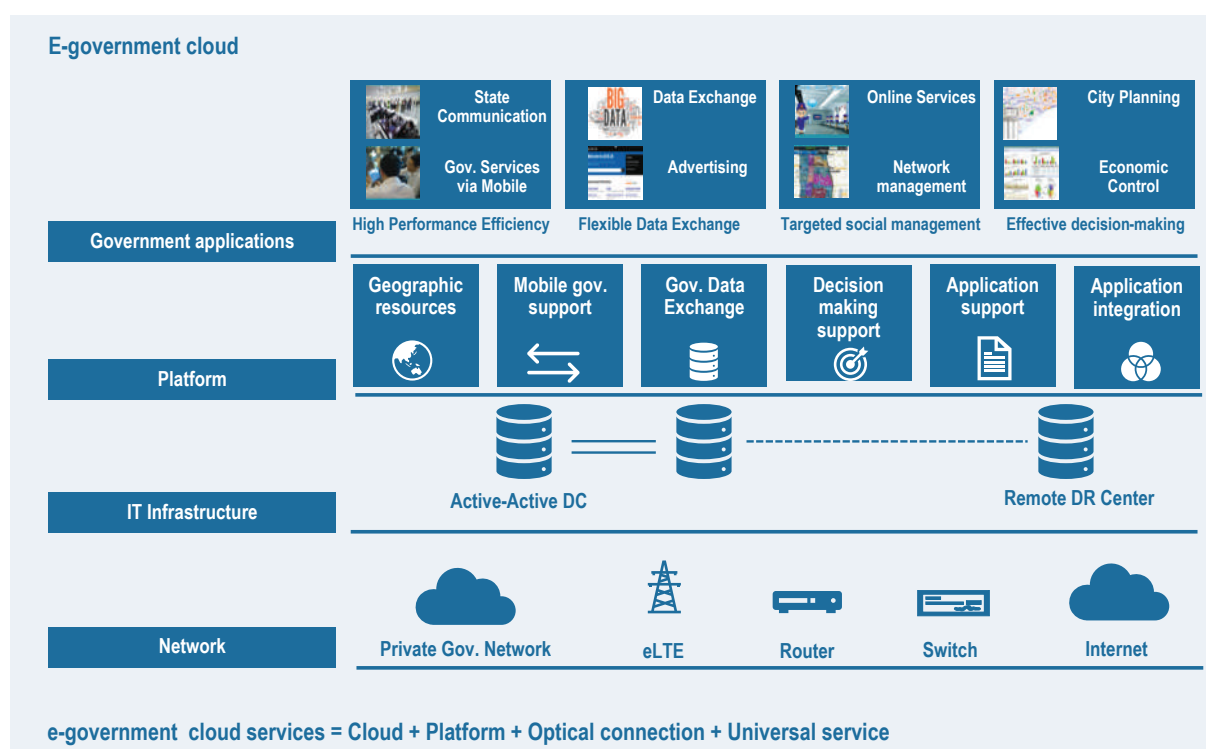PS - virtual server, VDI - virtual desktop, video conferencing, and others. DC of Beeline is focused on providing IaaS services. PaaS services are not yet developed in the republic. In Uzbekistan, there are no more than ten racks in commercial centers under cloud platforms. The volume of the cloud services market can be estimated to be at $50-100 thousand. The main obstacles to the development of the data center and cloud services industry in Uzbekistan are:

- Insufficient Internet coverage, that still require constant improvements
- Difficulties in accessing ICT facilities for fiber optic links due to the State monopoly on relevant resources
- Limitations of existing engineering communications – which make it difficult to meet high requirements for fault tolerance such as Tier III

- Lack of expert knowledge and qualified personnel in this field
- Shortage of technical solutions in organizations of high-quality engineering infrastructure

To overcome some of its challenges, Uzbekistan can adopt out-of-box solutions such as Public Cloud Technology Stack deployments from a global Cloud Provider. Public Cloud Technology Stacks provide an architecture that is identical to global public clouds of global cloud providers such as Amazon Web Services, Huawei Cloud, or Microsoft Azure. They use standardized hardware and software. They provide a variety of available "big cloud" cloud services with a user experience identical to that of the public cloud but require much fewer resources and management because of unified management and remote administration.

The government of Uzbekistan should consider adopting cloud technologies early on, to avoid getting trapped into an old-legacy architecture that can lead to vendor lock-in issues in the future and inefficient spending in the present day. With the aforementioned benefits of cloud technology, a cloud-based e-government platform should be the ultimate aim (Figure 119).

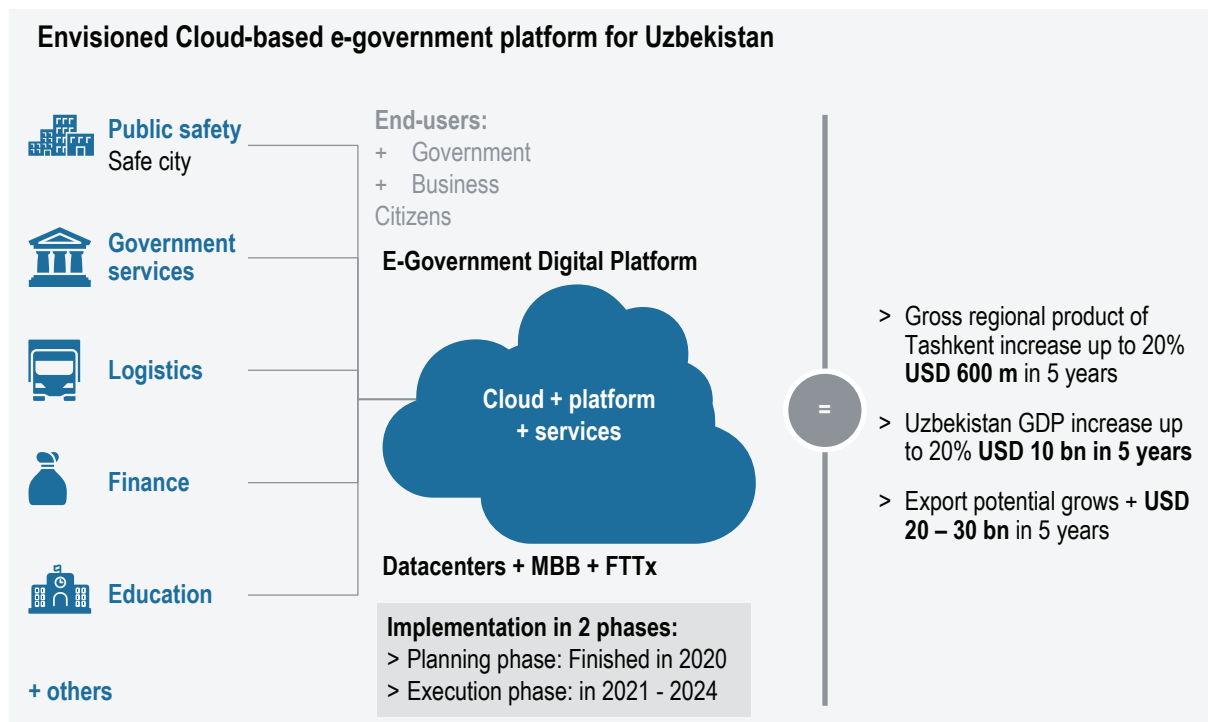**Envisioned cloud-based e-government platform for Uzbekistan**

Figure 123: Envisioned Cloud-based e-government platform for Uzbekistan

5.3.3 International connectivity

International gateways provide access to international terrestrial, submarine and satellite systems and manage incoming and outgoing international voice and data traffic by establishing interconnections between domestic and international networks. The expansion of international connectivity has often been found to benefit digitalization within a country through increased bandwidth and decreased broadband cost, hence making internet connectivity accessible to a larger population. Ministry of Digital Technologies currently has a monopoly over the country's international gateway, which it operates through Uztelecom, resulting in prices for IP transit in Uzbekistan being among the most expensive in the world as well as a country with bandwidth that is critically low on a per capita basis. This has also resulted in low investments. Currently, only about 170 thousand km of fiber-optic lines exist in Uzbekistan, which is inadequate for a country of this size. The Digital Uzbekistan 2030 strategy aims to address those challenges and improve length of fiber optic infrastructure and internet coverage both fixed and mobile. Initiatives for Uzbekistan to explore deeper interconnection and cooperation with neighboring countries, provide diversified transit services, and create of a transport hub in Central Asia have been identified along three categories:

(i) Additional international gateways (IGWs) (ii) Upgrades to existing IGW (iii) Multi-dimensional scheduling and flexible access

Additional IGWs

- Construct a backup node for the international ingress and egress office in the direction from Kazakhstan to Europe by the end of 2023

- Construct a backup node for the international entrance and exit office in the direction from Kazakhstan to the Asia Pacific region by the end of 2023

- Construct a backup node for the international entrance and exit office in the direction from Kazakhstan to the Caspian Sea by the end of 2023

- Add a backup node for the international gateway office in Kyrgyzstan by the end of 2023

- Add a backup node for the international gateway office in Tajikistan by the end of 2023

- Add a backup node for the international gateway office in Afghanistan by the end of 2023

- Add a backup node for the international gateway office in Turkmenistan by the end of 2023

Suggested additions to Uzbekistan International Gateway

Figure 124: Suggested additions to Uzbekistan International Gateway

Upgrades to the IGW

- The egress bandwidth of the international gateway in the direction from Kazakhstan to the Asia Pacific is 200Gbps, which will be completed by the end of 2023 and can be expanded to 5Tbps in the future

- The egress bandwidth of the international gateway in the Afghanistan direction is upgraded to 100Gbps. The capacity is expected to be completed by the end of 2023 and can be expanded to 1Tbps in the future

- The egress bandwidth of the international gateway in Turkmenistan is upgraded to 100Gbps. The capacity is expected to be completed by the end of 2023 and can be expanded to 1Tbps in the future

- The egress bandwidth of the international gateway in Tajikistan is upgraded to 100Gbps, which will be completed by the end of 2023. The bandwidth can be expanded to 1Tbps in the future

- The bandwidth of the international gateway in Kyrgyzstan is upgraded to 100Gbps. Complete the project by the end of 2023 and expand the capacity to 5Tbps in the future

Multi-dimensional scheduling and flexible access

- Add a western channel to connect the Kazakhstan national backbone network to the international gateway in the Caspian Sea direction, implementing fast traffic grooming in the southwest direction

- The capacity of the north-south traffic channel is upgraded to 1Tbps and can be expanded to 10Tbps in the future

- The capacity of the east-west traffic channel is upgraded to 1Tbps and can be expanded to 10Tbps in the future

5.3.4 Security

As new technologies emerge and data usage increase, risk, and threats to data security also increases. To prevent potential threats, the government of Uzbekistan needs to constantly improve its expertise level, ensure regular maintenance and upgrades for its software and hardware.

E-governments will collect exponentially more data as they advance and grow the amount of services they can offer digitally.

This only emphasizes the importance of deploying state of the art security measures that will promote confidence and peace of mind for citizens to utilize e-government services.

As seen in the benchmarking section, there are generally three levers to deploy data security: technology, governance and regulation (Figure 121). Data security through technology involves advanced infrastructure such as an integrated data center or blockchain which offers greater security in data storage and processing. Meanwhile, security through governance refers to the appointment of specific cybersecurity centers/ agency to oversee and manage data security, and develop policies etc. On the other hand, data security through regulations refer to the adoption of laws which set requirements on data systems, processing, storage and others with the aim of enhancing data security.
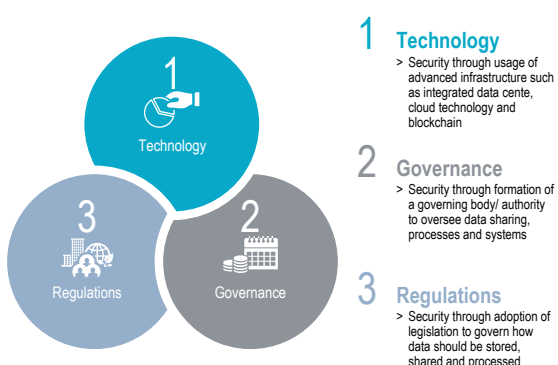
Measures for data security

Figure 125: Measures for data security

Overall, Uzbekistan has implemented a good level of data security with some developments across all three levers. Uzbekistan has adopted several relevant cybersecurity regulations such as the law on the legal protection of programs for electronic computers and databases, electronic document management, electronic

digital signature and informatization.[32] Meanwhile, it has data security through governance in place through the Uzbekistan Cybersecurity Center whose role includes examination of state information systems to ensure compliance, information security audit, assisting in development of information security policy and others. To continue enforcing data security, Uzbekistan also needs to reinforce its existing legislation on personal data security by requiring all personal data, including those collected by international data center operators, be stored within Uzbekistan. In addition, Uzbekistan improves security through technology by creating an integrated data center in 2022. As seen in the case of Korea, a GIDC offers high level of data security by preventing various malicious attacks. An additional aspect of technology security is through the operation principles of communication networks, such as distributing services among various international transmission systems and to different international hubs to avoid all services provided to the country or region getting affected in case of a hub fault.

Although Uzbekistan currently has various security levers in place, data security is a continuous and iterative process where constant assessment, maintenance and upgrades are required as services and technologies evolve. Ultimately, strong data security will lead to greater confidence among citizens' and result in higher adoption of digital government services.

5.3.5 Regulation and licensing

Today Uztelecom is the only fixed network operator, and Internet Service Providers (ISPs) and retailers of broadband services would have to rent from it. The presence of unregistered ISPs would be detrimental, hence needs to be regulated. On the longer term, performance of Uztelecom should be assessed since it is the sole operator, and hence the efficiency of broadband access is dependent on it.

As discussed above, regulatory environment in Uzbekistan is supportive of e-government development with key legislations in place.

In terms of telecommunications licensing, Uztelecom currently holds exclusive control over the country's international telecommunication networks. This is neither good nor bad, as similar references are seen in other countries,

such as Beltelecom in Belarus and Telecom Egypt in Egypt. Both examples show it to be an effective and straightforward way to regulate the licensing of telecommunications operations. The factor that determines whether the license for fixed network operation should be increased is the efficiency and effectiveness of the operator in continuing to develop the national broadband access. If the operation of an exclusive operator meets the expectations of the state and citizens, there is no need to specifically issue an additional license. On the other hand, if the development of ICT and network infrastructure seems to be delayed by one operator, issuing an additional license for the participation of another qualified operator is a potential remedy.

The licensing of ISPs, operators and retailers is also crucial. The policy "Register Unregistered" should be provided. If unregistered operators conduct business in an improper manner, this could cause collateral damage not only to the market mechanism but also to citizens' interests. Moreover, unregistered operators will be able to evade tax payments and thereby disrupt the pricing structure in the broadband market. In general, a licensing regulation aims to ensure the development of ICT and network infrastructure, and a balance between competition and investment in the ICT market moves.

Therefore, the recommended short-term measure is to regulate unregistered operators, such as Internet service providers and retailers of broadband services. In the long term, the government should assess the performance of operators responsible for national broadband development, considering the nature of network infrastructure deployment. In most conditions, the market welcomes the dual provider strategy to create competition, though it still depends on the unique culture and market atmosphere in Uzbekistan.

In addition, as the data center sector in Uzbekistan develops, the licensing regulations and policies governing the number of data center operator license issuances and the stringent process of awarding these licenses should also be established

Key steps and indicative timeline

1. Broadband infrastructure rollout as per targets of Digital Uzbekistan 2030.

2. World class data center development and cloud adoption.

3. Increase and upgrade of international transmission channels.

4. Maintenance and upgrade of security.

5. Regulate unregistered operators and assess the performance of operators responsible for national broadband development.

Key steps and timeline for infrastructure development

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030
Broadband infrastructure rollout									
Connectivity of public sector buildings	Phase 1			Phase 2			Phase 3		
Connectivity of households	Phase 1		Phase 2				Phase 3		
Connectivity of commercial buildings and industrial parks	Phase 1		Phase 2				Phase 3		
Data Centers									
Development of world class data center and obtain certification									
Adoption of cloud platform									
International connectivity									
UZ-KZ international transmission channel (3rd IGW)	Upgrade active node					Construct backup nodes			
UZ-KG international transmission channel		Construct backup nodes							
UZ-Tajik international transmission channel		Construct backup nodes							
UZ-AFG international transmission channel			Construct backup nodes						
UZ-Turkmen international transmission channel	Upgrade active node		Construct backup nodes						
Optimization of the international transmission private network		Construct a western channel and connect it to UZ-KZ third IGW							
Security									
Maintenance and upgrade									
Licensing									
Regulation of operators and performance assessment	Regulate unregulated operators			Assess performance of operators and make necessary changes					

Figure 126: Key steps and timeline for infrastructure development

5.4 Human capital

Based on the operating model, several roles with specific responsibilities have been defined. Skills such as project management and technical ICT skills will be required, which the government of Uzbekistan may develop through professional training of civil servants or external partnerships with R&D or the private sector.

Human resources and digital capabilities are one of the key enablers for the development of an e-government. With various ministries, agencies and the project management office in place, clear roles and responsibilities should be assigned to each department, with specific skills requirements for each. According to the recommended operating model, the digital government will be governed by a steering committee consisting of the MITC, individual ministries, cabinet of ministers and a project management center working alongside UZINFOCOM. Specifically, the roles and responsibilities are as follows:

Cabinet of Ministers: Responsible for approving list of services identified to be digitized.

Individual ministries: CDOs of various ministries provide support to Project management center during implementation and recommend service updates.

Project management center: Responsible for managing implementation, conducting business process reengineering, preparing technical scope of work for UZINFOCOM.

Ministry of ICT: Support on formulating new services and general management.

UZINFOCOM: Responsible for technical implementation of services and service maintenance.

According to the above structure and roles, the following knowledge and skills will be required:

Cabinet of Ministers: Knowledge of demand for the services, latest trends in digital services to offer feedback and advice on any potential improvements

Individual ministries: Knowledge on citizen needs and demands in digital services and how to develop further, based on latest trends in services.

Skills in strategic planning and project management such as strategy development, timeline/ KPI tracking, leadership, communication skills, time and risk management will be necessary to identify the types of services to digitize and support the Project Management Center during implementation.

Project management center: Project management skills such as timeline/ KPI tracking, leadership, communication skills, time and risk management, knowledge on business processes, technical ICT knowledge to prepare scope of work for UZINFOCOM.

Ministry of ICT: Knowledge on latest technology trends, potential use cases in service offerings to identify services to be digitized and upgraded.

UZINFOCOM: Digital, data and technology skills such as operations, product & service and user experience. In terms of digital, operational, product & service and user experience skills are required. Operational skills include operational management, applications operations, infrastructure management, incident management, while product & service covers product and program management, and user experience including content strategy, design, graphics, and interaction, among others. For the data domain, data engineering, data science and performance analysis skills are key. For the technology domain, quality assurance & testing skills such as QAT engineering, management, analysis are needed, as well as technical support skills such as data architecture, network architecture, software development, infrastructure engineer and others.

Development of the above human capital skills can be done internally within the government or through external partnerships.

Internally, leadership positions should first be established and filled first, as they can help in human capital planning in the Whole-of-Government (WOG) as well as in competency development and manpower planning. Following that, public service officers can be upskilled through training programs, digital literacy framework and training plan including ICT competencies for specific job functions and digital academies. For further support, Centre

of Excellences (CoE) specializing in ICT with capability centers in various ICT domains (e.g., data science, AI, application development, cybersecurity) can be developed to support development of ICT skills and leadership for WOG. On the other hand, human capital may also be developed externally, through cross sector collaboration with the private sector and research institutions, as well as strategic partners to support in building up capabilities.

Key steps and indicative timeline

1. In current operating model, identify the level of skills in existing public service officers.

2. Identify gaps in skills and manpower based on skills requirements for each role and responsibility.

3. Based on size of gap and ease of upskilling to fill gap, either recruit or upskill through digital programs.

4. Periodic refresher training and recruitment for vacancies.
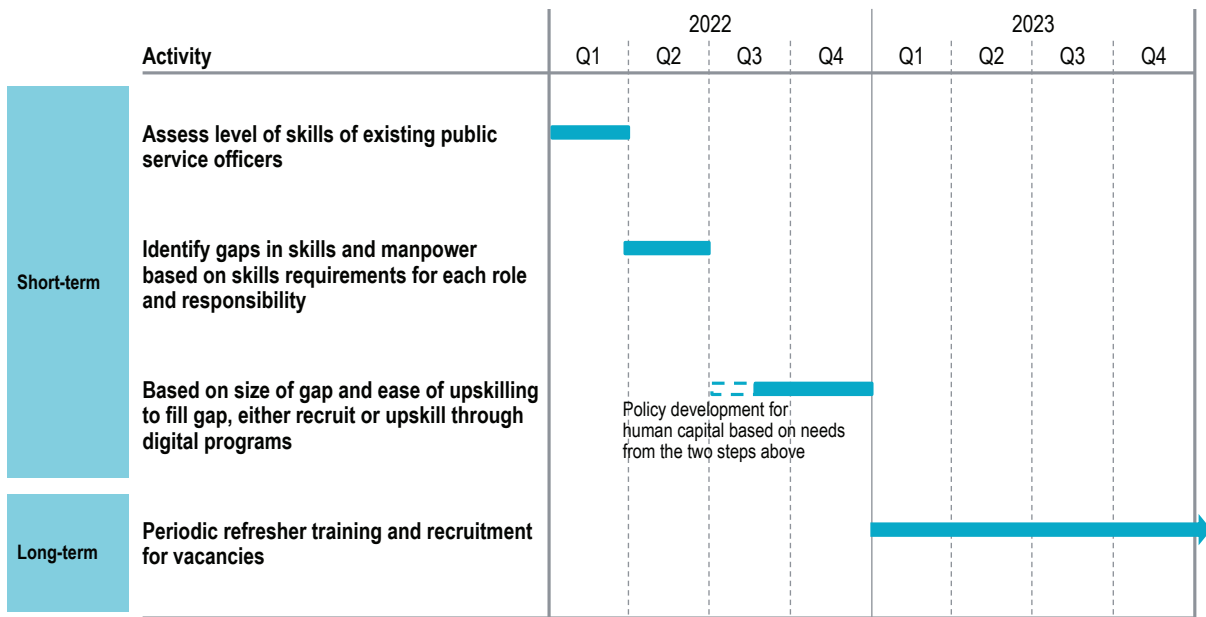
Key steps and timeline in human capital development

Figure 127: Key steps and timeline in human capital development

5.5   Financing

Financial resources are crucial to e-government development as it enables development of key enablers such as infrastructure and human capital. Through benchmarking in section 3.3, we have identified various sources of funding that are typically used for infrastructure, human capital and local digital ecosystem development (Figure 124). Adoption of specific funding models should be decided on a case-by-case basis, and in alignment with the strategy of the government of Uzbekistan.

Funding models and typical usage

	Funding model	Description	Typical use of funding: Infrastructure	Human capital	Local digital ecosystem
Government funding/ policies	National budget	Direct funding from national budget	✓	✓	✓
	Subsidies	Offer subsidies to private companies	✓	✓	✓
	Concessional loans	Loans at zero/low interest rates with long grace period	✓		✓
	Tax exemptions	Tax reliefs to encourage private sector investment	✓	✓	✓
Borrowings	Loans	Loans from banks (World Bank, ADB etc) to fund dev.	✓		
	Bonds	Issue bonds as a form of borrowing to fund dev.	✓		
Partnerships/ Leasing	Public-private partnership	Jointly invest in developing infra and ecosystem/ concessions for infra	✓		✓
	Software leasing	Adopt software/ hardware on a leasing model	✓		
	Share-in-Revenue/ Savings	Pay vendor based on % of revenue or savings	✓		
Paid by the citizens/ businesses/ users	Taxes (e.g., VAT)	Collect additional taxes from the population e.g. VAT	✓	✓	✓
	Pay-for-use	Pay-per-use basis by the people	✓		
	USO fund	Contribution from mobile operators	✓	✓	✓
Indirect revenue	Indirect revenue from ads	Offer website asset as advertising space	✓	✓	✓

Figure 128: Funding models and typical usage

Infrastructure development

Uztelecom is an operator that carries out a mission to develop national broadband communications through deploying a nationwide fiber-optic network which involves significant investment. As such, it requires more support to sustain business growth. Below we discuss several possible models which can be used to support infrastructure development.

Public-private-partnership: The government of Uzbekistan may accelerate infrastructure development by partnering with the private sector. Depending on the PPP model (Design-build-operate-transfer, build-operate-transfer, concessions etc.) adopted, it may also reduce its initial investment cost as the development is financed by the private sector. Other benefits include increased efficiency of infrastructure development, transfer of design, construction and operational risks, payments upon delivery and output focus model leading to high quality developments and potential to leverage competency of private sector.

Subsidy: Most common and popular way to provide financial support for national broadband development. In the past, when the government of Uzbekistan announced and launched the first phase of national broadband network deployment, subsidies were planned. It looks appealing to follow the previous model to provide financial assistance on a permanent basis.

Reforming the USO fund: The Universal Service Commitment Fund (USO) is contributed by mobile operators and used to apply for ubiquitous wireless signal coverage, especially

in rural areas. The mechanism of managing the USO fund may be outdated and needs to be reviewed and reformed for greater economic and social impact. This includes aligning it with Digital Uzbekistan's goals and transforming it to strengthen the broadband ecosystem. This involves using the fund to provide broadband infrastructure in rural areas as well as to stimulate demand factors such as ICT literacy, access devices, and the development of attractive content and services.

Tax exemptions. Types of tax reliefs such as tax credits, tax exemptions, and tax credits can help Uzbekistan move towards the goal of digital transformation. Several economic studies have shown that tax exemptions are a cost-effective way to stimulate private-sector research and investment in the broadband ecosystem. In the short term, the implementation of the tax incentive program will lead to a decrease in tax revenues. Tax incentives are very attractive to capitalists who can invest in Uzbekistan in the long term, if there is a well-thought system of taxation of broadband development. It can not only increase the volume of broadband services and generate more tax revenue after a certain period but also increase the contribution of the digital economy to the gross domestic product. Policy aspects should be further discussed with the Government.

Human capital development

Human capital can be developed internally through the government through various methods such as setting up digital programs. Alternatively, with the right incentives, private sector can also play a role in developing the digital skills of the population or helping the government to train its employees. Below we discuss several funding models which can be used to develop human capital.

Subsidies: Governments may offer subsidies to private companies to set up digital training programs to upskill the digital skills of the population and offer training services to the public sector. Offering training programs to the population of Uzbekistan can uplift the overall digital capabilities of the nation, and potentially provide the public sector a long-term supply of digital human capital. Improving the digital skills population may also increase adoption of digital government services.

Tax exemptions: Similarly, the government may also offer tax reliefs to provide more incentives for private companies to develop digital training programs for the population and public sector.

Local digital ecosystem

As seen in other countries such as Singapore and Estonia where there are well-developed digital ecosystem, private companies play a key role in enhancing the development of e-government and the digital economy as they have the knowledge, skills and competency to improve digital services of the governments, innovate services using the latest technologies, participate in policymaking and develop digital human capital. Therefore, the government of Uzbekistan should promote the development of a local digital ecosystem. Below we discuss several funding models which can be used to promote development of a local digital ecosystem.

Public-private partnership: The government can jointly create an investment fund with private companies. These funds can be used to invest in digital start-ups with potential to grow and contribute to the development of the e-government and digital economy. In addition to funding, skills and knowledge of private companies on investments (due diligence, valuations etc.), operations and development of startups can be leveraged in the investment process.

Subsidies: The government of Uzbekistan may also offer subsidies to encourage setting up, expansion or digital transformation of private companies. Subsidies may contribute to reducing the overall capital requirements from entrepreneurs to start businesses hence may increase the number of companies being developed. Meanwhile, subsidies can be offered to expanding companies in the digital industry, or to companies undergoing digital transformation as it increases the overall digital capabilities of the nation.

With the various financing models available to fund infrastructure, human capital and ecosystem development, the selection of which models to adopt should be decided on a case-by-case basis and in alignment with the strategy of the government of Uzbekistan. Although there are a range of funding options, the government of Uzbekistan should take note of several potential challenges that it may still face such as having a fixed number of funding

cycles annually which may delay launching of projects. This was faced by Singapore and was resolved through a new resourcing framework developed with the Ministry of Economy and Finance[33]. The government may also face challenges such as insufficient funding, hence proper planning is necessary. Other challenges may include lack of interested parties/ partners and having to keep the citizens happy by not enforcing unnecessary additional taxes.

Key steps and indicative timeline

1. In accordance with section 5.1 on program implementation, financial infrastructure development programs were implemented in the 1st and 2nd quarters of 2022.

2. Implementation of policies for human capital development.

3. Implementation of policies for digital ecosystem development.

In terms of funding of projects, the timeline of funding highly depends on the source of funding and the project timeline. Typically, an annual national budget will be allocated. However, this might be insufficient hence additional sources of funding might be required. The source of funding is also highly dependent on the type of project. Key steps include financial evaluation of project (including costing, returns-on-investment calculation), assessing available funding models for each project and searching for partners if required. In short, funding of e-government requires high level of forward planning, budgeting and should be assessed on a case-by-case basis.

Key steps and timeline for financial resources

Figure 129: Key steps and timeline for financial resources

06

CHAPTER

Roadmap for Uzbekistan
e-government and data strategy

6 Roadmap for Uzbekistan e-government and data strategy

Given the implementation rigor associated with the development of e-government and its broader digital economy, it is imperative that Uzbekistan ensures a measured execution of the implementation plan developed in Chapter 5, as well as the digitalization of its services in a prioritized manner starting with the possible quick-wins.

In this chapter, we will describe the roadmap for Uzbekistan e-government and data strategy. Chapter 6.1 lays out the implementation roadmap with indicative timelines clearly visualizing key milestones to be achieved in each phase. Chapter 6.2 will outline key attention points with regards to infrastructure,

followed by Chapter 6.3 describing the key success factors for the implementation.

6.1 Implementation roadmap and timeline

Based on the implementation plan developed in Chapter 5, the following are the implementation roadmap and timelines across the key areas of e-government development: (a). Service offerings, (b). Regulations and policies, (c). Operating model, (d). Infrastructure, (e). Human capital, and (f). Financing.

(a). Service offerings

Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030
Quick-wins: G2B services not involving payments	▬▬								
Short term: Implement G2B2C and G2C services not involving payments		▬▬▬							
Medium term: Digitize services involving some form of payments (complex services)				▬▬▬▬					
Long term: Offer advanced data and smart services								▬▬▶	

(b). Regulations and policies

	Activity	2022 Q1	Q2	Q3	Q4	2023 Q1	Q2	Q3	Q4
Regulations	**Review and update regulations (continuous/ iterative process)**	██►							
Policies to encourage infrastructure development	**Implement financial policies (subsidies etc.)**		████				████		
	Implement policies to encourage collaboration between broadband and utilities companies	From Q1 2021 as per 'Digital Uzbekistan 2030'							
	Implement policies to promote non-discriminatory access to public infrastructure	From Q1 2021 as per 'Digital Uzbekistan 2030'							
	Implement policies of spectrum assignment with obligations			████████████████████████████████►					
	Implement policies of last-mile fiber pre-installation	From 2020 as per 'Digital Uzbekistan 2030'							
	Update of 900/2100 MHz spectrum neutral license	From Q2 2020 as per 'Digital Uzbekistan 2030'							
	Allocation of more spectrum (700/800/2300 MHz)	From Q4 2020 as per 'Digital Uzbekistan 2030'							
	Implement policies on optimization of the Right of Way regulations	From 2020 as per 'Digital Uzbekistan 2030'							
Policies to promote usage of digital services	**Implement electronic ID policy**					████████████████►			
	Review and enhance policy on data privacy/protection and governance, including adoption of standards on info security and privacy info mgmt.	██►							
Policies to promote digital ecosystem development	**Continue open data program**	██►							
	Implement policies to attract business set up (e.g., incentives etc.)	██►							

(c). Operating model

Activity	2022	2023	2024	2025	2026
Shift towards hybrid model	████	████	████		
Transition towards ecosystem model			████	████	████ →
Regular meetings between various stakeholders to review progress of projects and policies development and make improvements in case of any issue	████	████	████	████	████ →

(d). Infrastructure

	Activity	2022	2023	2024	2025	2026	2027	2028	2029	2030
Broadband infrastructure rollout	**Connectivity of public sector buildings**	Phase 1			Phase 2			Phase 3		
	Connectivity of households	Phase 1		Phase 2				Phase 3		
	Connectivity of commercial buildings and industrial parks	Phase 1		Phase 2				Phase 3		
Data Centers	**Development of world class data center and obtain certification**									
	Adoption of cloud platform									
International connectivity	**UZ-KZ international transmission channel (3rd IGW)**	Upgrade active node					Construct backup nodes			
	UZ-KG international transmission channel	Construct backup nodes								
	UZ-Tajik international transmission channel	Construct backup nodes								
	UZ-AFG international transmission channel	Upgrade active node		Construct backup nodes						
	UZ-Turkmen international transmission channel		Construct backup nodes							
	Optimization of the international transmission private network	Construct a western channel and connect it to UZ-KZ third IGW								
Security	**Maintenance and upgrade**									
Licensing	**Regulation of operators and performance assessment**	Regulate unregulated operators			Assess performance of operators and make necessary changes					

(e). Human capital

	Activity	2022				2023			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Short-term	Assess level of skills of existing public service officers	▬							
	Identify gaps in skills and manpower based on skills requirements for each role and responsibility		▬						
	Based on size of gap and ease of upskilling to fill gap, either recruit or upskill through digital programs			▬					
Long-term	Periodic refresher training and recruitment for vacancies					▬▬▬▬▶			

Policy development for human capital based on needs from the two steps above

(f). Financing

Activity	2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Implement financial policies for infrastructure development (Annual cycle in timeframe for digital government strategy)		▬	▬			▬	▬	
Implement policies for human capital development (Annual cycle in timeframe for digital government strategy)			▬				▬	
Implement financial aid policies for digital ecosystem development (Annual cycle in timeframe for digital government strategy)		▬	▬			▬	▬	

6.2 Key attention points with regards to infrastructure

Governments play a key role in the development of a country's ICT infrastructure. It holds the authority to implement policies, planning and approvals, among others, hence wields large influence over the country's ICT development. Its efficiency in planning and carrying out its role can have significant impact on the ICT development of its country.

For instance, administrative efficiency is key to ensuring that mobile operators can meet coverage and connectivity expectations. To improve, it is recommended that the Government improve the digital administrative channel. Digitalizing forms and processes will save valuable time and support operators in their efforts. Governments are also encouraged to centralize all statistical and geographic information suitable to support mobile broadband deployment. National authorities can think about improving the efficiency of permit approvals by having:

(i) A clear set of building codes.

(ii) Defined national requirements to ensure compliance with relevant health and safety regulations.

(iii) Standardized authorization procedure, including a list of information requirements and a mandatory time frame for decision-making.

(iv) Single information point for the issuance of permits, transparency, road rights, and dispute resolution regarding infrastructure deployment.

(v) Initiatives to map the relevant infrastructure and provide access to the data through the Single Information Point.

Local authorities subsequently should:

(i) Implement effective processes for the authorization of mobile network antenna stations, in accordance with national framework

(ii) Follow the national permitting policy. In Uzbekistan, the government can streamline the construction permitting process and save 30% of the time for site approval.

Other ways the Government may influence the ICT infrastructure of a country include establishing competition through licensing, which is usually done with the aim of ensuring strong competition and thus maximize consumer welfare, innovation and investment. Besides, governments are also in charge of assets allocation, and doing this efficiently will boost the advancement of digitalization in the country. As discussed in the above chapters, Governments also play a large role in policymaking for ICT development, for example in incentives creation to improve accessibility for its people. Additionally, Governments are in charge of standards control, which includes updating, setting standards and aligning incentives to maximize use for national priorities (Figure 126).
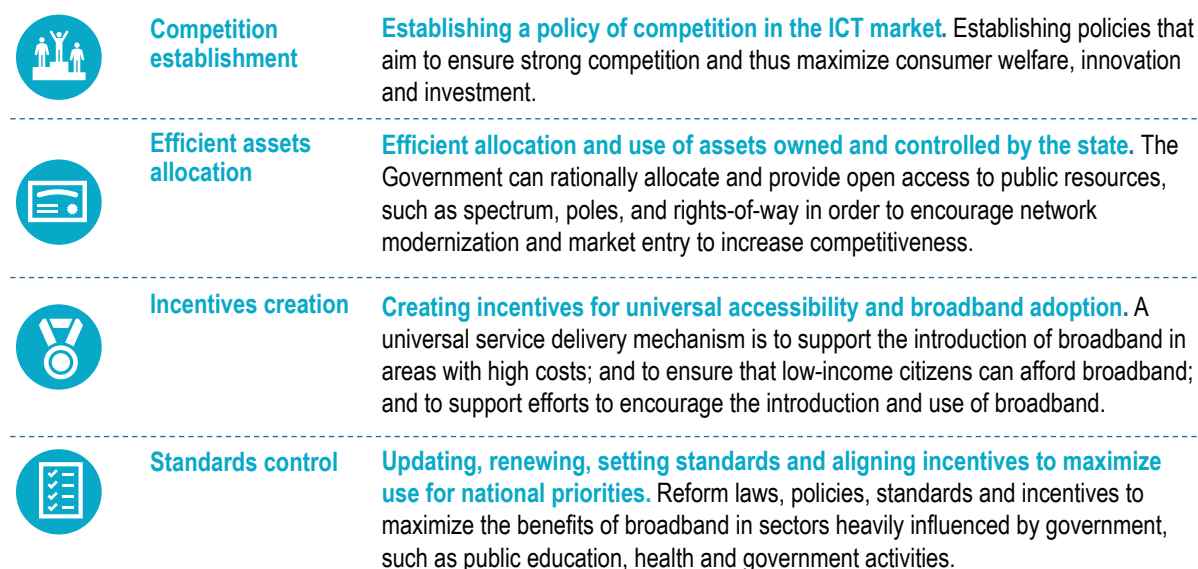
Ways to influence an ICT infrastructure ecosystem

	Competition establishment	**Establishing a policy of competition in the ICT market.** Establishing policies that aim to ensure strong competition and thus maximize consumer welfare, innovation and investment.
	Efficient assets allocation	**Efficient allocation and use of assets owned and controlled by the state.** The Government can rationally allocate and provide open access to public resources, such as spectrum, poles, and rights-of-way in order to encourage network modernization and market entry to increase competitiveness.
	Incentives creation	**Creating incentives for universal accessibility and broadband adoption.** A universal service delivery mechanism is to support the introduction of broadband in areas with high costs; and to ensure that low-income citizens can afford broadband; and to support efforts to encourage the introduction and use of broadband.
	Standards control	**Updating, renewing, setting standards and aligning incentives to maximize use for national priorities.** Reform laws, policies, standards and incentives to maximize the benefits of broadband in sectors heavily influenced by government, such as public education, health and government activities.

Figure 130: Ways to influence an ICT infrastructure ecosystem

6.3 Key success factors

The successful implementation of national policies requires several right ingredients to be in place. To begin with, the implementation should be led by a clear and actionable strategy, where activities, roles, and timeline, among others are clearly laid out. Execution of the strategy should be overseen by the government, and will require digital skills and support from local ICT and industry ecosystem and financing support (Figure 127).

Key success factors for e-government development

1 **Clearly defined and actionable implementation strategy** planned out in phases in alignment with various stakeholders

2 Implementation strategy **led and overseen by the government**

3 **Necessary digital skills** are put in place to support e-government development

4 **Local ICT and industry ecosystem** to provide support and collaboration opportunities to develop e-government

5 **Financing support** for infrastructure, human capital development and others

Figure 131: Key success factors for e-government development

6.3.1 Actionable implementation strategy

A clearly defined strategy should be developed in alignment with various stakeholders to be realistic and to ensure all important stakeholders involved are aware of their responsibilities for the coming years. Digital strategies are often developed with a long timeline of five- or ten-year as ICT development usually involves long-term projects. Phased projects should

be implemented to set the foundation first and to enable spreading of resources across a period as opposed to all at once (Figure 128).

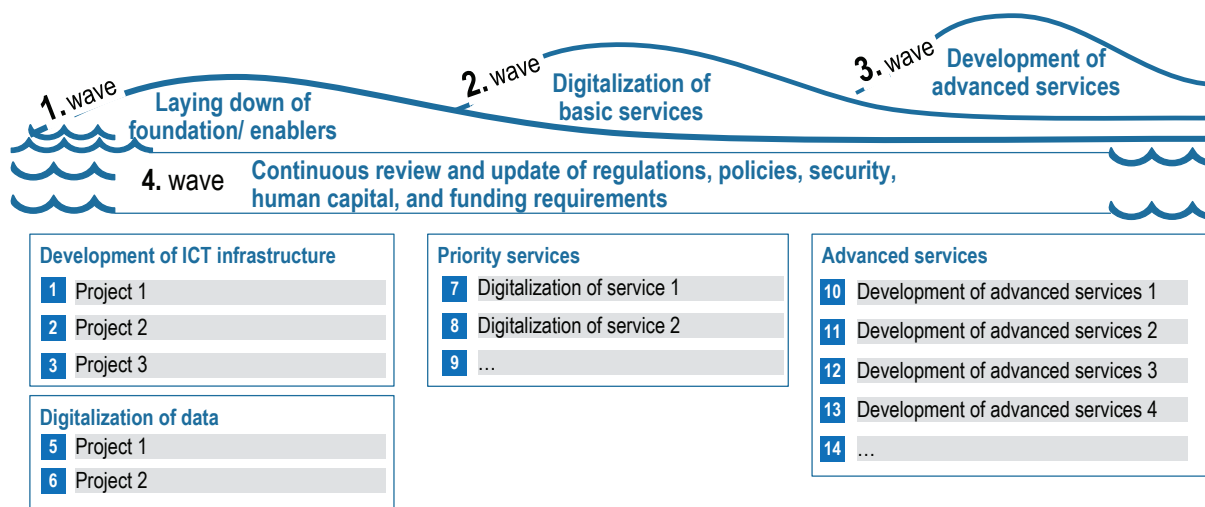## Example of strategy implementation by phases

Figure 132: Example of strategy implementation by phases

Strategies developed should include roadmaps for projects which defines the timeline, targets, stakeholders and communication plans (Figure 129). Interim milestones should be developed to enable progress-tracking to ensure delivery of final targets.

Example implementation strategy

Figure 133: Example implementation strategy

6.3.2 Government leadership

A national ICT plan needs to be monitored and assessed to ensure successful implementation. This should be done by the Uzbekistan e-government steering committee which consists of the Ministry of Digital Technologies, various ministries, cabinet of ministers and the project management center (Figure 130).

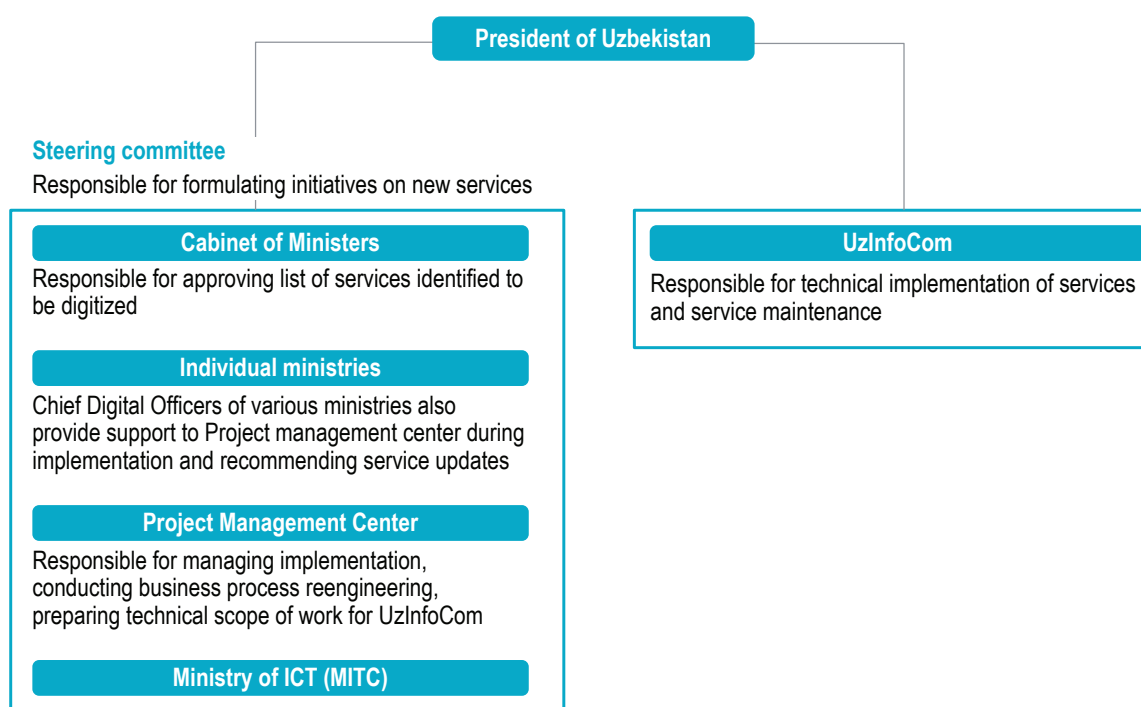## Operating model of Uzbekistan digital government

Figure 134: Operating model of Uzbekistan digital government

While the project management center manages day-to-day implementation of the projects, the overall national e-government development policy should be reviewed by the whole committee every three to five years to ensure progress is being made. The steering committee should use project management tools such as KPI dashboard, risk monitoring radar and others during implementation to document progress of projects. In addition to evaluation by the steering committee, independent audit for the entire ICT development plan should be conducted and regularly published by an experienced quality assurance team for an additional perspective on the progress of the plan.

6.3.3 Digital skills

Digital skills are a key enabler for the development of an e-government. As the development of e-government involves both hardware, such as ICT infrastructure, and software such as mobile apps and services portal, digital skills are required in both aspects. Digital skills in hardware are required to understand the system requirements, latest technologies and will enable communication with external contractors. On the other hand, software digital skills will be required in the development of digital services, mobile app, services portal and

others. Additionally, skills on processes such as business process engineering and analytics are also required. Digital skills requirements should be laid out in the strategy development phase, with initiatives to fill gap in manpower and skills laid out as part of the strategy to ensure necessary skills are in place to enable smooth execution of the remaining strategy.

6.3.4 Local ICT ecosystem

As mentioned above, private sector companies can contribute significantly to the development of an electronic government. Specifically, private sector companies can be partners for development and innovation of digital services as they have the specialty and skills. Besides, private companies may also be the contractors to support the government in development of infrastructure, as well as be a source for digital skills and perspective from the private sector and citizens for policymaking. Therefore, a local ICT ecosystem will be a huge support for the development of an e-government. Having a local ecosystem will provide more convenience and could also be more cost effective than sourcing foreign support hence the government should consider developing the local ICT and industry ecosystem.

6.3.5 Financing

Besides human capital, financing is the other crucial enabler for e-government development as every part of the e-government development will require funding, with some, such as infrastructure, requiring large sums as well. Therefore, financial requirements including capital and operational expenditure should be forecasted upfront for each project to ensure sufficient funding is allocated for smooth project execution. These requirements should then be considered in the annual budget and additional sources or policies should be considered in case of any shortage in available funding for important projects.

All in all, implementation of an e-government requires significant future planning with leadership and governance throughout. It is no one-man feat hence support should be garnered from the private sector. Therefore, these key success factors should be considered in Uzbekistan's e-government implementation to enable a smoother and more efficient implementation.

The content in chapter 6 serves as a reference. The government of Uzbekistan shall determine the final timeline and schedule of its e-government development project. It is noteworthy that communication and resource allocation within the cabinet and between departments can get complicated. Thus, it is always recommended to have at least a high-level authority e.g., the Presidential order, to call for actions and decisions and they should always be forward thinking. The recommended implementation plan is a concept that simulates the length of time taken to realize the objectives. In the near future, if the proposed idea of this white paper is accepted by any public authority, we suggest moving toward an action plan to realize e-government development in greater detail or to submit a second-round white paper to offer more detailed suggestions.

07

CHAPTER

Conclusion

7 Conclusion

Considering the significant progress Uzbekistan has achieved since it first embarked on its e-government journey in 2013, one cannot help but admire its resilience. The Uzbekistan government's will to improve citizens livelihood through digital transformation and efficient government services demonstrates its firm commitment to lead the country's digitization forward.

The Uzbekistan government's Digital 2030 strategy is the key to guide future progress of digitalization. Following the strategy, a comprehensive approach and strong implementation will ensure successful routes to the destination.

On this journey, Uzbekistan would need to address areas of digital development that still lags, namely ICT infrastructure and human capital development, while continuously enhance the e-government services offering. These two areas also make a key contribution to the UN EDGI ranking sub-indices where Uzbekistan has room for improvement: the Telecommunications Infrastructure Index (TII), where Uzbekistan has a "High" score, and the Human Capital Index (HCI), where Uzbekistan has " Very High" score.

Although the Uzbekistan government is aware of areas for development and have taken measures to improve the situation, this White Paper aims to provide suggestions on a comprehensive approach that systematically considers all key dimensions to support the planning and implementation. In this approach, it is recommended that the Uzbekistan government make concrete efforts in taking the following key steps in three areas:

1. Accelerate enhancement of infrastructures with adoption of the latest technologies

   1.1. Improve connectivity and broadband quality, coverage and IPv6 deployment.

   1.2. Develop "world-class" data center with certification policy and adopt cloud technologies

   1.3. Upgrade international gateway

   1.4. Improve data security expertise, technologies, and standards

   1.5. Establish supporting regulation and licensing to ensure efficiency in ICT market

2. Develop the local ICT industry and human capital for e-government and digital economy

   2.1. Adopt tech-savvy operating model for e-government

   (i) Transition to hybrid model, and ecosystem model in the long term, for digital service implementation

   (ii) iDefine roles and responsibilities for the four layers of the e-government operating system architecture

   2.2. Upskill and train local human capital in digital skills

   2.3. Plan resource requirements in terms of funding model

   2.4. Establish digital governance, and supporting regulations and policies

3. Continuously enhance the e-government service offerings

   3.1. Improve user experience and broaden target segments

   3.2. Harness data assets and develop data services offering

   3.3. Develop phased expansion of e-government service portfolio

   3.4. Build interface in line with service offering, focusing on mobile-first approach, coverage of rural and remote areas, and channels targeting G2B/ G2B2C services

These key steps are core building blocks to improve Uzbekistan's score in the TII and HCI. Taking these key steps would propel Uzbekistan

forward to a more robust digital future and closer to its goal of a 0.86 score in the UN's EGDI ranking. This will place Uzbekistan in the challenge for position as the top-20 countries worldwide in terms of digital government development by 2030.

On this journey, the Uzbekistan government is not alone as it is supported by its ICT companies, growing local IT ecosystem, and most importantly, the Uzbekistan people, all of whom should be more closely involved in the future e-government development process.

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