FEASIBILITY (NEEDS-ASSESSMENT) SURVEY RESULTS REPORT

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Contents

Abbreviations and Acronyms

ACSH	Astana Civil Service Hub
AI	Artificial Intelligence
ARMED	Armenian Electronic Medical Records System
ARMSTAT	Armenian Statistical Service
ASAN	Azerbaijani Service and Assessment Network
ATAMEKEN	National Chamber of Entrepreneurs of the Republic of Kazakhstan
AZN	Azeri Manat
BOT	Internet / web artificial intelligence application
CASA	Central Asia – South Asia Electricity Transmission and Trade Programme
CDO	Chief Digital Officer
CEI	Citizen Engagement Index
CGSI	Core Government Systems Index
CIO	Chief Information Officer
CSO	Chief Security Officer
CTO	Chief Technology Officer
DAI	Digital Adoption Index
DEA	Data Exchange Agency
De-Fi	Decentralised Finance
DNS	Domain Name Server
DPC	Data Processing Centre
EDS	Electronic Digital Signature
EHIS	Azerbaijani e-Government Information System
EKENG	E-Governance Infrastructure Implementation Agency
EGDI	E-Government Development Index
EU	European Union
GiZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPON	Gigabyte Passive Optical Network
GTEI	Gov Tech Enablers Index
GTMI	Gov Tech Maturity Index
G2C	Government to Consumer
G2G	Government to Government
HCI	Human Capital Index
HR	Human Resource
JICA	Japanese International Cooperation Agency
JSC	Joint Stock Company
ICT	Information and Communication Technologies
ID	Identification
IEC	International Electrotechnical Committee
INSEAD	Institut Européen d'Administration des Affaires
IKT	Information Communications Technologies Application and Training Centre
IP	Internet Protocol
ISO	International Organisation for Standardisation

ISTN	Image-and-Spatial Transformer Network
IT	Information Technologies
ITCC	Information Technology Cooperation Centre
ITU	International Telecommunications Union
KOICA	Korean International Cooperation Agency
KZT	Kazakhstan Tenge
MOIS	Ministry of the Interior and Safety
NCE	National Chamber of Entrepreneurs
NJSC	National Joint Stock Company
NIA	National Information Society Agency
NIPA	National IT Industry Promotion Agency of the Republic of Korea
NLP	Natural Language Processing
PAR	Public Administration Reform
POS	Point of Service
PPP	Public Private Partnership
PSC	Public Service Centre
PSDI	Public Service Delivery Index
QR	Quick Response [Code]
OSI	On Line Service Index
OSQ	On Line Survey Questionnaire
SAPPSSI	State Agency for Public Services and Social Innovations
SIM	Subscriber Identity Module
SIMA	Azerbaijani Biometric Digital Signature System
SMS	Short Messaging System
SSO	Single Sign On
TII	Telecommunications Infrastructure Index
TIKA	Turkish Cooperation and Coordination Agency
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organisations
UNICON	Unitary Enterprise Scientific – Engineering and Marketing Research Centre
USD	United States Dollar
UX	User Experience
UZINFOCOM	Uzbek Single Integrator for the Creation and Support of Public Information Systems
VAT	Value Added Tax
VDS	independent safety and security testing institution
VPS	Virtual Private Server
WIPO	World Intellectual Property Organisation

A. Introduction

The United Nations Development Programme (UNDP) in Kazakhstan utilising the capacity of the Astana Civil Service Hub (ACSH), as a knowledge exchange platform, is implementing a joint development initiative with the Ministry of the Interior and Safety (MOIS) and the National Information Society Agency (NIA) of the Republic of Korea.

This project aims at developing further the capacity of public servants to innovate in governance matters and for delivering digitalised public services through differentiated channels of delivery in the seven countries participating in the project; namely Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan.

The participating countries have already taken some significant steps towards digitalisation of public service delivery to business and citizens, and of their operational processes, however in varying degree and pace of progress. Furthermore, some of them have also started incorporating the notion of innovation in government and in their strategies for development. However, there is still much to be done in order to put the concept into practice in the functioning of the public sector; as well as to move towards the provision of digitalised public services through the use of differentiated channels of delivery. Thus, the objective of this needs-assessment study was to explore the state of affairs in each of the participating countries with respect to introducing innovation in government operations and policy implementation and to providing digital public services utilising differentiated channels of delivery.

B. Survey description

The study entails an analysis of where each country stands with respect to innovation, e.g. familiarity with the concept, degree of penetration in government operations, good innovative practices in place, etc. It also entails an analysis of public service provision and channels of delivery in each country, e.g. existence of one-stop-centres, degree of digitalisation of public services, channels of delivery, future plans, etc.

The results of this study will allow for a clearer understanding how far a country has advanced with the digitalisation process of government operations and public service delivery, as well as how it has adopted international standards and practices in the operationalisation of its digital environment.

C. Survey questionnaire

A survey questionnaire was employed to assess the current state of affairs and future plans for digitalisation of government operations and public service delivery. It covered eleven thematic areas:

(1) National development priorities	(7) Digital Divide
(2) ICT governance	(8) Network and Cloud Computing Infrastructure
(3) CIO and ICT technical staff/experts availability	(9) Volume of public services provided digitally
(4) ICT training and capacity evaluation for government personnel	(10) Degree of adoption of emerging technologies by the government
(5) Existence of technical standards for digitalisation	(11) Country scores on international development indices
(6) Legal framework in place	

The survey included a total of thirty-three questions spread across the eleven thematic areas described above (see Appendix I for a detailed presentation) and it was distributed electronically among the government organisations that deal with innovation policy and practices and with public service delivery, as well as with the ACSH country Focal Points and independent experts included in the ACSH Roster of Experts; all from the seven participating countries. The table below shows the number of surveys distributed and the number of responses that were received by country, by government representatives and independent experts and by gender of participants.

Country	Government Organisations						Independent Experts					
	Surveys sent			*Responses received*			*Surveys sent*			*Responses received*		
	Total	M	F	Total	M	F	Total	M	F	Total	M	F
Armenia	9	6	3	3	2	1	2	2		2	2	
Azerbaijan	10	7	3	5	3	2	1		1	1		1
Georgia	13	3	10	0			2	2		0		
Kazakhstan	10	4	6	1		1	10	4	6	3	1	2
Kyrgyzstan	7	5	2	2	1	1	4	3	1	1	1	
Tajikistan	6	3	3	0			4	3	1	1	1	
Uzbekistan	4	3	1	1	1		6	3	3	1		1
TOTAL	***59***	***31***	***28***	***12***	***7***	***5***	***29***	***17***	***12***	***9***	***5***	***4***

Although government representatives from some countries did not participate in the on-line survey, relevant information was gathered through the subsequently conducted in-depth interviews, which is included in the findings presented in the sections below. The on-line survey was complemented with a series of in-depth interviews with officials from the seven participating countries engaged in the digital transformation policy area and practice. Nine interviews were conducted involving ten individuals from all participating countries.[1] They provided their responses to a set of questions on several aspects of digitalisation policies, practices, and processes in their respective countries (see Appendix 2 for a detailed presentation).

D. Survey responses analysis

The analysis focused on finding out where each country stands on innovation, i.e. degree of penetration in government operations, and the number of innovative practices in place. It also focused on public service delivery and the channels of distribution, i.e. existence of one-stop-shops, degree of digitalisation of public services, the channels of delivery and future plans for expansion. The results of this analysis are presented by thematic area.

[1] Individuals by country. Armenia: 3; Azerbaijan: 1; Georgia: 1; Kazakhstan: 2; Kyrgyzstan: 1; Tajikistan: 1; Uzbekistan: 1.

1. National Development Priorities

Armenia

The Government has adopted the "Strategy on Digitalisation 2021-2025" that was prepared by the Ministry of High-Tech Industries,[2] and the "2021-2026 Action Plan",[3] making digitalisation initiatives an integral part of the national mid- and long-term policy priorities. Furthermore, the Central Bank of Armenia has adopted a strategy that intends to digitalise financial services and provide them on-line for business and individuals.

Overall, digitalisation is considered a priority and it s emphasised by all high-level government decision-makers indicating their support to every project geared towards digitalisation. However, it seems that some priorities are still at a declarative level, not having been described in sufficient detail to serve as the basis for the development of comprehensive and effective programmes and projects. This has led to implementation bottlenecks in some instances.[4] At present, the responsible Ministry of High-Tech Industry has initiated the revision of the Strategy making the necessary adjustments and amendments.

Although some funds are allocated to digitalisation initiatives in the central budget, they are not adequate for realising the envisioned results. Furthermore, no centralised financial mechanism exists for financing digitalisation initiatives in the medium- and long-term. To date, major digitalisation projects have been funded by international organisations, e.g. the European Union and the World Bank, with no central coordination, however. This has resulted in duplications, or delays ending up with results that may not meet the existing demands of public administration.

Certain initiatives are underway, which are congruent with the Strategy's priorities: (1) the system of e-documents verification implemented for all government entities, or the creation of a unified platform for citizens' notification; [5] (2) the re-design of the E-Gov platform that will unify all public services delivered via digital channels, which are currently delivered through different websites and portals; (3) the upgrading of the electronic healthcare system (ARMED);[6] (5) enhancement of digital identification systems.[7] Overall, there are no critical lags in the implementation of digitalisation initiatives, except for cybersecurity.

The main challenges in the implementation of digitalisation initiatives are: (1) lack of adequately qualified personnel as government organisations cannot afford to employ highly qualified IT specialists that expect higher salaries; [8] (2) limited personnel capacity in cybersecurity, data management and processing, and open government processes; (3) resistance to change, as existing public service personnel fears that they may lose their jobs through digitalisation or they often believe that they can do the work better using their minds

[2] The Strategy's key priorities are: (1) development of innovative technologies; (2) cyber security; (3) data policy systems and creation of centralised data centres (G-Cloud) encompassing all major government systems; (4) creation of common standards frameworks for the digital environment; (5) digital literacy improvement among the population; and (6) effective coordination of the digital transformation.
[3] https://gov.am/files/docs/4740.pdf
[4] For instance, the Strategy aims at the creation of electronic documents, without however specifying the meaning of the electronic document or how it will be incorporated into public administration operation.
[5] Both of these projects are technically and financially supported by the World Bank.
[6] https://corporate.armed.am/en/about-system
[7] IDs that include Electronic Digital Signature already exist in Armenia. They will be enhanced by including biometric data to create the conditions for providing a wider array of public services electronically.
[8] Government organisations overcome this problem in the short-term by hiring groups of experts through projects supported by international development donors. However, no continuity is ensured, nor institutional memory is built this way. No clear plan exists how to attract and retain IT specialists in the public service now.

rather than computers; (4) lack of clear understanding of the benefits of using IT in government operations.

Azerbaijan

All national strategic policy documents published in the past five years address digitalisation as one of the country's priority policy objectives. Likewise, the current "National Economy Development Strategy Roadmap" and the "Azerbaijan 2030 socio-economic priorities" state digital transformation and the enhancement of citizens' digital literacy as a priority. Moreover, the newly established (2021) Ministry of Digital Development is currently developing a digital transformation strategy, expected to be ready for public consultation in the coming months.

The "Strategic Roadmap for Technology Development in Telecommunications and Information Technologies in Azerbaijan" dictates that 566 million manat (US$ 333 million approximately) will be devoted to building innovative applications in government operations and to the provision of public services digitally for the next ten years. Such funds are allocated through the central budget to high priority projects. In addition, the service fees paid to the State Agency for Public Service and Social Innovations are utilised for the expansion of its service networks, i.e. new systems for provision of on-line services, new service centres, etc.

A major priority of the Government of Azerbaijan is realising complex infrastructure projects such as the expansion of internet access and the establishment of data exchange systems among government organisations, as it is aware that an adequate infrastructure is vital for rapid digital transformation. Other important projects currently implemented are the ASAN Bridge,[9] ASAN login,[10] ASAN Finance,[11] ASAN Pay,[12] My GOV,[13] GPON Internet,[14] inter-institutional electronic document management system, and the SIMA biometric digital signature system.[15] In addition, mobile customs declarations, e-visa mobile notary, digital classroom, and e-health are good examples of prominent field-based digital applications being developed currently. Although, most of these projects are underway, there are some that are stalled, e.g. the e-document validation system, since not all the stakeholder organisations possess the necessary infrastructure and capacity to adopt the system.

Georgia

The 2015 Public Administration Reform Strategy of Georgia encompasses a pillar on service delivery, which includes the e-Georgia policy, i.e. digitalisation, e-government, the e-governance model, and structures, etc.[16] Nowadays, with support from UNDP Georgia, the "Digital Georgia" Strategy is being formulated and it includes the goals and objectives for the next several years. It will also consider on-going initiatives in order to avoid duplication and incorporate further development of such initiatives into the current Strategy. The Strategy covers the period 2023 to 2025 or 2026. Furthermore, the objectives of the Strategy are part of the country's mid-term policy priorities, i.e. strengthen the e-governance model, enhance digitalisation and service provision through differentiate channels of delivery.

[9] https://www.digital.gov.az/en/projects/our-projects/asan-bridge
[10] https://www.digital.gov.az/en/projects/our-projects/asan-login-en
[11] https://www.digital.gov.az/en/projects/our-projects/asan-finance
[12] https://www.digital.gov.az/en/projects/our-projects/asan-pay
[13] https://www.digital.gov.az/en/projects/our-projects/mygov-en
[14] https://www.aztelekom.az/en/read/157-for-the-first-time-a-network-based-on-gpon-technology-is-being-built-in-azerbaijani-villages
[15] https://azintelecom.az/en/key-activities/centralized-information-systems/sima/
[16] This pillar of the Public Administration Reform (PAR) Strategy is based upon the e-Georgia strategic document prepared in 2014, which was not adopted by the Government at the time, but instead it incorporated its content into the PAR Strategy of Georgia.

As far as financing of these initiatives is concerned there are no specific budgetary outlays earmarked for digital governance, which is problematic with respect to implementation of various digitalisation projects. For example, the Data Exchange Agency (DEA) of the Ministry of Justice – created in mid-2020 as a result of a merger between the DEA and Smart-Logic - is allocated a budget, which covers salaries and other operational expenses and some minor development of some hardware, etc; however, it does not have additional outlays for major upgrades. This is a serious issue with respect to implementation of digitalisation related projects.[17]

The most important initiatives that the Government is focused on are: (1) digitalisation of public services that are already available through the Public Service Halls, without however, rethinking or redesigning the service in the process. It simply duplicates the process of delivery through the Service Hall; (2) diversification of service delivery channels. Digital services are currently provided through a web application – My.gov.ge – and the aim is to develop mobile applications for service delivery.[18] The latter initiative is not currently embedded in any policy document, but it is being discussed.

An initiative that demonstrates continuity in its implementation is the electronic document authentication / verification services that started with the enactment of the relevant law in 2018. Due to the provisions of this law, the number of public services provided on-line increased considerably. There was no need any longer for a document to carry a physical signature as the law dictated that electronic documents were legally at par with the paper based ones. This service was gradually adopted by many government agencies indicating continuity in the implementation of this initiative. This has also somehow met the expectations of citizens, as many of them are used to conducting various other transactions in other facets of their lives using mobile applications. This development also drives the effort to providing public services through differentiated channels of delivery, primarily focusing on through mobile devices.

Kazakhstan

The Government has adopted the national “Kazakhstan 2050 Strategy” that lays out the transition to a new model of digitalisation of government organisations, as well as the use of big data and artificial intelligence, and the transformation of the public administration system. The national project document “Technological breakthrough through digitalisation, innovation, and science” is also in force, where issues of digitalisation are described in the most detailed way. This document does not only focus on public administration, but it also covers education, human resource capacity development, etc. In addition, the Ministry of Digital Development, Innovations and Aerospace Industry has developed a concept paper, the “Digital EI” Concept, which was transformed into an Action Plan covering many aspects of the digital transformation strategy and describing digitalisation issues in much detail, i.e. public administration, education, economic matters, human resource capacity development, etc. In addition, each Ministry have their own detailed and specific strategic and operational plans; all aligned with the national digitalisation priorities.

Digitalisation policy and digitalisation initiatives are repeatedly mentioned in the President’s speeches as a major priority of the country. Their financing is provided by the Ministry of Finance that allocates funds for various priority initiatives, as long as they provide a sound

[17] However, the new Agency possesses big infrastructure and competencies in policy making direction and it provides IT services and support.
[18] However, diversification of service delivery channels depends upon the development of a secure ID system. Now, one needs to identify themselves through a certification service to use digital services via the SIM card of their mobile devices. Thus, service provision is limited to information provision, and it does not allow for the provision of services that require a transaction.

rationale and adequate economic justifications. The Government also encourages private investment through public-private partnership schemes. In fact, there are already some such projects implemented.

The priority areas for digitalisation are outlined in the "National Plan for Technological Breakthrough through Digitalisation, Science, and Innovation".[19] They cover six directions : (1) services in 5 minutes; (2) development of the IT Industry; (3) listening state; (4) digital tools for a comfortable life; (5) development of innovative and technologically advanced business; and (6) quality internet and information security.[20] Similarly, the "Concept for the Development of the Information and Communication Technologies Industry and the Digital Sphere" outlines six areas for the digital transformation of the country: (1) Government to Consumer (G2C); increasing economic competitiveness through digital transformation; (3) Digital management of government (G2G); (4) development of smart cities; (5) data management; and (6) reliable and secure infrastructure.

On-going projects are the conclusion of the automation of state services - standing at 90 per cent at the moment to 100 per cent as soon as some nuances are also automated; the completion of the G2B initiative of linking the government with the banking institutions of the country - implemented by the National Chamber of Entrepreneurs (ATAMEKEN);[21] and the development of large information systems capable of handling big data analysis for evidence-based decision making. There is no integrated data management system in place currently.

An obstacle in the implementation of digital initiatives is the existence of duplication of functions across government organisations. Each government organisation automates its activities separately, instead of utilising automation processes already developed by another government organisation. In streamlining this issue, a model of government activities was developed. During its development it was discovered that the state apparatus performs 40,000 functions approximately. Today, these functions have been rationalised into six domains, fifty spheres of activity, and four hundred functional directions. Based on this rationalisation, it was observed that five to seven information systems could be utilised by all government organisations resulting to saving significant budgetary outlays.

Similar work is carried out with information systems that are analysed to detect potential duplication and based on the findings provide recommendations on their consolidation and a schedule on how to optimise digitalisation costs.

Kyrgyzstan

The long-term "National Development Strategy 2040" outlines the country's overall commitment to digital transformation, and it defines certain goals, tasks, and activities for digitalisation. The "National Digital Transformation Strategy 2019-2026" lays down the tasks to be implemented for the digital transformation of the country.[22] Several presidential decrees

[19] Approved by the Decree of the Government of the Republic of Kazakhstan, No 727 (12.10.2021).

[20] The National Plan also includes four directions for the development of science: (1) strengthening the personnel potential of science focusing on the scientist; (2) improving competitiveness of the scientific ecosystem; (3) improving contribution of science to the development of the country; and (4) improving the administration of science. Overall, the National Plan contains ten directions, 26 tasks, 44 indicators, and 211 activities.

[21] ATAMEKEN is the National Chamber of Entrepreneurs (NCE) of the Republic of Kazakhstan a non-profit organization. NCE's mandate is to enhance the negotiation power of business with the Government and public authorities, and to protect the rights and interests of business, ensuring active involvement of all entrepreneurs in formulating legislation and regulations for business. The Chamber represents the interests of small, medium, and large businesses, covering all business areas, including internal and external trade.

[22] The National Digital Transformation Strategy was originally drafted for the period 2019-2023. It is now complemented by a corresponding document for the period 2022-2026.

issued last year (2021) also prioritise digital transformation. In addition, the issue of digitalisation is a separate item of the agenda at each meeting of the Cabinet of Ministers.

Central government budgetary allocations for digitalisation initiatives is not sufficient. To satisfy the demand for the implementation of envisioned digitalisation initiatives, it should be increased two to three times. Some other funding is available in the form of grants from international donors, which can be a dreary process, as donors' goals and objectives may not always coincide with the country' priorities. Furthermore, it is not possible to attract donor funding for infrastructure projects.[23]

Initiatives that are included in the Strategy 2019-2023 have been implemented by 80 per cent approximately. This was partly due to the pandemic and the diversion of earmarked funds because of it. It was also due to inconsistency observed in implementation. For instance, public services that they were to be provided in electronic format, were not as the associated processes were not automated in time. Such inconsistency calls for better analysis and planning, in order to make sure that all associated tasks are completed within a specified time frame. A good example of a well-planned project is the automation of tax services. Its implementation is moving step by step, first automating processes, then integrating services and electronic reporting, and then introducing digital cash registers and electronic invoicing.

Priority areas for digitalisation in Kyrgyzstan are: (1) development of an adequate digital infrastructure, i.e. achieving 100 per cent high-speed internet coverage for the entire population, introducing cloud-based solutions and a unified e-mail system, as well as developing the G-net state-wide network; (2) automation of all business processes, so that public services can be fully delivered digitally; and (3) building a centralised data centre meeting international standards. This latter task seems to be lagging behind vis-à-vis the envisioned implementation plan. A reason for this delay may be attributed to insufficient human resources managing such projects.

Tajikistan

The Republic of Tajikistan is involved in digital transformation for more than fifteen years. During this period a number of concepts and programme documents were adopted, among which the following are noted: (1) The Concept of Electronic Government (2012-2020);[24] (2) State Strategy of Information and Communication Technologies for the development of the Republic of Tajikistan;[25] and the Concept of the Digital Economy.[26]

They have accelerated the introduction of digital technologies in the economic and social domains. The "Concept of the Digital Economy", adopted in 2019, describes the transformation of public service delivery to electronic format, i.e. digitalisation, electronic signature, and electronic tax payment. It provides for the formulation of a common vision for the digital transformation of the country based on international models for developing a digital economy. The model adopted includes the implementation of a number of measures to strengthen the foundations of the envisioned digital transformation process, i.e. the assessment of the current state of affairs and further strengthening of the regulatory framework, as well as of state policy in introducing new technologies; strengthening leadership and change management institutions; assessment and development of human capital necessary for the transformation; assessment of the state of the business environment (entrepreneurship); R & D and innovation

[23] For instance, some large database systems cannot be deployed on the current operating system (Windows 8). It is thus necessary to first acquire the appropriate hardware, software and new operating system(s) that can support the database deployment. However, donors cannot support the purchase of such infrastructure.
[24] Decree of the Government of the Republic of Tajikistan No 6431 (30.12.2011).
[25] Decree of the President No 1174 (05.11.2003).
[26] Decree of the Government of the Republic of Tajikistan No 642 (30.12.2019).

climate; and a range of measures to strengthen information security and to increase confidence in the use of digital technologies.

Furthermore, the Concept provides for the strengthening of the digital infrastructure, such as the creation of a model digital network and the provision of ubiquitous broadband access, the development of a modern telecommunications system, and the creation of data centres and digital platforms. In addition, the Concept provides for the transformation of key areas of economic activity of the country, the digitalisation of which can have a cascading impact on the entire economy, such as the transformation of public service provision and the transition to digital government, the digitalisation of the social sphere, as well as of key industries, and the creation of new sectors, such as financial technology.

Examples of the implementation of the above mentioned policy documents' directives are the creation of a "Single Window", and of electronic reporting for taxpayers, the creation and establishment of the Agency for Innovation and Digital Technologies under the President of the Republic of Tajikistan, the establishment of the Council on Artificial Intelligence, and the opening of the Centre for Artificial Intelligence and Data Economy, both under the Ministry of Industry and New Technologies of the Republic of Tajikistan. The latter deals with the implementation of artificial intelligence and innovative solution in the industrial sector of the economy.

The industrial development and green economy development priorities contained in a presidential order – introduced by the President in his speech of 21 December 2021 - considers information technology and artificial intelligence as priorities for the country.[27] The Government is also mandated to adopt and implement a National Artificial Intelligence Strategy in order to develop and widely apply the latest technologies in various areas of the country's economy. By introducing artificial intelligence, it hopes to increase the number of jobs and create more favourable conditions for development. In this context, the Ministry of Industry and New Technologies launched a special centre that focuses on projects dealing with artificial intelligence, along with the creation of an electronic management system, digitalisation of banking services, and delivery of digital public services.

The Concept envisages a phased implementation of digital transformation; the first stage is from 2020 to 2025, the second from 2026 to 2030, and the third from 2030 to 2040. These stages are congruent with the Digital CASA project, a World Bank funded regional programme.

The Strategy envisions the creation of regional, city, and district data centres that comply with the norms and requirements for information security in the Republic of Tajikistan, and the development of digital public services by transforming the process of providing public services at different government levels; in order to increase the efficiency of service delivery to the population.[28] These milestones stages are congruent with the Digital CASA project, a World Bank funded regional programme.

In 2020, the "Smart City" initiative was launched in the City of Dushanbe. The project aims at creating an electronic document exchange management system so that will allow city district

[27] Address on Major Aspects of Tajikistan's Foreign and Domestic Policies by the President of the Republic of Tajikistan, Leader of the Nation, H.E. Emomali Rahmon, 21 December 2021, Dushanbe city; https://www.mfa.tj/en/main/view/9389/address-on-major-aspects-of-tajikistans-foreign-and-domestic-policies-by-the-president-of-tajikistan-leader-of-the-nation

[28] These initiatives are also part of the Digital CASA Project that provides for the creation of regional infrastructure and data centres.

administrations can communicate with each other electronically. The project is already being implemented. It also aims at establishing an IT Park that will create jobs.[29]

Another initiative under development is the preparation of a new Law "On Electronic Documents and Electronic Signature".

The first artificial intelligence laboratory in Central Asia was created in Tajikistan, where programming courses are provided to schoolchildren.[30] The Centre is a non-governmental organisation that cooperates with the Ministry of Industry and New Technologies for training activities. The Government counts on the assistance of such organisations in developing specific sectors.

In a similar context, the Ministry of Education holds competitions (Olympiads) for selecting digitalisation initiatives created by private entrepreneurs. For example, the Ministry supported the development of the "E-Donish" [e-knowledge] project that provided a digital library allowing access to electronic versions of books.

Uzbekistan

The "Digital Uzbekistan 2030" Strategy was introduced in 2020 by Presidential Decree delineating the country's vision for its digitalisation transformation.[31] Several other government documents introduced between 2018 and 2022 guide the country's drive for digitalisation.[32] One of the integral goals of the Strategy is the development of the "Electronic Government" system that would allow for the provision of all public services electronically.[33]

The issue of digitalisation is often mentioned in presidential speeches, as well in his interventions during national and international fora. He places special emphasis on the importance of digitalisation and the creation of e-government and of a digital economy.

Although there is no specific financing earmarked for digitalisation projects, the relevant regulatory acts indicate that the sources of funding for such project may come from the state budget, or from extra-budgetary funds, or foreign grants and other sources that are not prohibited by the legislation. Most digitalisation projects are assigned to specific state or business institutions, thus indirectly indicating the source of funding for their implementation as part of their digitalisation initiatives. In addition, a special "Fund for the Development of Information and Communication Technologies" has been established under the Ministry of Information and Communication Technologies, which finances digitalisation projects in the country.

Currently, approximately 1,600 digitalisation transformation projects are under implementation, of which approximately 60 per cent have been completed. The main catalyst for such projects is the interest of the population and of business entities. Some delays in implementation are observed due to lack of specialised in ICT and experienced personnel, and technical and

[29] "Smart City" is a state institution that is also engaged in other digitalisation initiatives; however no information is available besides its existence.
[30] TajRupt.AI is the first research laboratory for the study of artificial intelligence in Central Asia, established in November 2019. More information at https://asiaplustj.info/en/news/tajikistan/society/20210609/tajrupt-opens-its-office-in-dushanbe; https://www.tajrupt.org/
[31] Decree of the President No PD-6079 (05.10.2020) "On Approval of the Digital Uzbekistan 2030 Strategy and Measures for its effective implementation".
[32] Decree of the President No PD-5349 (19.02.2018) "On Measures to Further Improve the Field of Information Technologies and Communications"; Resolution of the President No RP-4699 (28.04.2020) "On Measures for the Widespread introduction of the Digital Economy and E-Government"; Decree of the President No PD-6191 (23.03.2021) "On Additional Measures to Further Create Favourable Conditions for the Population and Business Entities when Using Public Services, Reducing Bureaucratic Barriers in this Direction".
[33] Goal No 9; https://lex.uz/docs/5841077

financial resources not being available on time. These are barriers in progressing faster and further.

The most important initiatives under way are: (1) E-health; (2) E-education; (3) Public Utilities; and (4) IT education, within which Business Process Outsource (BPO) is being promoted and several BPO schools have been launched. There are also some other in the areas of construction, transport, ecology, and tourism. Much attention is also paid to a project supporting the transition from a paper-based document exchange system to an electronic system utilising inter-departmental data transmission networks. The new system is based on the principle of a "single point" that is used to send and receive data, allowing for a systematic and orderly system of data exchange among government authorities. Further development of the telecommunications infrastructure will allow for automation of data transfer processes. In addition, much effort is devoted to increasing the range of services that are provided electronically. In fact, in 2021, a significant change was observed between the volume of public services provided electronically and those provided in the traditional way.

Another national priority is to enhance the digital literacy of the population, in particular of the younger generation. Educational programmes with in-depth studies of computing and information and communication technologies are currently under development for students in the secondary and higher education institutions.[34]

[34] Government programmes and competitions are announced that allocate grants to young people and in particular girls, and/or provide financial benefits for admission to universities and/or for start-up projects.

2. ICT Governance

Armenia

The Ministry of High-Tech Industry – created in 2018 - is the key actor in policy development for communications, information technologies, information security, etc. The E-Governance Infrastructure Implementation Agency (EKENG) – a joint stock company owned by the government headed by the Prime Minister's Office – is responsible for major cross-government systems development and maintenance, and the implementation of major digitalisation projects. And the Office of the Deputy Prime Minister is responsible for monitoring progress of policy implementation on a regular basis.

Until 2022, the Digitalisation Council of Armenia existed. It was chaired by the Deputy Prime Minister as the council's Chief Information Officer (CIO), and it comprised twelve ministers and higher officials. The Council used to approve all digitalisation-related initiatives of different government organisations and entities. EKENG played the role of technical advisor to the Council. The Digitalisation Council was replaced by the Digital Systems Administration Board; however, it is not yet clear what its mandate will be as its Chapter is still not developed. The Central Bank is also a member of the Board acting as the Secretariat.[35]

Furthermore, few state entities, e.g. Ministry of Education, Ministry of Labour and Social Affairs, and the State Revenue Committee, have their own agencies or other subordinate bodies, which are quite competent in information technologies and digitalisation. Many IT initiatives originate from these entities, as they possess skilled professionals, more or less, who possess an understanding of what could be done in the public service delivery realm to facilitate citizens' access to education and social affairs services.

Azerbaijan

Three institutions are responsible for digitalisation policy making and implementation: (1) the Ministry of Digital Development and Transport is the primary institution responsible for digital transformation; (2) the State Agency for Public Services and Social Innovations (SAPSSI) under the President of the Republic of Azerbaijan is responsible for the planning and implementation of the digital transformation of government services and the provision of innovative public service delivery applications;[36] and (3) the E-Government Development Centre – affiliated with SAPPSI – responsible for all e-government applications, the creation of the software infrastructure of the digital environment, and the effective management of public information resources.[37] In addition, the State Agency for Special Communications and Information Security is responsible for executing cybersecurity policies countrywide, together with the Ministry and the State Agency. Some projects - of special importance - are carried out in coordination with the Presidential Administration. Legal coordination between government bodies is provided though the Cabinet of Ministers.

Moreover, the Executive Group of E-Government was established in 2018. Its board comprises IT top management in all government entities. The Group oversees a number of sub-groups that focus on various areas of expertise, i.e. cyber-security, legal regulations, etc. The

[35] As the Central Bank is not part of the government per se, there may be conflict with the ministries in its role as the Council's Secretariat. Thus, it is presumed that sooner or later the previous arrangement will be re-introduced.
[36] The SAPSSI is also responsible for the unified management of the "ASAN" service centres (one-stop shops), including the coordination of the functions of the employees of the state agencies that are engaged in these centres, and their assessment, as well as of the mutual integration of databases of state agencies, and the acceleration of electronic services organisation and management.
[37] The "E-GOV Development Centre" as a coordinating body is in charge of enforcing supervision in the field of formulation, implementation, integration and effective management of public information resources and systems, as well as promoting public awareness of services among the population; https://www.digital.gov.az/en/page/about

Executive Group of E-Government is managed by the State Agency for Public Service and Social Innovations. Official meetings are periodically organised, along with a number of informal events, in order to improve the communication among members of the Executive Group and establish direct links amongst professionals in this field.

It seems that these organisations have reached a clear understanding of the areas of their jurisdiction by consensus thus facilitating the overall objective of digitalisation transformation of the country. In addition, new legislation and regulatory decisions generated by these organisations are scrutinised by the Presidential Administration and the Prime Minister's Office prior to entering into force, in order to prevent potential overlap in their mandate.[38]

Examples of a public-private partnership in support of the digitalisation policy implementation are the ASAN Visa Project, the E-procurement system, the "Cyber Hygiene" project, etc. The E-Government Development Centre provides an easy digital application process for companies that want to cooperate as partners in such projects. In addition, the Centre has developed special criteria for the capacity evaluation of applicant companies with respect the technology they use, the human resources they employ, and their overall sustainability.

Georgia

The Ministry of Justice coordinates and oversees digital policy implementation in the country. The Electronic Governance Development Unit in the Administration of the Government of Georgia under the Prime Minister is mandated with the making and coordination of digital policy, however, in practice it is the Digital Governance Agency that after its reorganisation has assumed the coordination role, *de facto*, even though it is not part of its mandate.[39]

Kazakhstan

The Ministry of Digital Development, Innovations and Aerospace Industry is responsible for reviewing projects that emphasise the use of innovation in government operations and the digitalisation of public services. The Executive Office of the President of the Republic of Kazakhstan also has a role in matters of innovation and digitalisation. The National Information Technologies ZERDE – a Joint Stock Company – is defined by government decree, as the operator of the information and telecommunications infrastructure for electronic government. The National Project Office facilitates communication among different ministries and other government organisations that are involved in the execution and implementation of digital policy.

A Centre for Digital Transformation has been established with a mandate to re-engineer all government functions and processes preparing them for their digital transformation.[40]

Kyrgyzstan

The newly created Ministry of Digitalisation is responsible for digital matters and projects.[41] The Coordination Council and the Project Office under the President of the Republic of Kyrgyzstan are responsible for intersectoral coordination in the areas of e-government, e-

[38] These organisations are directly answerable to the Presidential Administration, except for the E-Government Development Centre that is a subordinate organisation of the SAPSSI.
[39] This is problematic in a sense as the Agency does not have the legal mandate to dictate policy to other Ministries or be able to regulate activities related to digital governance.
[40] The "National Information Security Coordination Centre" also monitors and protects information resources of state bodies. In doing this, it develops recommendations for users and owners of information systems to take measures in: identifying vulnerabilities, and neutralizing cyberattacks. In addition, the Centre has a national security incident response service, i.e. it notifies users of any potential threats through the web and YouTube with interviews, banners, publications, etc.
[41] Until recently, these functions were carried out by the State Communications Agency of the Government.

services, and digitalisation. Furthermore, for issues of digitalisation of public administration, progress monitoring is also carried out by the State Personnel Service, the government body responsible for personnel policy and matters in the public sector.

Tajikistan

In accordance with a Decree of the Government of the Republic of Tajikistan, the Ministry of Economic Development and Trade of the Republic of Tajikistan is designated as the authorised government entity in the field of digital economy.[42] For regular consultations and progress monitoring of the implementation of the Digital Economy Concept, and the programme and digital economy roadmap, the Council for the Development of the Digital Economy under the President of the Republic of Tajikistan will be established.

Uzbekistan

The state government body mandated with ICT and digitalisation is the Ministry for the Development of Information Technologies and Communications.[43] The Ministry's mandate includes the development of information technologies, e-government, digital economy, telecommunications and postal services and the use of the radio frequencies spectrum. The Ministry implements digitalisation policy and coordinates and controls digitalisation programmes and projects.[44]

Several other organisational entities exist under the Ministry for the Development of Information Technologies and Communications. IT-Park, the e-Government Project Management Centre, the UZINFOCOM Single Integrator for the creation and support of public information systems,[45] the State Unitary Enterprise Scientific – Engineering and Marketing Research Centre (UNICON.UZ),[46] and the Centre for Digital Economy Research.

The IT-Park is responsible for creating favourable conditions for the development and production of competitive products and services in the area of information technologies, and their promotion to domestic and foreign markets.[47] The e-Government Project Management Centre, established in 2020, is responsible for ensuring a unified technological approach to the development of electronic government and for prioritising the areas for digital development in state bodies and organisations. It is also mandated with the coordination of programmes and projects in e-government throughout all stages of their implementation. The Centre is also responsible for progress monitoring in innovation and digitalisation policy implementation according to the "Digital Uzbekistan 2030 Agenda".[48] It also provides high-level expertise for project management and technical documentation in the development and implementation of projects related to information and communications technologies for e-government.

[42] http://www.adlia.tj/show_doc.fwx?Rgn=136663
[43] https://mitc.uz/en
[44] Decree of the President No PD-6079 (05.10.2020) "On Approval of the Digital Uzbekistan 2030 Strategy and Measures for its effective implementation".
[45] https://uzinfocom.uz/en/
[46] https://unicon.uz/
[47] IT-Park is also responsible for providing the Technopark residents with the necessary infrastructure, including modern laboratories to carry out their activities, and providing them with financial, marketing, legal and other consulting services. It is also responsible to provide support, on a venture financing basis, to start-up projects, and assistance in the commercialisation process of their innovative product or service. Special benefits are provided for occupiers of the IT-Park, such as exemptions from all types of taxes and customs duties. Currently, 398 entities are established in the park with 23 start-up projects being implemented, employing 4,200 individuals. It is planned to establish similar IT-Parks in fourteen regions of the country, i.e. Nukus, Bukhara, Namangan, Samarkand, Gulistan, and Urgench, as well as at the Muhammad al-Khorezmi School. See also https://lex.uz/docs/4422256
[48] https://egov.uz/

UZINFOCOM Single Integrator is in charge of development and integration of information systems, resources, and software applications in the e-Government system. It is also in charge of hardware and software installations and maintenance, as well for the preparation of design and technical documentation.[49] The UNICON.UZ Centre was established in order to develop scientifically-base policy for the development of the high-tech industry, create a regulatory framework for the telecommunication sector, develop such areas as standardisation, metrology, telecommunication networks equipment certification, and provide scientific and technical support for the introduction of information technologies.[50] The Centre for Digital Economy Research is set up to determine the long-term prospects for the development of e-government and of a digital economy based on the implementation of scientific and technical research activities in priority areas for introducing digital technologies; and to evaluate the impact of digitalisation processes in production and in other sectors of the economy.[51]

Public-private partnerships exist in digitalisation projects and are supervised by the Public-Private Development Agency under the Ministry of Finance. In 2021, the design work was completed on a PPP project in information technologies, and an agreement was signed for the creation, operation, and maintenance of a national monitoring and marking information system, initiated by CPRT TURON LLC,[52] with an initial cost estimate of US$ 20 million.

The newly created Agency of Public Services is mandated with the implementation of a unified state policy in public service delivery to business entities and to individuals.[53]

3. Availability of CIO and ICT technical staff experts

[49] UZINFOCOM has other responsibilities also such as promoting the development of the domestic market of information and communication technologies and software products through the systematic involvement of domestic enterprises and organisations in the implementation of e-Government projects, and the introduction of information technologies in all sectors of the economy. See also https://uzinfocom.uz/en/

[50] https://unicon.uz/

[51] The Centre is also mandated to cooperate with the expert community, in preparing proposals for the implementation of digital initiatives in government organisations and agencies through an in-depth study in the field of digital economy and e-government. It is also obliged to form the conceptual and methodological basis for the introduction of "smart" technologies and big data analytics in various sectors of the economy. See also https://derc.uz/

[52] https://www.pppda.uz/en/4966

[53] The Agency is also mandated for (i) improvement in the procedures for the provision of public services by eliminating redundant administrative procedures and by developing interdepartmental electronic interaction; (ii) formulation of a unified register of public services, and coordination of the activities of state bodies and other organisations in this area; (iii) participation in the development of unified approaches to the design, development, implementation and integration of information systems, resources and databases used in the provision of public services; (iv) monitoring and evaluating the effectiveness of the activities of state bodies and other organisations in the provision of public services, including the introduction of appropriate information systems, resources and databases; (v) introduction of innovative forms and methods of rendering public services; and (vi) development of proposals for improving legislation and law enforcement practices in this area. The Agency's main functions are (i) implementation of the unified state policy in the provision of public services to individuals and legal entities: (ii) coordination and provision of methodological guidance on the activities of state bodies and other organisations, including civil registry offices in the provision of public services; (iii) development of proposals on priority areas for improvement, as well as in the field of civil registry office provision of public services, ensuring their implementation; (iv) development, on behalf of the President of the Republic of Uzbekistan, the Cabinet of Ministers of the Republic of Uzbekistan, the Ministry and on its own initiative, draft laws and other regulatory legal acts on improving the provision of public services; (v) provision of information to the public about the state of the provision of public services; (vi) provision of general management for the activities of Public Service Centres and territorial archives of the Registry Office; (vii) promotion and expansion of international relations in the provision of public services, and the establishment of communication and cooperation with foreign and international organisations on the provision of public services; (viii) organisation of the implementation of state registration of legal entities, as well as individuals as business entities; and a few other.

Armenia

The Deputy Prime Minister is assigned as the CIO and chairs the Digital Systems Administration Board. The Board plans to introduce the positions of Chief Information Officer (CIO), Chief Technical Officer (CTO), Chief Security Officer (CSO), and Chief Data Officer (CDO). In the meantime, the role of the Chief Technology Officer is performed by EKENG. However, this position has no legal foundation and no job descriptions have been developed yet.

An overall deficit of ICT technical experts exists as IT specialists recruited by ministries and other government organisations to contribute to the digitalisation process leave as soon as they have accumulated experience and have grown professionally for the private sector, which pays much higher salaries. This inability of the public sector to retain ICT technical experts contributes to the overall lack of quality public sector IT specialists. A way to address the problem is outsourcing IT services.

Azerbaijan

There are no officially defined CTOs position in the government administration. However, Heads of the IT departments in government organisations assume the functions related to such as position. Similarly, there are no official defined CSO positions. Some government entities have special departments responsible for cybersecurity, others have a cybersecurity division in their IT departments. Managers of these divisions assume the functions and tasks related to cybersecurity. Equally, there are no CDO positions, In fact, the title and the position is quite new for government organisations, and it is not widespread.

Since such positions are not legally defined, no job descriptions exist. Functions and tasks performed by designated individuals are subject to agreement with their organisations' heads. Those individuals who carry out the digital transformation process in government organisations are usually those who possess some experience and expertise in the field and have received higher education abroad.

Georgia

There are no positions of Chief Technical Officer or Chief Data Officer. Each organisation has its own internal information Security Officer, as there is a law in effect that obliges private and public organisations requiring them to have their own Information Security personnel.

As far as technical experts are concerned, it is difficult for government organisations to recruit individuals for such positions due to salary levels paid in the public sector. There is some discussion on raising the salary levels for technical experts, however this is only discussed on project levels, and it is still at this level.

Kazakhstan

The CDTO (Chief Digital Transformation Officer) role has been introduced in state bodies, vice ministers who are responsible for the implementation of digital projects and the transformation of various industries. In other government organisations and agencies, Deputy Heads, oversee the implementation of digital initiatives. The role of the Chief Technical Officer (CTO) for digitalisation and data management is assigned to one of the Vice Ministers of digital development and innovation. An attempt was made to introduce Data Stewards on data management in each Ministry, but this initiative did not move forward, due to staff limitations most likely. The positions of those responsible for data management (Data Stewards) in central government bodies have been determined.

Kyrgyzstan

There are no such positions of Chief Technical Officer, Chief Security Officer, or Chief Data Officer. Most ministries provide for the position of Deputy Minister for Digitalisation, as well as for special staff units for ICT and digitalisation. Information technology specialists, positions are also provided in most of the government agencies in Kyrgyzstan for the implementation of the unified "TUNDUK" system. Overall, it is difficult for the public sector to attract and retain experienced individuals specialising in IT matters due to non-competitive compensation packages offered.

Tajikistan

In ministries, positions such a Chief Technical Officer, Chief Security Officer or Chief Data Officer do not exist. In most ministries, a Deputy Minister oversees the direction of ICT and new technologies. In general, it is difficult for the public sector to attract and retain experienced ICT professionals due to a non-competitive compensation regime. In the financial and banking sector, departments of information security exist that are equivalent to technical directors in charge of IT.

Uzbekistan

No such positions are introduced in government organisations. However, each state body has a deputy head position coordinating the development and implementation of information and communications technology tasks and projects, effectively acting as Chief Digital Officers.[54]

The main tasks of the deputy heads for digitalisation are: (1) development timely implementation of departmental programmes for digital transformation, providing for the wide introduction of information systems and resources; (2) creation of the necessary conditions for further expansion of electronic government services provision through mobile devices and other forms of electronic interaction; (3) take measures to ensure openness and transparency of the activities of government departments, posting open data and other information on the internet; and (4) ensure information security of the departmental digital infrastructure and the protection of electronic data and documents. The Ministry for the Development of Information Technologies and Communications coordinates the activities of the deputy heads for digitalisation across government organisations.

Almost all ministries and government department have created specialised units responsible for digitalisation, which employ ICT technical specialists and analysts and ICT managers. Technical specialists from the private sector can also participate in digitalisation projects of government organisations in accordance with the provisions of the Law "On Public Procurement".

[54] Decree of the President No PD-6079 (05.10.2020) provides for deputy heads of all ministries and departments, and of local executive authorities to be assigned the role of deputy head of digitalisation (Chief Digital Officer). In general, the responsibilities and roles of IT and digitalisation responsible positions are defined in regulatory documents, which reflect the responsibilities and rights of these employees. in many cases, job descriptions exist that define their organisational and legal status, functions, rights, and responsibilities, as well as their qualification requirements.

4. ICT Education/Training availability and government personnel capacity evaluation

Armenia

There are no capacity building programmes on ICT offered to government personnel. The Ministry of High-Tech Industry just launched the "Cyber Hygiene" course aimed at increasing the digital literacy of the population.

IT related training courses for civil servants have been introduced but they primarily target civil servants working in ICT related functions.[55] However, when new digital systems are introduced, training covers all responsible personnel. Basic knowledge of ICT is now a prerequisite for hiring civil servants. For managerial and professional groups of positions such competencies as "information technology and communications" and "service delivery" are required.

Some donor-funded one-time capacity building initiatives offer specialised trainings on-line. Topics usually covered are cybersecurity and cyber threats. However, these courses are beyond the comprehension of the average public servants. It would be more beneficial if such training courses were offered focusing on business process re-engineering, resource optimisation, digitalisation, etc.

Civil servants' training is coordinated by the relevant Deputy Prime Minister. There is no dedicated central organisation coordinating and overseeing training activities in the country. This role is assumed by the Civil Service Office, although education and training in the field of ICT is carried out by each government entity independently.

Azerbaijan

There is no mandatory training on digitalisation. No legislation exists that requires civil servants' participation in such training. Government organisations are free to organise training activities for their personnel at their own initiative. Some organisations, often utilising their international connections, organise various training events related to digitalisation and relevant issues implemented by international organisations.[56] In general, the absolute majority of government organisations encourage their staff to participate in specialised trainings and certification programmes. In this regard, government organisations pay for examination fees and other associated costs. However, even though there is a growth in the number of ICT related education and training activities, there is still an evident lack of in-service training for government personnel, as the majority of government employees perceive the digital transformation process as the responsibility of ICT departments solely.

ICT education and training activities are carried out independently by each government organisation and there is no central budget funds allocated for digitalisation-related training to date. Moreover, the E-Government Training Centre, affiliated with the Ministry of Digital Development and Transport, and the IKT Lab exist.[57] These organisations do not possess the legal authority to establish and regulate compulsory training programmes. The E-Government

[55] ITC training is regularly provided to the EKENG staff only. This training is demand-driven covering the critical areas of the organisation so that it possesses the capacity to fulfil its mission.
[56] Local government entities generally cooperate with international organisations such as the United Nations (UN), the European Union (EU), International Telecommunication Union (ITU), the Korean International Cooperation Agency (KOICA), the National IT Industry Promotion Agency of the Republic of Korea (NIPA), the Turkish Cooperation and Coordination Agency (TIKA), and the German GİZ (*Deutsche Gesellschaft für Internationale Zusammenarbeit*).
[57] The "Information-Communication Technologies Application and Training Centre" LLC was created in 2013 with financial support from KOICA.

Training Centre organises trainings for the Ministry's personnel on topics of their jurisdiction. Participation in such trainings is voluntary. The Centre has currently eighteen training locations, of which fifteen are located in the regions. The Centre also provides video-based trainings for different target groups in the public and private sector and to the public at large. The Centre's training services are provided under the "ICT LAB" trademark. Some capacity building programmes are organised through international cooperation projects, but these are usually related to local government bodies' management, including digitalisation as a sub-topic in these training activities.

Overall, training programmes are limited to technical topics and some commercial software.[58] If trainings on digitalisation were organised, they should first start with management level personnel and gradually move down the hierarchy, as those who make decisions should possess a good understanding of the digital transformation concept and be knowledgeable about its benefits, as well as possess the minimum level of capacity to manage the digital transformation process.

Georgia

Training on digital matters is demand-driven and it is not provided on a regular basis. However, a learning platform exists that one can find several courses. Some other training is provided through various initiatives undertaken by international organisations such as UNDP, GIZ, USAID, etc.

Kazakhstan

The Ministry of Digital Development, Innovations and Aerospace Industry has developed a distance learning course "Digital Civil Servants". It aims at making civil servants acquainted in depth with the relevant legislation and e-government and well as on information security. Civil servants also learn how to work with digital tools in improving their efficiency, etc.[59] The Academy of Public Administration is generally mandated with ICT related education and training activities for government employees, in cooperation with the Ministry of Digital Development, Innovation and Aerospace Industry.

Furthermore, the Ministry of Digital Development, Innovations and Aerospace Industry conducts business process re-engineering – BPMN – courses for government employees, on an on-going basis.

The Ministry of Digital Development, Innovations, and Aerospace Industry has also developed a new concept to improve the level of digital literacy of the population. Its activities include the creation of a YouTube channel on digital literacy of the population, in which educational videos for the population will be published. It also plans to invite opinion leaders to television and popularise digital literacy by launching Digital Literacy television programmes on all the state channels. There is also a need to provide training to government personnel on data management, as there are few competent employees that can work with data.

Different government agencies deliver their own trainings at their own initiative; some of them in cooperation with ZERDE. ZERDE also conducts trainings jointly with foreign and local partners.[60] This year ZERDE plans to train up to 500 civil servants, and 100 specialists in from

[58] Most trainings organised are limited to Microsoft Windows and Office and some other software, a curriculum not considered sufficient to deal with the crucial aspects of the digital transformation process fully.
[59] This course is designed for three categories of civil servants: (1) heads of divisions; (2) implementers; and (3) industry specialists involved in the digitalisation of state and local government institutions.
[60] For example, ZERDE arranged trainings in cooperation with NIA Korea, through which fifty specialists from government agencies were trained on ethics and management.

both the quasi-public and public sectors.[61] These trainings on digital competencies will be delivered in cooperation with the Academy of Public Administration. It is hoped that such trainings will be delivered annually from here on.

Funding for these training activities comes from the ministries that conclude training agreements with ZERDE. As training financial resources are not sufficient, additional funding is attracted from donor organisations, e.g. UNDP/ACSH, from business entities and non-governmental organisations, which was used for trainings on Big Data, Change Management, and Design Thinking courses.

Kyrgyzstan

The Ministry of Digital Development is responsible for raising the digital competencies of public servants. However, activities for the development of digital competencies is divided by policy area. For instance, the Ministry of Education was given the responsibility to revise curricula and education programmes at all levels (pre-school, primary, secondary, higher, and vocational education) to incorporate digital competencies. Similarly, the development of digital competencies of central and local government employees was assigned to the Agency for Civil Service and Local Self-Government Affairs. Nevertheless, the Ministry of Digital Development is also involved in providing training. It focuses on IT project management, and analysis of ITC-focused projects as these two areas are considered a priority.

In 2019, the State Agency for Civil Service and Local Self-Government Affairs introduced the course “On Digital Transformation in Public Administration”, offered to all public servants. This course explains the goals of digitalisation and its expected outcomes.[62] Another course developed to train civil servants was on digital competencies, providing a listing of digital competencies and skills civil servants should possess. However, delivery of this course was postponed due to the pandemic, as another training course on cybersecurity.[63] Some other training on digitalisation also takes place but it is not systematic in nature. For example, KOICA organises courses on cybersecurity, but they are limited in scope, as only two to three people participate each year.

The Academy of Public Administration offers courses on “Digital Transformation of a Public Authority” and “Digital Technologies in Public Administration”. Seminars are also organised and offered on a variety of topics, i.e. digital competencies of civil servants; big data, and data-based decision-making; cybersecurity, and a number of courses on office software, i.e. Microsoft Office, etc. The length of these seminars varies between 8 and 24 hours of training. Furthermore, universities in the country offer degrees for IT specialists. It is expected that active training of civils servants to improve their digital skills and competencies will begin in 2022. It is also planned to create a Centre of Excellence to be in charge of training. The IT Hub is offering trainings for citizens and civil servants in Bishkek and planning to deliver them in other regions as well.

[61] Several government organisations are currently being selected for capacity building training of selective personnel, aimed at making them qualified trainers and who can carry out trainings within their organisations. The training programme is being developed, and the training team members are being selected.
[62] The State Agency is responsible for ICT education and training of government personnel compiling state programmes for training, retraining, and advance training of civil servants and municipal personnel.
[63] The Japanese International Cooperation Agency (JICA) plans to organise a training course on cybersecurity complemented by a study visit to Japan this and next year for employees of the Ministry of Digital Development and of other government agencies that are also responsible for digitalisation.

Tajikistan

Any training is organised at the level of ministries and departments. There is no central organisation responsible for ICT education and training for government personnel. This function is partially performed by the Academy of Civil Service and the Agency of Civil Service under the President of the Republic of Tajikistan.

Recently, the “Invest Dushanbe Forum”, through the Investment Committee of Tajikistan, opened a school / business centre, which provides free training to civil servants to improve their qualifications. There are also some training courses that are provided by international organisations, e.g. JICA, G-Asia, etc.

Uzbekistan

The Ministry of Development of Information Technologies and Communications is responsible for providing education and training on ICT to government personnel. Trainings on ICT are considered important, as they develop the capacities of government officials in streamlining and modernising the work of their organisations through the use of ICT, resulting in turn to improvements in the quality of public service delivery. Thus, trainings for civil servants are held on a regular basis.

IT centres have been established in all regions of the country for training in digital technologies, as the ICT sector is developing very rapidly. In recent years, attempts have been made to establish higher education institutions to train ICT specialists. The Tashkent University of Information Technologies, Inha University, Amity University, and other non-state educational organisations offer trainings in the field of ICT.

The trainings focus on improving the technical skills of public employees, and of specialists in the use of digital technologies, software products, database management systems, e-government, digital economy, digitalisation of public services, etc. Successful completion of trainings by individuals has an impact on their promotion prospects. A system of compensation was put in place as of January 2021, where expenses for receiving international IT certificates in systems administration, database and cloud platform management, information security, etc are compensated up to 50 per cent.

The One Million Programmers training programme is the largest IT programme in Central Asia preparing junior level specialists. This mass-scale programme is delivered through 205 fully functional and equipped educational centres with IT parks in 40 regions, including the capital city. Young generation has an access to all educational programmes.

The e-Government Project Management Centre conducts evaluation of ICT knowledge of public employees and it provides certification, and the State Inspectorate for Supervision of Education Quality under the Cabinet of Ministers is responsible for the assessment of the quality of education provided in the field.[64]

Training activities are financed through the ministries’ and government departments’ budgets that includes funds for training.

[64] https://tdi.uz

5. Legal Framework

Armenia

The basic legal framework on digitalisation matters dates back to 2007, and thus several aspects of the current reality are not considered. There are also some outstanding issues that cannot be legislated at the moment, since no firm decisions have been made on which way to. For example, the discussion on the qualified / advanced level service provision by the certification authorities is in process, thus legislation will be developed once a decision is made.

However, with the exception of the information security domain, the legislation is somewhat adequate in other areas, e.g. interoperability, protection of personal data, access to supporting documents, etc. In some cases, the existing legislation has not been utilised to its full potential. For example, legislation on the use of electronic documents was adopted in 2004, but they did not materialise until 2009. With respect to open data policy, open government, digital and cybersecurity, some bottlenecks need to be addressed and strengthened by legislation. The Ministry of High-Tech Industry is currently working on this, and the relevant legislation is expected to be developed this year (2022). There is still much to do, however. Revision of legislation is required to make it compliant with international standards.

Azerbaijan

The current legal framework is sufficient to carry out digitalisation operations and sustain digitalisation initiatives undertaken by different government organisations. The legal framework Is regularly updated in line with new requirements. Insufficient legislation is mostly found in the use of digital payments and digital wallet systems and related international transfers. Furthermore, lack of relevant legislation hinders the private rather the public sector.

Georgia

The Constitution of Georgia includes a provision about the right to access to Internet. A law on electronic document and electronic trust services is also in effect. Furthermore, a law is in effect outlining the functions of the Digital Governance Agency. In addition, a law on unified information and the State Registry obliges state agencies to provide information to the web portal designated for the provision of public services outlining what databases they have in place, and what services they offer. However, there is no enforcement mechanism in place to make this process systematic. Thus, in essence there is no legal framework in place for exchanging information among public organisations. There is no law on open data, but one article appearing in the Public Administration Code. A law exists on protection of personal data which includes provisions on the principles of data processing.

Kazakhstan

Overall, the relevant legislation is up-to-date. In some instances, legislation is several years ahead. For example, the Law “On Informatisation” (2015) is a complex legislative act encompassing a wide variety of various issues including the platform and service model, data security, etc.

Currently, the Parliament is reviewing a new bill “On the Introduction of Amendments and Additions to Certain Legislative Acts of the Republic of Kazakhstan on the Implementation of Certain Instructions of the Head of State”, which includes norms on re-engineering, methodology and support for the re-engineering of administrative bodies carried out by a subordinate organisation of the authorised body for data management; with the purpose of a swift and seamless transition of the information and communication platforms of “electronic government” to a platform model and to receive high-quality public service when creating and developing informatisation objects. It is proposed to include norms using a *special procedure*

in accordance with the legislation of the Republic of Kazakhstan on digitalisation. In addition, as an alternative to a special order, it is proposed to change the current mechanism of the Informatisation Service Model for the rapid creation and development of informatisation objects. It is also proposed to introduce digital expert examinations of draft regulatory acts to analyse the business processes of state bodies in order to identify outdated procedures and optimise (automate) them, including using information and communications technologies.

The Ministry of Digital Development, Innovation and Aerospace Industry is developing a "Digital Code." This document will serve as the fundamental normative act, through which the relations of the entire branch of law are systematised. It will also initiate the creation of a unified data management policy (collection, processing, storage, requirements). The Digital Code affects the rule of law in the areas of telecommunications, electronic communications, e-commerce, e-government, cybersecurity, electronic transactions, personal data and liability of Internet intermediaries. The Code will also simplify the process and ease the digital transformation process.

Kyrgyzstan

Relevant legislation is not adequate in Kyrgyzstan. A lot of work has to be done on the legal aspects. For instance, there is a law on electronic signature and a resolution, however there are issues both in terms of mutual recognition of electronic signatures and their general legitimacy. And there are many more such problems.

Tajikistan

A legal framework is currently being developed to regulate the activities of Techno parks. The emphasis is on IT Parks; and an E-document management and an Electronic Digital Signature (EDS) system.

Uzbekistan

The existing legal framework is adequate. For an extensive list of the current legislation, see appendix 5.

6. Existence of infrastructure and technical standards related to digitalisation

Armenia

Internet coverage is around 95 percent and getting better all the time. Internet connectivity is also adequate. Overall, it seems that the relevant infrastructure is in place to support and facilitate the digitalisation process. Some security issues exist as the system is decentralised with each ministry having their own servers at best equipped with air conditioning or placed under lock somewhere in their basements. Thus, a need exists for the development of data centres infrastructure. In this connection, the discussion is on-going on the use of cloud storage also involving open data policy and open government aspects. Once these issues are clarified, decisions will be made what to store and where and then establish the appropriate infrastructure.

An inter-agency electronic communication system is in existence since 2008 in Armenia used for document transfer. Thus, it is really an electronic document management system only. Yet, there are some government organisations, e.g. law enforcement agencies that still adhere to paper based communication although they are also included in the system.[65]

In 2021, a new generation of an interoperability platform was introduced – to replace the one introduced in 2015 - which made it possible to exchange data in a secure way across different government organisations' systems. The core databases that are part of this exchange platform are the population, business, vehicle, police, land, property, and civil acts registers. Fifty six million transactions were made in 2021 through the interoperability platform.[66]

Interoperability standards have been in place since 2015. They are considered adequate overall, as they allow for data exchange across government systems. The interoperability standards include some general security features. Furthermore, no security standards *per se* exist and they need to be developed.[67]

As already mentioned no centralised data centre exists. However, a back-up data centre was established in the Government, but it is not obligatory legally for other government organisations to join. Currently, EKENG performs the role of the Government Integrated Data Centre. The exchange of data between specific databases, registers, etc is performed through the corporate network that is administered by EKENG. However, state organisations also use their own local networks connected to the Internet, which however in some cases they do not have any security standards in place.

The Digitalisation Strategy provides for the development of five standards. In accordance with the Strategy, the Ministry of High-Tech Industry is developing unified standards for the digitalisation of the public administration system and services provided by the state. The Ministry of High-Tech Industry will use international experience and the involvement and support of private sector specialists during the development of standards.

[65] Statistics of the electronic document management system in place show that almost all institutions exchange documents online through the state electronic document exchange centre using the Mulberry electronic document exchange system. The high percentage of electronic document management and the exchange of electronic confirmations shows that electronic document processing has become a norm in most public institutions.
[66] Operating this platform, it was found out that major issues exist related to the quality of data in the connected databases. Thus, major work has to be done in the next three to five years.
[67] The Digitalisation Strategy provides for the development of five standards. In accordance with the Strategy, the Ministry of High-Tech is developing unified standards for solving the digitalisation of the public administration system and services provided by the state. The Ministry of High-Tech Industry will use international experience and the involvement and support of private sector specialists during the development of standards.

Uniform standards will regulate four main areas: (i) Process requirements to establish procedures that are necessary for implementation, in order to obtain a more manageable and better final product. The digitalisation project must meet specified requirements, and at each stage it is necessary to ensure the processes provided for this stage and their results. Implementation of the programmes will be carried out in stages and at each stage the results to be delivered will be outlined and a report/display on the progress of the program will be prepared. At the end of the project, requirements on the results and delivery procedures will be presented; (ii) Security requirements establish standards related to the implementation, maintenance and use of digital solutions that will ensure the reliability, integrity and security of digital systems and data; (iii) Technical requirements regulate reliability, expansion possibilities, compatibility, service capabilities, acceleration, accessibility, etc; and (iv) Functional requirements for digitalisation that will determine the minimum functionality to be provided by the new digital solutions being developed. These aim at supporting the reliability of existing systems, receiving reports, identifying problems with unified approaches, and ensuring the availability of functional subsystems (system monitoring, error detection, statistics usage, logging, user authentication, etc).

The design of these new systems will be carried out according to uniform standards and monitor pre-established processes, including software architecture, testing (automated testing systems), and feedback mechanisms. In this context, the experience of Korea, recently exposed to, through the on-line course, has been very useful in guiding the next steps.

The E-Governance Infrastructure Implementation Agency (EKENG) is responsible for introducing standards frameworks in the area of public service digitalisation. The National Organisation for Standardisation and Metrology of the Ministry of Economy is the designate organisation to maintain technical standards in the country.

Azerbaijan

The necessary infrastructure is in place to support data transfer among government entities and government organisations around the country – even in remote areas.[68]

The most up-to-date legislation related to standards frameworks is the “Rules for the creation, maintenance, integration, and archiving of government information systems” (No 263, 12 September 2018), the “Rules for the evaluation of electronic services and information systems in government organisations” (19 November 2016), and the “Rules for the formation and integration of national spatial data” (No 448, 28 December 2018).

Such legislation, however, does not cover technical issues in detail, it only designates the appropriate organisations to establish, distribute, and monitor the implementation of technical standards. This approach provides flexibility to cope with agile change in the implementation of rapidly changing technical standards. For instance, standards for data storage and exchange, and integration with e-government information systems are prepared by the E-Government Development Centre, and standards for cybersecurity infrastructure are prepared by the State Agency for Special Communications and Information Security.

The State Agency for Public Services and Social Innovations under the President of the Republic of Azerbaijan is mandated to approve technical requirements for the formation, maintenance, integration and archiving of state information resources and systems.

The State Committee for Standardisation, Metrology, and Patents is the main government institution responsible for the localisation of international technical standards. The Committee

[68] Data communication among government organisations is provided through a private and secure network infrastructure – the azstate.net. Data communication between information systems is provided by the ASAN Bridge.

ensures the localisation of various standards, especially ISO, and it has the authority to represent the country in international standardisation committees.

Standards exist on electronic signature and electronic document management, and for the creation and management of internet-based information systems. A standard was recently developed, complying with international norms (ISO High Level Structure) for Open Data Management. The country is currently developing standards compatible with the European Union standards systems.

These standards may not fully comply with international standards, but they are sufficient for the time being to meet the requirement needs. For instance, the use of the azstate.net and ASAN Bridge infrastructure components have enhanced technical quality and security.

Recently, the introduction of the ASAN Bridge – the Data Exchange Layer – provides the platform for exchange of documents among different government agencies, thus eliminating the need for citizens to submit documents from other government entities.[69]

As far as shared services are concerned, an integrated and centralised data centre is in operation (G-Cloud) since 2019 and it is managed by the Ministry of Digital Development and Transport. Prior to the introduction of the G-Cloud, government organisations operated their own data centres. Such centres are currently operating in parallel with the G-Cloud, until the process of transferring their data to the integrated data centre has been completed. The last government organisations to transfer their databases to the G-Cloud are the Ministries of Internal Affairs and of Taxation, as they possess large and rather complex databases.

The State Agency for Special Communication and Information Security is responsible for data communication and associated cybersecurity issues among government bodies. The Agency deploys a centralised management model, and government institutions can request security analysis and audit from this Agency free of charge.

Georgia

In most cases, public organisations are connected to the Internet in Georgia, although there are some problems with connectivity in rural areas. In most cases, mobile internet is also available and accessible by citizens.

Infrastructure to support the digitalisation process is in place based on Microsoft technology. However, this infrastructure is quite old and needs a major upgrade, as it cannot meet current demands. There are far too many organisations connected to this infrastructure, as well as far too many services provided through it.

As far as data centres are concerned, there are several major public entities that have their own data centres and IT infrastructure, however this is not sufficient for today's levels of demand for digital processes and services.

A draft interoperability standards document is developed based on the European internal interoperability framework, but it is not enforced. A law also exists that that includes the list of critical information systems that are covered by information security procedures, which could be considered as the standard for information security in Georgia. The Digital Governance Agency and the heads of government agencies are responsible for overseeing information security in government organisations.

[69] The ASAN Bridge is operated by the E-Government Development Centre as the centralised data exchange solution, under the supervision of the SAPSSI authorized to regulate the exchange of data among government organisations.

On the other hand, there is no cybersecurity standards in the public sector information systems. A government technical agency is operational, which is in charge of public sector cyber and information security. Its mandate is to prepare regulations determining, for example, the minimal information security standards or rules for cyber protection, e.g. the penetration testing, as well as to oversee all relevant issues pertaining to the critical information systems in the public sector.

Kazakhstan

The necessary infrastructure is in place to support data transfer among government entities and government organisations around the country. The country possesses a high-speed internet infrastructure. It also operates five Data Processing Centres (DPC), which however need to become more voluminous and productive, thus their infrastructure needs to be improved considerably.[70]

Standards exist, and they cover such areas as operation of networks, electronic documents circulation systems, software usage, etc. More emphasis should be now placed on cloud, data analytics, cybernetic and security and mobility standards.

Technical standards related to digitalisation are included in the Catalogue of National Standards and National Classifiers of Technical and Economic Information. The Catalogue is approved by the Committee of Technical Regulation and Metrology of the Ministry of Trade and Integration.[71] This Committee is the designated government organisation for maintaining technical standards.

All standards developed are in accordance with the International Organisation for Standardisation (ISO) and the International Telecommunications Union (ITU), and they are constantly updated if additions and changes are made in the international standards.

All digital services are provided through an e-government portal operated by the “NJSC State Corporation Government for Citizens”, which also monitors the quality of services provided. A call centre is also operational through which citizens can lodge complaints about the speed of delivery or the quality of service provision. Furthermore, a Monitoring Centre exists that monitors which systems are working or failing.

Cybersecurity is an integral part of any information system covering all processes starting from the design stage of an information system to the actual delivery of services. Mechanisms exist to monitor information security, to respond to information security incidents, to conduct investigations and to bring to justice those who were negligent in the process, as the relevant legislation is very explicit and well developed.

The Information Security Commission under the auspices of the Ministry of Digital Development, Innovations and Aerospace Industry is the regulator of the system. The National Information Security Coordination Centre monitors and protects information resources of the government organisations, and it develops recommendations for users and owners of the information systems for taking measures to identify vulnerabilities in their systems.

Kyrgyzstan

There is an 80 per cent country wide coverage of 2G internet. However, high-speed internet is still very low. This is a common problem across most countries of Central Asia, with the

[70] In July 2008, the State company “Zerde National Infocommunications Holding” was created to develop info-communication technologies and e-government, implement “disruptive” projects, and establish a uniform info-communications environment, by developing a standards framework.
[71] https://cloud.mail.ru/stock/7UGdnqYZaTumQcmLJYpvy1ze

exception of Kazakhstan. For the exchange of data among government organisation, the "E-Kyzmat" system has been developed to allow for interdepartmental electronic interaction.[72]

The electronic interoperability system "Tunduk" is also operational in the country since 2018. It is an information system that allows state and municipal agencies, as well as legal entities to exchange data necessary to render services to citizens and organisations in the electronic form.

The purpose of the "Tunduk" project is to increase management efficiency within the government agencies, significantly reduce corruption and minimise obstacles caused by red tape for citizens and entrepreneurs by means of automating and ensuring receipt of reliable data and obtaining high-quality public services in a prompt manner.[73]

In addition, an electronic document management system "INFODOCS" is in operation in all government organisations. However, in some hard-to-reach regions, due to low internet access, does not work.[74] Furthermore, according to the legislation in force, electronic documents are required to be duplicated in paper format. Thus, the electronic document management system is not being implemented efficiently across government organisations. There is a need for providing trainings and seminars on how to use the system and perhaps to go paperless in order to make the system work fully.

Standardisation issues are provided in the relevant action plans for digitalisation. Some standards frameworks exist within the scope of the adopted digitalisation programme covering some aspects of digitalisation; however, such standards are not certified. There is a need to adopt a comprehensive approach.

Tajikistan

Tajikistan suffers from poor quality and expensive internet connectivity attributed to several factors, including incomplete policy and regulatory environment, limited use of ICT, low levels of private investment, and circumvention of global internet traffic. In some places due to mountainous terrain of the country there is no internet connection at all. However, it is hoped that the planned introduction of 5G will improve the quality of internet connections and it will expand connectivity considerably. Extensive work is under way by mobile telephone operators to distribute networks of 4th and 5th generation to the rural areas of the country.

Uzbekistan

The process of establishing standards frameworks is at its beginning. The Ministry for Development of Information Technologies and Communications is mandated with the management and coordination of standardisation activities in the field of information and communications technologies.[75] The Basic Organisation for Standardisation has been created

[72] The "E-Kyzmat" system was developed from 2010 until 2018, when it was first launched. As of 2019, it has been fully operational across all government organisations and agencies.
[73] https://kg.tunduk.gov.kg/wp-content/uploads/2019/03/%D0%B0%D0%BD%D0%B3%D0%BB-%D0%91%D1%80%D0%BE%D1%88%D1%8E%D1%80%D0%B0.pdf
[74] This problem is expected to be resolved soon, as according to a presidential decision all central and local government organisations should be operating the electronic document management system by 1 July 2022
[75] The standardisation system to be developed will take into account the following: (i) expediency of developing regulatory documents, considering their technical, social necessity and acceptability; (ii) complexity of standardisation of interrelated standardisation objects, including metrological support, based on the development of agreed requirements for these objects and linking the timing of the entry into force of regulatory documents; (iii) ensuring compliance of regulatory documents developed in the field of information technology and communications with modern achievements of science, technology, trends in the development of communications and informatization, best practices, legislative acts; (iv) interconnection and consistency of normative documents on standardisation of all levels, elimination of duplication of development of normative documents on identical objects

mandated with the countrywide application of international, interstate, national, regional, and state and industry standards by economic entities.

Every year, a list of priority standards in information technology, information security, and telecommunications is determined. Such standards are developed by industry enterprises of the Ministry for Development of Information Technologies and Communications and submitted for approval. Once the standards are adapted, their use becomes mandatory by all government organisations.

A number of standards have been adapted and are unified with a series of ISO/IEC 26001 standards, i.e. concept and model of security management, information security management systems, performance measurement, data storage security, network security, security gateways, guidelines, etc. Interoperability standards also exist.[76]

A project is being implemented to create a single centre for storing and processing e-government data that meet the requirements of Tier III international standards. This data centre is operated and managed by the "Electronic Government Project Management" Centre under the Ministry for Development of Information and Communication Technologies.

Currently, several ministries and government departments have and control their own data centres, e.g. State Tax Committee, State Customs Committee, Central Bank. Other governments departments rent VDS,[77] Virtual Private Servers (VPS), co-location, and hosting services from commercial providers, e.g. UZBEKTELECOM, United Integrator UZINFOCOM.

Network communication between government organisations is carried out over an interdepartmental data transmission network (ISTN) operated by the UZBEKTELECOM JSC. To connect to the Network, government agencies apply to the Ministry. Each government organisation is responsible for their own infrastructure cybersecurity. An entity also exists, the "Cybersecurity Centre", which coordinates and controls the area of cybersecurity.

of standardisation at different levels of management; (v) openness of information about the current regulatory documents, programs and work plans for standardisation; (vi) approval of regulatory documents based on the agreement of the majority of interested parties; (vii) use regulatory documents for certification and metrology purposes; and (viii) application of modern information systems and technologies in the field of standardisation.

[76] A list of industry standards can be found at https://stt2.unicon.uz.

[77] Independent safety and security testing institution standards; https://www.cybersecurityintelligence.com/vds-2827.html

7. Digital Divide

Armenia

Various government organisations are responsible for promoting digital inclusion and plan educational programmes on digitalisation. The Office of the Deputy Prime Minister, the Ministry of High-Tech Industry, the Ministry of Economy, and the Ministry of Education, Science, Culture and Sports and EKENG is also mandated to promote digital inclusions, but the citizens' education component is not functioning.

The Centre for Innovative Solutions and Technologies in Armenia (ISTC) – the result of joint efforts of the Government of the Republic of Armenia, IBM, USAID, YSU and EIF – offers trainings and seminars on cloud computing, cybersecurity, cognitive technologies, computing, big data analytics and artificial intelligence with an emphasis on using IBM products.

Azerbaijan

No central organisation exists that promotes digital inclusion and plans educational programmes for citizens. Training programmes are carried out by different ministries and government organisations. Such programmes are aimed at citizens informing them about e-services and supporting them in using them effectively.

For instance, the "Skills for the Future" programme is implemented by the Innovation Centre of the SAPSSI. This training programme aims to increase the number of trainers in innovation management in government organisations, universities, and high schools. Another example is the "Digital Literacy in e-Government" programme, managed by SAPSSI and supported by KOICA. Its aim is to raise the digital literacy levels among young people living in rural areas of the country.

Another example is the "Towards Digital Journalism" programme, organised by the E-Government Development Centre of the SAPPSI. The main goal if this programme is to increase awareness of media representatives and bloggers about ICT, e-government services, and digital solutions, as well as to expand public awareness about the existence of e-services. The programme covers such topics as the use of social media in journalism, the basics of blogging, Azerbaijan in global digitalisation, e-government projects, start-up activities, artificial intelligence, etc. In total, 100+ participants from news agencies, newspapers, and information portals have attended the programme.

Yet, another example is the "ICT Lab", operated by the Ministry of Digital Development and Transport with support from the Ministry of Education, Science, Culture and Sports. The main aim of the Lab is to train highly qualified ICT experts working in government institutions and the business world. Furthermore, starting with the 2017-2018 academic year, the "Digital Skills" programme is implemented in secondary level schools aiming at developing students' ITC skills. This project is implemented by the Ministry of Education, Science, Culture and Sports and the "*Algorithmika*" International Education Company. Additionally, training programmes on improving digital literacy levels are organised by various private companies and non-governmental organisations. Universities and vocational high schools also provide some training on digitalisation related skills.

Georgia

N/A

Kazakhstan

There is no specialised organisation to promote digital inclusion and plan educational programmes for training citizens. From time to time the Ministry of Digital Development

conducts webinars with the participation of international development organisations targeting the expert community. There are no educational programmes for citizens. Additionally, the Academy of Public Administration provides courses related to digitalisation and e-government.

In 2021, the following system measures are being worked out to provide highly qualified IT specialists for (i) implementation of the project "Virtual teacher" in the subject "Informatics" in secondary schools of Kazakhstan; (ii) state support of private educational organisations in the field of IT; (iii) inclusion of the subject "Computer Science" in university curricula; and (iv) opening of modern programming schools in Kazakhstan.

Kyrgyzstan

The Ministry of Digitalisation is overall responsible for digital issues, and the State Personnel Service is responsible for the development of a unified educational policy for state and municipal employees. No government sponsored training is offered for citizens. however some international development organisations and donors provide trainings occasionally, usually though one-time events. The Academy of Public Administration offers courses on digitalisation aspects.

Tajikistan

The Ministry of Education and Science covers some aspects concerning promotion of digital inclusion.

Uzbekistan

The central organisation that is responsible for promoting digital integration and planning educational programmes is the Ministry for Development of Information Technologies and Communications. No training on digital aspects is provided for citizens.

Appendix 6 provides information on the number of internet users and the type of connections that exist vis-à-vis the population of each country, as a proxy in an attempt to discern the extent to which a digital divide exists, with respect to internet access that presupposes the use of digital services provided by each country’s Administration.

8. Network and Cloud Computing infrastructure

Armenia

Mission-critical data are stored on the nationwide cloud. The development of a government-wide G-Cloud is currently under evaluation.

Azerbaijan

Websites of all government organisation are hosted in The State Agency for Special Communication and Information Security Data Centre. In addition, this State Agency also acts as domain name registrar for the government and manages and maintain the DNS servers of the official domain name area .gov.az. In addition, e-mail service is provided to all government bodies over their own legal domain names from a single centre operated and maintained by the same State Agency. Some government organisations that carry out complex and elaborate operations and store large volumes of sensitive personal data, i.e. Ministry of Internal Affairs, Ministry of Tax, Ministry of Health, etc have their own data centres. All data necessary for internal operations, i.e. IP phone, friend server, HR system, access control system, security camera recordings, directory services, are managed and maintained by each government organisation in their own mini data centres.

The Government has initiated a transition for all government organisations' data to a centralised government cloud service to provide for better management and security, and to reduce costs. Existing data systems are moving to the nationwide cloud step-by-step starting with government organisations that carry out small or medium volume operations. Large government organisations will follow next. However, mission-critical government data are already stored on the nationwide cloud "AZCLOUD".[78]

Georgia

N/A

Kazakhstan

The Ministry of Digital Development, Innovation, and Aerospace Industry adheres to the policy of creating conditions for the development of the network and cloud computing infrastructure in the country, as it believes that cloud technology has a positive impact on the socio-economic development of the country as a whole and for each individual citizen. For instance, cloud computing as an emerging new IT industry segment contributes to the creation of new jobs, and it improves labour efficiency in several sectors of the economy. In this context, measures will be taken to develop the appropriate infrastructure by stimulating the construction of new data processing centres and making the necessary legislative amendments; as well engaging the domestic IT industry in the implementation of infrastructure projects for storing and processing data.[79]

Currently, the domestic infrastructure of cloud computing possesses a certain degree of readiness for coping with the government requirements for the implementation of cloud computing projects. Domestic business players in cloud computing services have proved the viability of their business in providing hosting services, virtual servers, virtual data centres, etc.

[78] https://gcloud.azcloud.az
[79] According to the Unified Information Security Requirements, critical government data must be stored on servers located within the territory of the Republic of Kazakhstan.

It is believed that the transition to cloud technology will intensify in the coming years, in congruence with global trends.[80]

Kyrgyzstan

There are no cloud services available, however the work for implementing a G-Cloud Service is currently under way.

Tajikistan

It is planned to build a data centre in the Republic of Tajikistan. The development of a national government G-Cloud is also being studied and evaluated.

Uzbekistan

N/A

[80] According to IKS Consulting, the volume of the Kazakhstani cloud services market in 2020 amounted to KZT 6.93 billion (USD 15 million approximately), an increase of 42 per cent compared to the previous year. Of this volume, the infrastructure as a service (IaaS) segment amounted to KZT 4.8 billion (USD 10.5 million approximately) or 65 per cent of the total volume. This trend continues into 2021.

9. Number of public services provided digitally

Armenia

In the past decade, the Government has made a major effort to deliver public services through digital channels. The following list presents the main electronic services that are available either through the governmental unified platforms or independently.

e-Service	Description
e-Cabinet portal	Through the portal users get access to the data stored in state databases, including information on identification documents, civil status, driving license, owned real estate and cars, participation in companies, jobs, monthly salaries, paid taxes, etc. Also, users can track the requests of their data by different organisations.
e-Request	Users are provided with the opportunity to submit letters to state authorities without visiting them, track the letters with the help of the control numbers provided, receive an answer to their letters through the portal or by e-mail.[81]
State Register for Legal Entities	Via the website users can submit applications for preliminary registration of legal entities, sole proprietors, requests for changes in the register, search for existing companies, as well as purchase full information about any company.
Unified website for publications of draft legal acts	Registered users can vote for/against the published draft legal acts, add comments and suggestions, and subscribe for receiving notifications about public discussions.
e-Petition	The portal enables the creation and publication of on-line petitions, join or resign from petitions by removing their names from the supporters' list of the petition, check the status and, if available, the responses of the state agency on the published petition.
Citizen feedback platform	After receiving state services, the users are provided with the opportunity to evaluate the quality of the services provided. Three agencies are now connected to the platform in pilot mode – the Ministry of Justice, the Ministry of Foreign Affairs, and the Police; others are soon to join. Each service, whether electronic or requiring a visit to a government office, is registered in the central system, and a specially generated 16-digit code is sent to a citizen, who received a service via email or to a mobile, and s/he can evaluate the received service there. It has been observed that not many citizens tend to give their feedback. The overall number of those who provide their feedback are less than 5 per cent. Most feedback is usually very positive.

[81] Development of this portal began in 2016, when the Innovation Laboratory "Kolba Lab" - part of the United Nations Development Programme (UNDP), in cooperation with the European Union (EU) launched a two-year project to promote innovative solutions in the field of public administration. The Ministry of Justice proposed the creation of a single portal for electronic requests, which would increase the accountability and transparency of public administration, as well as the provision efficiency of public services. This idea was implemented with EU funding. The Portal was operated by the Ministry of Justice until October 2019. It is currently managed by JSC EKENG on behalf of the Prime Minister's Office. The legal basis of the Unified Portal of Electronic Requests is defined in the Decision of the Government No 524-N (26 April 2018); https://e-request.am/ru/about

e-Community	The system is completely based on the Government interoperability platform, receiving data from the Police and the Cadastre Committee and it calculates local taxes and duties for the whole population, regardless of the community they are registered in.
e-Services platform of the Cadastre Committee	Through the platform citizens can submit a whole range of applications and receive requested services completely online.
e-Health portal	Citizens have access to their healthcare information (data on diagnoses, laboratory tests, allergies, medications received, planned visits and other details). The portal serves as the main notification means for Covid-19 test results.
Unified Social Portal	One Social Window is a complex informational database with the help of which citizens have access to the complete information about social services under State Care, as well as to application forms and procedures of each provided service.
School admission system	Through the school admission system, parents select a school and register their children to the first-grade class. The system automatically identifies the links between the parent and children, thus optimising the school selection process (As each school has limited places for admission, a child that has siblings already enrolled in a particular school, has priority over other applicants).
e-Payments	Provides the opportunity to pay taxes, state and local duties, fees, penalties on-line.
e-Tenderinghttps://armeps.am/epps/home.do	The system provides the opportunity to access state tender documents, complete and submit bids electronically and keep track on tender processes. All state tenders are held via this platform.
State securities	Citizens can buy Government short-term, mid-term, and long-term securities, get complete information about allocation dates, terms, etc, as well as obtain reports of their securities accounts.
Judicial information system	Public informative portal where comprehensive, detailed, real-time information related to all court case proceedings, and verdicts is contained. Searching for legal cases by using various parameters is also possible.
e-Notary	The system of Notarial Chamber allows submissions of documents to notaries' offices, electronic payment transactions, creation of electronic archive of the documents, generation and verification of contracts, handling of testaments, etc.
E-verify	Visitors can check the validity of the documents provided by state bodies.
Construction permit	Users can request different types of construction permits (assignment, re-zoning, acceptance, occupancy, demolition, etc) via the system. It is still in pilot implementation phase.

e-Apostille	The system hosts an electronic register of apostilles issued by the Ministry of Justice or the Ministry of Foreign Affairs. Users can easily check the validity of apostilles and download the e-document.
e-Visa	Foreigners can submit and pay for visitors' visas via the website, also check the status of their application.
e-Auction	Electronic auction system of the compulsory enforcement service.
Online notification portal	All notifications that are subject to be published are available on the website.
Intellectual Property	This system facilitates online submission of patent and trademark applications.
Electronic Tax Filing System	All tax reports and calculations are submitted to State Revenue Committee electronically.

Furthermore, a number of platforms also exist, which are currently under development and will, when operational, revolutionise the delivery of public services to citizens.

Besides services digitalisation, the Armenian Government has established several infrastructural blocks for further digital transformation of government operations, i.e.

- A government interoperability platform, which provides for exchange of data among state entities' databases, such as population, business, property, car registration, driving permits, tax information and many other registries. The platform enables retrieval of required data in real time from the owners of the data, thus eliminating the need for asking citizens to provide various references from other state agencies needed for service provision. This platform is a technological and organisational environment enabling a secure internet-based data exchange across information systems of public and private organisations.
- Electronic identification means that have been available to Armenian citizens since 2009. With the help of their ID, citizens can identify themselves on different platforms and service delivery websites. However, in order to use the e-ID system citizens still need to have at the disposal an ID card reader and special software installed on their computer. In 2018, the Mobile ID solution was introduced, which makes digital identification and signing through a USIM card inserted in their mobile phone devices. Another smart phone solution is currently under development, which will provide the same functionality as its predecessors, but it will not require any additional hardware other than the smartphone itself.
- Electronic signatures: electronic documents with signature certificates are provided by the Certification Authority of Armenia and they possess the same legal status as the paper signatures. Currently, submission of electronically signed tax reports is obligatory for all business entities.

According to experts' estimation, the overall volume of public services provided digitally is about 20 per cent. However, this percentage is uneven across services. For instance, tax services are delivered digitally 100 per cent.[82] Meanwhile, a paradox is observed. The more

[82] Meanwhile, a paradox is observed. The more services that are provided digitally, the less they are used. A big study, supported by UNDP, was carried out to understand why this is happening. The study showed that only about 5 per cent of available electronic services are popular among the population. Regardless of the degree of awareness

services that are provided digitally, the less they are used. A big study, supported by UNDP, was carried out to understand why this is happening. The study showed that only about 5 per cent of available electronic services are popular among the population. Regardless of the degree of awareness about the available e-services, 95 per cent of the population tends to think that it is better to get a service by visiting the appropriate public authority, e.g. a cadastre of a registry office.

A similar situation is observed with the digital signature application. A million Armenian citizens have a digital ID incorporated into their ID cards, however only about 7 per cent use them. This, perhaps, could be explained by the lack of computer literacy among the population, and by a public distrust towards state organisations. Furthermore, by going to a physical office to obtain a service, one could negotiate with someone or ask for assistance and/or pay for this, while with using e-services one needs to have a card reader and some computer-related knowledge.

The main channels used for e-service delivery are portals and websites. Neither mobile apps, nor SMS are used for the purpose. As far as the cost of services is concerned, there is no different between the service provided electronically or in person. However, a cost differentiation exists for some of the cadastre services (e.g. provision of topography plans, extracts from maps). The cost of obtaining this service electronically is three times less than getting it in person. This policy, if generalised, may affect the volume of public services obtained digitally.

Overall, public service delivery systems are characterised by low usability, and they are not accessible to people with disabilities. Furthermore, they are no universal design standards, which could be used by service providers.[83]

Azerbaijan

998 public services are provided by 139 organisations. 710 of these public services are provided electronically from 42 government agencies and organisations.[84] These services are provided through the MyGov platform, a single platform that connects government, citizens, and business. Interested parties may apply for services electronically, obtain e-references, and other documents, and verify accuracy of their data. Through this platform interested parties can also authorise the use of required personal information by various government agencies.[85]

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[83] According to data in Armenia's "Digitalisation Strategy 2021-2025", 15 per cent of the population used e-government tools in 2019. The main reason for accessing the e-platforms was to get information. In the same year, – 82 per cent - did not use electronic tools, as they did not need to transact with the public sector. The main reason for non-use was lack of digital skills. For electronic transactions, only 3 per cent of the population use an identification card (Survey "Armenia: the Use of ICT in Households and individuals", World Bank, 2020).

[84] Electronically (not digitally), as the electronic process covers the application phase, and the services are not provided digitally. This is due to the inability to digitalise archived information required to provide such services digitally. It is suggested that the degree of digitalisation of public services should not be depicted only by the number of services provided digitally, but other factors should be also considered. For instance, 50 services of the 498 may account for eighty per cent of the volume of services provided to citizens. Thus, priority should be given to the digital transformation of these services

[85] Services include application for connection to Az-POS system; application for extension of reporting term for income or profit tax; changing "ASAN IMZA" user mobile ID; deregistration of a physical person with a tax authority; obtaining an e-extract from the State Register of Real Estate; submission of tax declarations (except for simplified tax returns), accounts and certificate confirming the absence of tax liabilities; preparation of declarations by tax authorities and sending them to taxpayers for approval; provision of information on availability of apartments in high-rise residential building that have extracts from state real estate register; provision of information on completed documents; provision of information on selling prices of apartments under purchase contract; submission of a

Government agencies provided 190.8 million unique public services in 2020 (compared to 189.2 million in 2019). Of them 85.4 per cent were provided electronically and the remainder in paper format. Currently, the portal has more than one million users, and citizens use the portal an average of 2.5 million times a month in connection with various public services. These services cover tax matters, social services, and other public services.

E-services are provided through the MyGov platform, or the government organisations' websites and portals. Mobile applications are also available for public services frequently requested by citizens. The SMS system was widely used during the COVID19 pandemic period to further facilitate access to public services.

An "E-Procurement" system is also operational that accelerates the activities of local micro, small and medium enterprises by ensuring their participation in public procurement in Azerbaijan.[86] The "Licenses and Permits" portal, launched by the E-Government Development Centre in 2018, issues special permits [licenses], various certificates and other documents required for entrepreneurial activities. Furthermore, taxpayers submit their tax returns electronically through the State Tax Service portal.[87] Additionally, the following services are provided electronically, (i) electronic health insurance (e-Tabib); (ii) electronic social services (e-Social); (iii) electronic examination by the Government Examination Centre (e-DIM); and (iv) electronic education services (e-Tahsil).

simplified tax return through a Call Center; application for cancellation of the state registration of real estate; provision of information on real estate facility from the state register; application for additional registration of real estate mortgage and cancellation of state registration of subsequent mortgage; online changes of physical person's accounting data; online registration of taxpayer's business entity (facility); online tracking by applicants the execution of application on real estate registration; acceptance of appeal to establish later contact in real time mode with a person who called a Call Center during non-working hours; acceptance of application on tax evasion and actions (inaction) of tax authorities' officials; acceptance of electronic declarations; acceptance of electronic tax invoices; acceptance of orders for sale by auction of state-owned non-residential areas that are at the disposal of local executive authorities, not in use and located in residential buildings; acceptance of orders for sale by auction of shares of joint stock companies established as a result of transformation of small and large-scale enterprises; acceptance of orders for sale of small enterprises (facilities) at auctions; acceptance of orders on sale by auction of facilities privatised as buildings under construction; preparation of annual special report form on state of preservation and use of state property; application for recruitment to the service in tax authorities; application for additional registration of real estate mortgage and state registration of subsequent mortgage; application for cancellation of the state registration of real estate leasing; application for sale by auction of state enterprises and organizations, as well as fully privatised joint-stock companies and cars and other vehicles exceeding demand owned by legal entities with state share in charter fund, including vehicles and equipment whose serviceable life is expired, fully eroded and ready to be written off; application for state registration of real estate mortgage; application for certificates confirming origin country of products; application for a certificate of quality confirming the quality and safety of food products exported; application for confirmation code numbers to production and processing enterprises engaged in export of food products to EU countries; application for a reference on addresses of real estate facilities; application for a reference on tax debt; application for annulment of notice on deduction for real estate mortgage; application for cancellation of state registration of servitude; application for compiling of technical documents (passport and plan size) on real estate; application for concluding "Tax Partnership Agreement"; application for extracts on real estate; application for issuance of extract from personal account sheet; application for provision of information from real estate state register; application for reconciliation acts; application for registration of grant agreements in respect of commercial legal entities; application for registration of notice on direction of deduction for real estate mortgage groups. A complete list of the services provided electronically may be found here: https://www.dxr.az/elektron-formada-gosterilen-xidmetler

[86] Access to this system is possible through the ASAN Login system using the ASAN electronic signature. Entrepreneurs interested to participate in e-procurement activities pay a participation fee through the ASAN payment system integrated in the e-procurement portal and then they receive the terms and condition of the competition. They can submit all required documents, including technical and financial information documentation through the e-procurement portal.

[87] http://www.e-taxes.gov.az

Most public services are offered for free. A service fee may be charged for some, according to legislation provisions but it cannot exceed a small amount. Some services require the use of e-signature. Citizens need to obtain one from the e-signature provider at a cost of US$ 1.5 per month approximately.

Georgia

Two types of public services are delivered electronically. Informational and transactional services. The number of public services currently provided electronically are approximately 700.[88] Two million instances of these services were delivered electronically in the past year. However, the tendency to obtain public service in the Public Service Halls is still prevalent among the population, considered more comfortable by most citizens, as they do not trust the electronic version. Some electronic services do not have adequate user-experience (UX) design rendering them unattractive to use.

Digital services are currently delivered through the web portal My.Gov.ge, however work is on-going on the mobile applications, that will include all electronically delivered services, as long as the mobile ID system is in place that would allow for transactional services through the use of SMS that provide information for authentication and authorisation purposes.

Citizen satisfaction of the digitally provided public services is measured through surveys. A recent survey indicated that users do think that the service portal is user-friendly, and easily navigated, and technically stable. No surveys exist that explore the reasons why other citizens do not use electronic services, but they prefer to visit the Public Service Halls. On the other hand, no citizen feedback system exists, except by sending an email to My.Gov.ge.

The digitalisation process would improve if there were no ten- or twenty-year strategies, as for such periods is difficult to make projections and predictions, given the uncertainty that surrounds us. It may be better to have thematic goals, such as creating an ID system that could be accomplished effectively in a relatively short period of time; creating an open data system; putting an interoperability framework in place; or making digital service delivery portals as user-friendly as possible.

The digitalisation process would also improve if the mandates of government organisations involved in digitalisation do not overlap in any way, making it clear who is responsible for policy, who does the legal work and who takes care of technical issues. Or who is a service delivery agency, and who a service development entity. Furthermore, any mandate for the digitalisation transformation should not be at the ministry level but it should be universal across government organisations. Such a function should rest with the Government that would enforce adherence to digitalisation initiatives across the whole administration.

Kazakhstan

Public services provided to business electronically are included in the Register of Public Services.[89] They include services such as opening and running a business, property registration, tax services, e-procurement, issuance of certificates and personal documents, tax services, etc. 690 public services are currently included in the updated Register, of which more than 90 per cent are provided in electronic format through a State Corporation established for the purpose.

[88] This large number is an outcome of the drive to provide as many digital services as possible because of the COVID19 pandemic, since the Spring of 2020. The number originally planned to be delivered electronically was between 350-500 services by the end of 2020.
[89] https://adilet.zan.kz/rus/docs/V2000019982#z14

From January to July 2021 the portal "E-gov" received 30 million requests for services (over 52 million in 2020 services). As of July 2021, more than 12 million users have been registered on the portal. The State Corporation also operates 334 Public Service Centres (PSC), through which more than 11.1 million individuals received public services, e.g. driver licenses, registration/de-registration of vehicles, etc. Furthermore, the Mobile Data Centres reaching residents of remote rural settlements carries out 4,500 visits and accepted more than 120,000 applications between January and July 2021. Moreover, more than 5,000 certificates were issued though Public Access Points in the first seven months of 2021. In order to ensure accessibility for people with disabilities to receive public services more than 28,500 visits were made and provided 28,000 services to people with disabilities.

Kyrgyzstan

132 public services have been transferred to electronic format (21.3 per cent of the total) and including more than 10 to be digital. Examples are insurance premium accruals accounts (for the entire period of individuals' employment period); national passport state registry (information about the status of readiness new passports), patents (information provided on issued patents), issuance of certificates (e.g. birth certificates), tax arrears, checking fines, paying taxes, vehicle registration, etc. Fourteen of these services are provided to business entities. Examples are Extracts for the Unified State Register of Legal Entities, and certificates on bankruptcy of business entities.[90] The main channel for public service provision is the "Tunduk" public services website and its mobile application.

Public Service Centres also exist. They provide accounting and registration services, as well as 4 certificates about estates, acceptance of applications for the provision of a certificate of absence of a criminal record, etc.

As far as the cost is concerned, there is no differentiation in the price for obtaining the services in electronic format or through the traditional channels of delivery. An attempt is currently underway to provide some incentives for obtaining services electronically.

Tajikistan

"Single window" service centres are in operation, where entrepreneurs can register their business. There are also one-stop-shops that provide other government services electronically.

Apparently, about 20 per cent of government services are digitalised, e.g. obtaining an industrial licence, payment of all public services, payment of taxes and public utility bills, etc. However, all such transactions are performed through banking applications, with the exception of obtaining a license which is done through a separate application operated by the Ministry of Industry and New Technologies.[91]

A separate website has been developed, by the Ministry of Industry and New Technologies of the Republic of Tajikistan, and the entities responsible for energy and water resources, where users after registration, can log into their personal accounts and obtain the appropriate licenses on-line, as well as for the service on-line.

Other ministries and departments are actively working on the digitalisation of their services.

[90] In 2023, an electronic queue system will be introduced for obtaining land for the construction of houses.
[91] One can upload all required documents via email and then receive the license.

Uzbekistan

More than 300 electronic services are provided on the Single Portal of Interactive Public Services – My.Gov.uz – out of a total of 705 public services (44 per cent of the total). A mobile application of the Single Portal is also operational providing more than 100 services. All public services are also available at the Public Service Centres that exist throughout the country,[92] and at Post Offices.[93]

Tax services, procurement for business and administrative procedures are provided electronically. The newly created Agency of Public Services is mandated with the implementation of a unified state policy in public service delivery to business entities and to individuals. Some services provided digitally are application for a benefit; application for replacement of a lost driver license; application for child placement in pre-school educational institution, etc.[94]

In 2021, more than 16.4 million instances of public services were accepted through the Single Portal, of which 9.2 million (56 per cent) were in electronic format. Obtaining services electronically costs 10 per cent less than through physical presence at the service providers' premises. This discount goes up to 50 per cent for people with disabilities and those who receive social protection benefits.

The Single Portal provides for a feedback mechanism for measuring citizens' evaluation of services obtained, as well as for providing suggestions for improving electronic public service delivery.

[92] https://dxa.gov.uz
[93] https://postal.gov.uz
[94] For a full list of electronic services offered see https://my.gov.uz/ru/all-services.

10. Government adoption of emerging technologies

Armenia

It has adopted the Digitalisation Strategy 2021-2025 aimed at carrying out digitalisation of public services. It is considered an integral part of the country's public administration reform strategy. The Strategy's objectives are the development of digital infrastructure, digitalisation and automation of business processes, the creation of a National Cybersecurity Centre, the development and implementation of data processing policies, the development of legislation related to digitalisation and the development of digital skills among the population.

Azerbaijan

The hanging DNS (Digital Nerve Network System) was completed successfully by the SAPSSI. It brought all corporate data into a single data house and sharing it with the relevant government organisation department for analysis. There are, however, some projects going for experimental purposes that incorporate various technological trends. For instance, the ASAN BOT using artificial intelligence has been developed. Citizens can get the necessary services through artificial intelligence with the help of ASAN BOT.[95] In addition, various algorithms supported by artificial intelligence are used to verify disability decisions made by the Ministry of Labour and Social Protection. Furthermore, a blockchain project has been launched at the central bank. The project is currently in the testing phase. It is expected to come into effect soon. Moreover, plans are made to use internet of things in smart city projects; the project is at the concept creation phase.

Another artificial intelligence project launched is the ASAN Bridge. It is an integrated module of the e-Government Information Systems (EHIS) that coordinates government information resources and systems, and it ensures a stable and secure exchange of information between those resources and systems.

Established in 2018, the E-Gov Development Centre has well grasped the potential of these tools and invested in human capital to foster the development of expertise in the mentioned disciplines. Currently, the Centre focuses on applying Machine Learning and Data Science technologies in ASAN visa and ASAN pay systems, ASAN Login (AI-based video registration) as well as automating ASAN Question Answering component. For these purposes, a team of data analysts, machine learning engineers and developers work on building Natural Language Processing (NLP) instruments as well as a wide range of statistical learning models.[96] Furthermore, the ASAN Innovative Development Centre has been established, on the initiative of the State Agency, to make a positive contribution to improving the professional level of

[95] The ASAN BOT aims at providing citizens with the needed information about government services and assisting them in finding such information. Availability of automated bots to respond citizens' requests has a significant potential to make the process of question answering operative and effective. This technology can parallelize the process of answering the requests and make it easier for citizens to obtain specific pieces of information. One of the products the institution is working on is on this direction. The process of automating question answering is not an easy task in itself and involves several NLP tasks such as understanding and generating natural language, building, and searching a knowledge base and machine reasoning. Different approaches are researched and taken to realise the project. The project also helps lay the foundations for NLP research for the Azerbaijani language.

[96] An application of Machine Learning and NLP techniques in the ASAN visa system is the use of sentiment analysis, a process of identifying emotions and attitudes from textual data. The widespread use of social media and the increasing use of electronic surveys for assessing the quality of services has led to the significant increase in the amount of textual data. Collecting survey data in textual format allows users to express their opinions, and at the same time to describe particular aspects of services with which they are satisfied or dissatisfied in more detail using wide capabilities of the natural language. Natural language is optimal for expressing opinion and feelings. However, its analysis and extracting useful information from it requires sophisticated approaches and natural language processing expertise.

personnel in various private and public bodies in our country by applying advanced ASAN experience, innovative and new training methods.

On 1 May 2019 the opening ceremony of the Internet of Things laboratory took place at the Information and Communication Technologies Applying and Training Centre of the Ministry of Transport, Communications and High Technologies. The laboratory helps to increase the staff potential of young specialists in the field of innovation. The laboratory will be able to develop various solutions and real prototypes in the field of Internet of Things.

Big data analytics are mainly used in the field of Telecom for prediction and fraud detection.

Georgia

The Digital Government Agency has been included to the EU Commission working group which will work on the National AI Strategy, including blockchain technologies.

Kazakhstan

To date, various projects using advanced technologies are being implemented by central state and local executive bodies in pursuance of the goals in the National Project for the Technological Breakthrough as of those in the Concept for the Development of Information and Communications Technologies.

Internet of Things is used on online oil control meters. In the field of healthcare, a PPP project is being implemented using AI to detect oncological ailments and covid induced pneumonia symptoms. In the field of public service provision, machine learning technology is used in the following services: issuance and withdrawal of registration certificates, acceptance of tax returns, suspension / resumption of tax reporting, generation of citizen credit reports by state revenue bodies, tax refunds, and payments of fines.

In the area of bid data use, the Smart Data Ukimet information and analytical system has been implemented, aimed at creating a single space of big data obtained from various sources with the purpose of providing analytical information on the activities of the Government of the Republic of Kazakhstan in the form of tables, graphs, and visual panels, performing variant forecast calculations of indicators, developing a set of scenario forecasting models. Fifty eight information systems from various government organisations contribute to the big data analysis system.[97] In several cases the accuracy of forecasting and risk management has improved. The use of the Smart Data Ukimet has also reduced the workload of government agencies and the government in this respect. The system is also used for analysing social benefits payments to the deceased revealing certain shortcomings in the process of registering social benefits payments and resulting to further reengineering of processes. The expected effect of this reengineering of the process of accruals of social payments is estimated at KZT 1.5 billion gain over 5 years. These projects are implemented by sectoral ministries and local executive bodies.

In 2018, the Government launched the international techno-park of IT start-ups, the Astana Hub. Today, the Astana Hub is one of the most dynamically developing IT technology parks in Central Asia. Since its launch, 558 star-ups have undergone acceleration and incubation programmes, 620 Kazakhstani and foreign IT companies have received the official status as

[97] Among these are the Ministries of Digital Development, Innovations and Aerospace Industry; Finance; Education and Science; Justice; Ecology, Geology and Natural Resources, Labour and Social Protection, Industry, and Infrastructure Development; National Economy; Foreign Affairs; and Agriculture. In addition, the Agency for Strategic Planning and Reforms, and the Almaty Akimat.

Astana Hub resident – enjoying zero tax privileges, i.e. income, VAT, etc, effectively allowing them to reinvest savings in further developing their projects.[98]

At the end of 2021, the Astana Hub received the status of Anchor Partner of the word famous innovative Plug and Play platforms. This collaboration allows the Astana Hub to bring disruptive global technologies to satisfy the needs and requirements of local corporations and government organisations. In turn, Kazakhstani start-ups have the opportunity to work with Plug and Play partners around the world.

New industry centres are planned to be launched in 2022 such as Metaverse, 5G, Decentralised Finance (De-Fi), Gov Tech and Space Tech to develop innovative products, services and technologies by providing access to specialised equipment, industry expertise, and other resources.

Kyrgyzstan

From 2021, proactive public service – e-notification system, smart city.

Tajikistan

The National Strategy for Artificial Intelligence of the Republic of Tajikistan aims at creating the foundations for turning the country into an “AI Nation”, in which AI technologies improve the lives of the population everywhere. This vision implies the launch of a full-fledged AI Industry as an innovative sector of the country’s economy by 2026.

The country already has an artificial intelligence laboratory that develops and trains specialists in the field of AI. Higher education institutions have begun training in AI with approved plans to create AI departments and faculties. Machine learning technologies have already been introduced in the country’s financial sector, where they increase the financial inclusiveness of the population through access to credit for citizens without a credit history.

Uzbekistan

The strategy document “Digital Uzbekistan 2030” outlines over 220 priority projects that have begun to improve the e-government system, to further develop the domestic market of software products and information technologies, to create IT parks in all regions and staff them with qualified personnel. In addition, the Programme "Digital Tashkent" is being implemented, which provides for the launch of a geoportal integrated with more than 40 information systems, the creation of an information system for managing public transport and communal infrastructure, and the digitalisation of public services in the social sphere. Subsequently, this experience will be replicated in the regions.

[98] Astana Hub residents have raised USD 271.28 million in funding, have saved USD 34.7 million through tax incentives, and generated USD 550 million of income.

11. Indices scores

I. E-GOVERNMENT DEVELOPMENT INDEX (EGDI)[99]

Country	2010	2012	2014	2016	2018	2020
Armenia	0.4025	0.4997	0.5897	0.5179	0.5944	0.7136
Azerbaijan	0.4571	0.4984	0.5472	0.6274	0.6574	0.7100
Georgia	0.4248	0.5563	0.6047	0.6108	0.6893	0.7174
Kazakhstan	0.5578	0.6844	0.7283	0.7250	0.7597	0.8375
Kyrgyzstan	0.4417	0.4879	0.4657	0.4969	0.5835	0.6749
Tajikistan	0.3477	0.4069	0.3395	0.3366	0.4220	0.4649
Uzbekistan	0.4498	0.5099	0.4695	0.5434	0.6207	0.6665
World average	*0.4178*	*0.4882*	*0.4712*	*0.4922*	*0.5491*	*0.5988*
Highest value[100]	*0.8785*	*0.9283*	*0.9462*	*0.9193*	*0.9150*	*0.9758*

The e-government development index is a composite index based on the weighted average of three normalised indices.[101] As a composite indicator, the EGDI is used to measure the readiness and capacity of national institutions to use ICT to deliver public services. This measure is useful for government officials, policy makers, researchers and representatives of civil society and the private sector to gain a deeper understanding of the relative position of a country in utilising e-government for the delivery of public services. All seven participating countries display scores above the world average with the exception of Tajikistan. However, they are all still far behind the leaders in the field with the exception of Kazakhstan.

II. E-PARTICIPATION INDEX

Country	2010	2012	2014	2016	2018	2020
Armenia	0.0428	0.0000	0.5294	0.5254	0.5674	0.7500
Azerbaijan	0.1714	0.1316	0.4313	0.6779	0.6798	0.6905
Georgia	0.0571	0.2105	0.5883	0.5593	0.6236	0.6429
Kazakhstan	0.5571	0.9474	0.7647	0.5932	0.8371	0.8810
Kyrgyzstan	0.4285	0.2895	0.4117	0.5932	0.6854	0.7143
Tajikistan	0.0285	0.0000	0.1176	0.2033	0.3876	0.3452
Uzbekistan	0.3143	0.2368	0.4706	0.6780	0.7584	0.8095
World average	*0.1899*	*0.2250*	*0.3947*	*0.4625*	*0.5654*	*0.5677*
Highest value[102]	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*	*1.0000*

[99] The EGDI is not designed to capture e-government development in an absolute sense; rather, it aims to give a performance rating of national governments relative to one another. https://publicadministration.un.org/egovkb/en-us/About/Overview/-E-Government-Development-Index

[100] The highest values in the e-government development index were achieved by Korea in 2010, 2012, and 2014; by the UK in 2016, and by Denmark in 2018 and 2020.

[101] One third is derived from the Telecommunications Infrastructure Index (TII) as a measure of countries' telecommunication infrastructure readiness to adopt opportunities offered by ICT to enhance their competitiveness. Another third is derived from the Human Capital Index (HCI) based on data provided by UNESCO and the other third from the Online Service Index (OSI) based on data collected from an independent Online Service questionnaire (OSQ) conducted by UNDESA. The survey assesses features related to online service delivery, including whole-of-government approaches, open government data, e-participation, multi-channel service delivery, mobile services, usage uptake and digital divides, as well as innovative partnerships through the use of ICT.

[102] The highest values in the e-participation index were achieved by Korea in 2010, by the Netherlands in 2012 and 2014, by the UK in 2016, by Denmark in 2018, and by Estonia in 2020.

The e-participation index is the result of an assessment of e-participation on the three components: (i) provision of information – whereby the government provides information to people; (ii) consultation – whereby the government consults individuals on policy and on service delivery at different stages of the process and provides feedback; and (iii) decision-making – whereby the government involves people in the decision-making process.

The seven participating countries score above the world average with the exception of Tajikistan, but they are still far from the leading countries, with the exception of Kazakhstan.

III. OPEN DATA BAROMETER INDEX[103]

Country	2013	2014	2015	2016
Georgia			16.79	37.44
Kazakhstan	27.61	25.87	20.09	26.10
Kyrgyzstan				13.24
Tajikistan				9.70
Korea	*54.21*	*57.65*	*71.19*	*81.16*

The Open Data Barometer is a global measure of how governments are publishing and using open data for accountability, innovation, and social impact. Data exist for only four of the seven participating countries and for those that data exist do not cover all years, as these countries were not part of the open data barometer until recently. **In Armenia**, Open Data policy is currently under development. In **Azerbaijan,** technical standards and approaches have been established to fill legal gaps in the open data policy area and are submitted to the Government for approval. Azerbaijan plans to be included in the open data barometer index in 2022. **In Kazakhstan**, an open data portal has been developed. The portal currently contains 125 data sets, provided by 12 pilot state agencies.

IV. GLOBAL INNOVATION INDEX[104]

Country	2021
Armenia	31.4
Azerbaijan	28.4
Georgia	32.4
Kazakhstan	28.6
Kyrgyzstan	24.5
Tajikistan	239
Uzbekistan	27.4

China	*54.8*
Estonia	*49.9*
Finland	*58.4*
Korea	*59.3*
Russia	*36.6*
Singapore	*57.8*

The Global Innovation Index 2021 captures the innovation ecosystem performance of 132 economies and tracks the most recent global innovation trends utilising 81 different indicators.[105] All seven participating countries do not fare well on this index especially when compared to such advanced countries as Estonia, Finland, Korea, and Singapore.

[103] A global measure of how governments are publishing and using open data for accountability, innovation, and social impact. https://opendatabarometer.org/
[104] Developed by Cornell University, INSEAD, and WIPO (World Intellectual Property Organisation), a specialised agency of the United Nations. https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2021.pdf
[105] The Index relies on a wide set of indicators to measure the innovation performance of economies as no single indicator captures the full spectrum of innovation performance from idea to inception to impact. Thus, the Global Innovation Index looks at a variety of data points covering three broad stages of innovation; science and innovation investments, technological progress, and socio-economic impact.

V. DIGITAL ADOPTION INDEX (DAI)[106]

Country	overall DAI		Business		People		Government	
	2014	2016	2014	2016	2014	2016	2014	2016
Armenia	0.6076	0.6217	0.6765	0.7142	0.4119	0.4788	0.7344	0.6721
Azerbaijan	0.5500	0.5942	0.4748	0.5087	0.5069	0.5227	0.6684	0.7511
Georgia	0.5636	0.5988	0.6249	0.6422	0.4092	0.4842	0.6569	0.6700
Kazakhstan	0.6343	0.6708	0.5371	0.5999	0.5330	0.5731	0.8327	0.8394
Kyrgyzstan	0.4273	0.4989	0.4878	0.6091	0.3060	0.3487	0.4882	0.5388
Tajikistan	0.2858	0.3233	0.3805	0.4167	0.1967	0.2362	0.2803	0.3170
Uzbekistan	0.3089	0.4012	0.2569	0.3587	0.2184	0.3134	0.4515	0.5313
Estonia	*0.7674*	*0.8331*	*0.7556*	*0.8465*	*0.7339*	*0.8001*	*0.8128*	*0.8527*
Finland	*0.7900*	*0.8069*	*0.9170*	*0.9226*	*0.8421*	*0.8305*	*0.6109*	*0.6677*
Korea	*0.8417*	*0.8578*	*0.7354*	*0.7504*	*0.7976*	*0.8424*	*0.9921*	*0.9807*

The Digital Adoption Index covers 180 countries on a 0–1 scale and it emphasises the "supply-side" of digital adoption to maximise coverage. The overall index score is the simple average of three sub-indices. Each sub-index comprises technologies necessary for the respective agent to promote development in the digital era, increasing productivity and accelerating broad-based growth for business, expanding opportunities, and improving welfare for people, and increasing the efficiency and accountability of service delivery for government. By measuring the relative adoption of digital technologies, it can assist policymakers in designing a digital strategy with tailored policies to promote digital adoption across different user groups.

VI. GOV TECH MATURITY INDEX (GTMI)

Gov Tech is a whole-of-government approach to public sector modernisation that promotes simple, efficient, and transparent government, with citizens at the centre of reforms.

The Gov Tech Maturity Index is a composite index based on 48 key indicators in four main categories: (i) Core Government Systems Index (CGSI); (ii) Public Service Delivery Index (PSDI); (iii) Citizen Engagement Index (CEI); and (iv) Gov Tech Enablers Index (GTEI). The latter measures the presence of several cross-cutting enablers relevant to advancing Gov Tech. The Gov Tech Maturity Index (GTMI) measures the key aspects of four Gov Tech focus areas—supporting core government systems, enhancing service delivery, mainstreaming citizen engagement, and fostering Gov Tech enablers.[107] The table below shows where participating countries stand in this Index vis-à-vis the most advanced countries in this area.

Country	Group	*Legend*	*No of countries*

[106] The Digital Adoption Index (DAI) is a worldwide index that measures countries' digital adoption across three dimensions of the economy: people, government, and business.
https://documents1.worldbank.org/curated/en/896971468194972881/pdf/102725-PUB-Replacement-PUBLIC.pdf
[107] https://openknowledge.worldbank.org/handle/10986/36233

	A	B	C
Armenia		√	
Azerbaijan		√	
Georgia		√	
Kazakhstan		√	
Kyrgyzstan		√	
Tajikistan			√
Uzbekistan		√	
Estonia	√		
Finland	√		
Korea	√		
Singapore	√		

Group A – Very high GTMI, Gov Tech leader	*43*
Group B – High GTMI, significant focus on Gov Tech	*59*
Group C – Medium GTMI, some focus on Gov Tech	*63*
Group D – Low GTMI, minimal focus on Gov Tech	*33*
TOTAL	*188*

12. Participation in development programmes sponsored by the Republic of Korea

Only four of the participating countries are involved with development programmes sponsored by the Republic of Korea.

Azerbaijan

It participates in several development programmes sponsored by KOICA. The SAPSSI has collaborated with experts from South Korea within the framework of the World Friends Korea Programme in the past years. In addition, KOICA has contributed to the realisation of some local digitalisation projects at various times.

Kazakhstan

The JSC ZERDE and the National Information Society Agency of the Republic of Korea are cooperating, since 2019, on the functioning of the Korea-Kazakhstan Information Technology Cooperation Centre (ITCC).

Kyrgyzstan

Several projects are implemented in the area of national security and information security with the Republic of Korea.

Uzbekistan

It cooperates with the Republic of Korea in the field of ICT development and implementation.

E. Key findings in digital government development

This final section summarises the information along the various thematic areas utilising the country responses obtained. It is a first assessment of the overall situation to grasp where the countries stand along the various dimensions and components of their digital transformation journeys, they have embarked on.

1. National Development Priorities

Overall, national development policies place an emphasis on encouraging adoption of innovation in government operations and in the provision of public services through differentiated channels of delivery. In several cases, digitalisation seems to be an integral part of the national mid- and long-term policy priorities. This is manifested through the existence of strategy and action plans documents clearly delineating the countries' goals for digitalisation of government operations and public service delivery. However, in some cases, although the intention is real, some of the initiatives contained in these strategic documents remain at a declarative stage. In some other cases, innovation and digitalisation are considered as important policy issues to be pursued, but they do not seem to be at the top of the policy agenda, at least not yet as relevant strategic documents are still in the preparation stage. However, substantial efforts are still being made to gradually digitalise public services and introduce innovation practices in government operations. In some other countries, digitalisation is at a nascent state, but plans for eventual digitalisation seem to be moving forward fast.

As far as financing of these priority areas is concerned, funds have been secured on the medium-term in one country. The remaining countries finance digitalisation initiatives through the state budget as they become a priority, effectively not having budgetary funds specifically marked for digitalisation. In some cases there is no funding available, where in this case digitalisation initiatives' implementation relies on funds provided by international development organisations.

As countries have different priorities and they happen to be at different stages of development of their digitalisation transformation process, a wide variation exists in the projects that are currently at the stage of implementation. The primary goal for all seven countries is to digitalise as many public services as possible and provide them through a multitude of delivery channels, such as through web or mobile applications, making public services available through a common interface.

As expected, the overwhelming majority of digitalisation projects focus on digitalisation of public services, followed by projects in numerous other areas that are either prerequisites to full digitalisation of public services provided through differentiated channels of delivery, e.g. internet connectivity, data centres, electronic ID systems, digital signature systems, information security systems, standards frameworks, mobile applications, etc or projects that focus on innovation, e.g. accelerator labs, artificial intelligence applications, etc.

Several projects are also under implementation focusing on electronic document management systems aimed at automation of government operations, along with others that focus on big data analysis and AI. In addition, in some countries major infrastructure projects focusing on improving and widening internet connectivity are under implementation.

2. ICT Governance

Several of the participating countries have established and/or assigned government agencies that perform various functions related to digital innovation. Some are dedicated to the purpose and others are assigned the function of coordinating and overseeing innovation and digitalisation policy implementation. This is important issue as in principle the leadership

organisation and its position in the hierarchy of the government administration play a crucial role in digital transformation.

Six out of the seven countries have established dedicated organisations to coordinate digitalisation policy formulation and implementation. In most cases they are agencies under a Ministry, in another case they are state companies created for the purpose. In some cases, they are answerable to a ministry and in other cases to the President's Executive Office or the Office of the Prime Minister as well. More often than not such organisations are responsible for formulation and implementation of policies intended to modernise the telecommunications infrastructure in facilitating the expansion of digital services; as well as for developing the digital skills among the population aimed at improving digital literacy levels. However, it is not clear whether these organisations are entirely responsible for the overall digital policy of their respective countries as other governance entities are also involved in this task.

3. Availability of CIO and ICT technical staff experts

In most, if not all seven countries, an overall deficit of technical experts exists, as most IT specialists prefer to work in the private sector where compensation is higher. Overall, it is difficult for the public sector to attract and retain experienced individuals specialising in IT matters due to non-competitive compensation packages offered.

There are no specific Chief Information Officer (CIO) positions designated in government organisations in the seven participating countries as such. However, there are other positions that have assumed such roles. More often than not they are the heads of IT departments in government organisations, who assume the functions related to such a position. In one country, the role of the Chief Digital Officer is assigned to Vice Ministers. In other cases, the relevant responsibilities are assigned to a high-official dealing with ICT issues in a government organisation. In another country, IT director positions were recently authorised in government agencies, who will presumably assume the role of CIOs.

Some government entities have special departments responsible for cybersecurity, others have a cybersecurity division in their IT departments. Managers of these divisions assume the functions and tasks related to cybersecurity.

4. ICT Education and Training and Capacity Evaluation for Government Staff

Overall, training on digitalisation and ICT and other capacity building programmes are provided to government personnel in all seven participating countries, although such training is not mandatory and not institutionalised yet. In other words, it is not yet offered on a regular and periodic basis to all civil servants as part of their training plan.

Although a growth in the ICT related education and training activities is noted across these countries, there is still an evident lack of in-service training for government personnel on digitalisation and ICT functions and processes. This is also due to the perception held by the majority of government employees that the digital transformation process is the responsibility of ICT departments solely. Thus far IT related training courses primarily target civil servants working in ICT related functions and secondarily all others.

In general, government institutions are free to organise training activities for their personnel at their own initiative. Thus, ICT education and training activities are carried out independently by each government organisation and there is no central budget funds allocated specifically for digitalisation-related training, but for training in general. Furthermore, the absolute majority of government organisations in the seven countries encourage their staff to participate in specialised IT and digitalisation trainings that lead to certification, and more often than not cover associated expenses through their budgets. Invariably, government organisations often

utilise training initiatives offered by international organisations to organise various training events related to digitalisation and relevant issues implemented by the international organisations (UNDP, GIZ, USAID, etc).

Numerous training programmes are implemented across the seven countries that aim at increasing the digital literacy of public servants, a crucial issue as on average 50 to 60 per cent of public servants do not know the basics. There are also courses that aim to acquaint civil servants with relevant legislative aspects of digitalisation and e-government, as well as information security, and how to work with digital tools in improving their work efficiency, or courses that explain the goals of digitalisation and its expected outcomes, etc. Moreover, there are courses on IT project management, and analysis of ICT focused projects.

Programmes are also launched and aimed at raising the digital literacy levels of the population at large. In some cases, such programmes include the revision of curricula at all levels of education (pre-school, primary, secondary, higher, and vocational levels) to incorporate digital competencies.

There are no central and/or dedicated organisations which are responsible for planning, delivering, and evaluating trainings offered. This role is usually assumed by the Ministry responsible for digitalisation and the Academies of Public Administration.

Some higher education institutions offer training to civil servants to improve their qualifications and competencies on digitalisation and ICT management. Some international organisations also provide such opportunities, e.g. JICA, G-Asia, etc. Some attempts are noted in establishing higher education institutions to train ICT specialists.

There are no statistics available about the completion rate of ICT education and training programmes in government organisations in any of the participating countries, according to the responses received.

5. Legal framework

All participating countries have enacted legislation on digitalisation and electronic government to a higher or lesser extent (see also Appendix 5). According to a World Economic Forum survey (2019),[108] Armenia and Kazakhstan seem to have the most flexible legislative bases.[109]

In general, the legislative framework on digitalisation matters is adequate in most areas that any of these countries are focusing on. In several cases, legislation is lagging behind current reality, either because various issued arise during implementation or because no firm decisions are made on time on which way to go with some functions and processes related to the digitalisation transformation process. Nevertheless, the legal framework seems to be getting regularly updated, in most cases and it is thus enhanced with new requirements.

Legislation covers the following topics: interoperability, personal data protection, electronic document exchange management, certification, validation, open data, access to information, information security, cybersecurity, digital financial transactions, digital signature, etc.

6. Existence of Technical Standards related to Digitalisation

Broadband internet coverage is rather low in all countries varying from 1 to 25 per cent per 100 inhabitants. Conversely, mobile telephony subscriptions are above 100 per cent with respect to the countries' population, effectively allowing for rather wide mobile internet

[108] https://eabr.org/upload/iblock/551/EABR_Digital_Potential_06_2019.pdf
[109] In the case of Armenia, this is due to the relatively rapid growth of innovative companies, the development of which is largely facilitated by the Armenian Diaspora living in industrially developed countries.

coverage. Internet use by the population of these countries is over 50 per cent of the population, ranging from 52 to 80 percent in five of the seven countries in 2020.

Based on these data (Appendix 6), it is evident that a considerable digital divide exists with respect to internet access, a prerequisite for the provision and subsequent use of digital public services. However, it is observed that increased investment is dedicated to the development of modern telecommunications infrastructure to improve disparity in service. As a result, broadband connectivity is growing, even though it is still fairly expensive, although the trend is for lower costs, primarily because of growing competition among providers.

There is a need for development of data centres infrastructure, considering at the same time cloud storage solutions. G-cloud data centres have been created in some cases, but in most cases data centres are fragmented spread across different government organisations that manage, operate, and maintain their own data centres. However, in these cases, data are exchanged securely across different government organisations' systems through various interoperability platforms introduced in several of the participating countries. Nevertheless, this state of affairs is not sufficient for today's levels of demand for digital processes and services. Furthermore, in most cases, data centres infrastructure needs to be upgraded.

In most cases, no security standards exist *per se,* adhering to international standards, and they need to be developed. In most of the participating countries standards are being developing in several critical areas, i.e. interoperability, process requirements, security requirements, technical reliability requirements, functional requirements, cybersecurity standards, mobile applications standards, etc; as well as standards for data storage and transmission, and integration with e-government information systems, and standards for electronic signatures and electronic document exchange management systems.

7. Network and cloud computing infrastructure

Mission critical data are stored on country-wide cloud infrastructure. Expansion of government-wide clouds are either under evaluation or under development in most of the participating countries. It seems that governments are interested in setting up centralised government cloud services to provide for better data management and security and to reduce operating costs.

However, a tendency exists that government organisations that carry out complex and elaborate operations, and store large volumes of personal data, i.e. tax and health related data have their own data centres.

8. Number and volume of public services provided digitally

All participating countries reported that a large number of public services is provided electronically. However, it is not clear whether all processes or some processes needed to complete provision of a public service are delivered electronically. It is also not clear whether public services provided electronically can be considered fully fledged digital public services.

Although clarifying such issues will allow for a better understanding of the extent to which public services and their provision are digitalised, this analysis treats the terms electronic and digital delivery of public services interchangeably. In other words, it does not make the distinction between electronic and digital, or whether a service is provided electronically or digitally, partially, or fully. However, it is assumed that such public services will eventually be provided digitally when various other necessary processes are completed in the near future.

For instance, it seems that in some of the countries tax services and public procurement procedures are fully digitalised, but it is not clear about other services. A selection of other public services provided electronically are cadastre services, licensing and registration of legal entities, electronic license applications, reviewing court decisions, notifying defendants of

procedural actions, auction system, marital status certificates verified by apostille, registry related certificates, i.e. birth, marriage, divorce, death, adoption, paternal recognition, etc. Furthermore, insurance premium accruals accounts (for the entire period of individuals' employment period); national passport state registry (information about the status of readiness new passports), patents (information provided on issued patents), issuance of certificates (e.g. birth certificates), tax arrears, checking fines, paying taxes, vehicle registration, extracts for the Unified State Register of Legal Entities, and certificates on bankruptcy of business entities, obtaining an industrial licence, payment of all public services, payment of taxes and public utility bills, etc. In most cases, all such transactions are performed through banking applications.

Other services are health services allowing for the application and registration for medical services, medication prescriptions, and to record doctor visits, as well as maintain electronic records of individuals' health history, census services, some social services that are fully digitalised (interested parties fill in the appropriate forms that contain sections of eligibility checklists; if one qualifies for a public service, e.g. a subsidy, then the appropriate amount is transferred to their bank account).

Electronic public services are delivered, in all cases, through a single [dedicated] e-government portal that provide public services electronically. In some cases, citizens can consent to the use of their personal data for receiving a public service requiring information from another government database. In addition, mobile applications are developed in some countries and in some others are still in the process of development and rollout. ID and verification systems need to be enhanced further to allow for public services being processed all the way. In some instances, mobile units go around the country reaching rural residents and provide them with public services needed.

E-verification systems of citizen identity and documentation have been introduced in some cases, in others they are currently being developed and will be implemented fairly soon. In one or two cases, such systems are still in a nascent state of development. SMS through mobile devices is often used as means of verification of identity in the course of transactions required to complete a public service process for delivery.

As far as the existence of integrated databases is concerned, work is on-going on streamlining and integrating government databases aiming to create unified registers of all databases that can be used by different government entities through an automated cross-control system.

No differentiation in service fees exists obtained electronically or through the traditional channels of delivery in general. Furthermore, in some cases, due to the lack of certification applications, citizens are required to pay for a third-party service that will authenticate them before they can complete an electronic transaction for receiving a public service.

Overall, electronic public service delivery systems are characterised by low usability. This is due to several factors mentioned here with no order of importance or significance. Electronic services are not usually accessible to people with disabilities. Furthermore, their delivery procedures do not follow the principles of universal design in their delivery process. In addition, public services users prefer to obtain a service in person in many cases, as they do not trust, or they are not accustomed to using electronic services. Raising the digital literacy levels of the population may improve the usability of electronic channels of delivery of public services.

Citizen satisfaction mechanisms and platforms are developed in some instances. More often than not citizens can lodge complaints or ask questions and pose queries. However, feedback mechanisms are not used much by citizens as feedback is provided by less than 5 per cent of

the users. In some cases, surveys are used to measure citizen satisfaction of the digitally provided services.

F. Improvement opportunities / Discussion points

Readiness level

In terms of readiness for digitalisation most of the participating countries are between the medium and high levels of readiness as political will is strong to a considerable extent and numerous thematic initiatives are included in national plans and strategic documents, without however, having secured financing in the medium-term for the implementation of envisioned initiatives in most cases. Hence, the structural status is at the medium level. In other words, in most of the seven participating countries, the digital strategy is defined, articulating ICT as a core competency, and the necessary legal framework is in place. However, securing mid- to long-term financing is still a challenge, along with putting in place a broad organisational alignment and adequate capacity development of human resources to achieve the desired and viable results.

Discussion points

In this context, it is worth exploring further by asking the following questions: (1) is the improvement direction aligned with the mid- and long-term development strategy? (2) are the resources and financing available for sustainable development? (3) are the necessary laws and regulatory framework in place to implement various initiatives? And (4) are such improvements going to contribute to the digital transformation of the seven participating countries as well as for each one separately?

Organisational alignment

In principle, the leader organisation and position in the hierarchy of the government structure are important factors in e-government and in the digital transformation process. Six of the participating countries have established dedicated agencies under a Ministry and/or have created specialised state companies. The overall leadership for digital transformation is vested at the Ministry level and with the President's Executive Office or the Prime Minister's Office.

In digital government, the leader organisation should be capacitated to balance optimisation and transformation objectives. It also requires an extensive communication strategy and change management protocols to promote the digital transformation process.

The roles and responsibilities of Chief Information Officers, Chief Technical Officers, and Chief Digital Officers are not clearly defined. The role of the Chief Information Officer is currently assumed by the heads of IT departments and the role of Chief Digital Officer is assigned to Vice Ministers or Deputy Heads of government organisations.

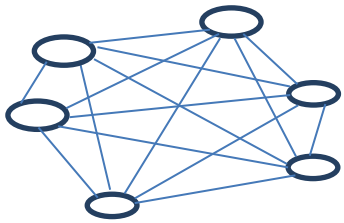
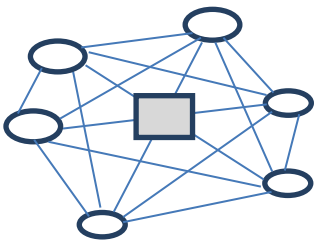
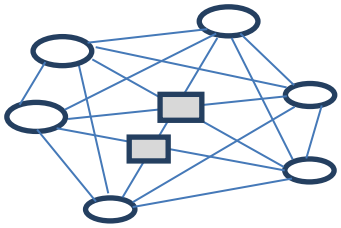
Discussion points

At the initial stages, traditional CIO/CTO structures are envisioned to consolidate the development for government-wide coordination. As e-government policy implementation matures and moves towards digital government, alignment between the CIOs and the respective departments needs to be strengthened.

The optimal digitalisation governance structure should be defined with a CIO as the leader. It is recommended that it should be a cross-functional organisation, not under a ministry. Government digital transformation teams should be led by a CIO who collaborates with organisational leaders to help guide digital business transformation efforts, strategies and digital capabilities and communicates mission and goals. Furthermore, the CIO, in collaboration with organisational leaders, identifies, creates, and builds new business models

that would provide strategic advantage to government administration. Thus, together, they can clarify the governance needs to shift to the new governance model, incorporating unique features of strategic initiatives and building consensus on the methodology to be followed. Then, the business team would streamline the business process to materialise digitalisation initiatives and deliver and communicate the benefits deriving from implementation. in turn, the technical teams should consist of application specialists, data and analytics personnel and infrastructure and operation personnel to integrate the processes.

Governance model describes three different types: a traditional centralised model in the middle for “medium” priority initiatives. However, as for the foundational e-Government systems, such as Civil Registry and e-NID, Geographical Information System and Land/Cadre/Real Estate management, vehicle registration, etc would require multi-phased, multi-stakeholder, and multi-lateral cooperation. Furthermore, digitalisation needs to be designed into the administrative processes. For the most critical thematic goals, it would be necessary to design co-ownership governance model in order to strengthen the business analysis, design, and refine capacity. In this governance model, joint leaders can change according to the subject matter expertise.

Digital Requirement	Governance type	Governance according to the strategic priority
Distributed Coordination Governance		As-is status of seven countries (Strategic priority is low)
Single-leadership Coordination Governance		Alternative 1 (To-be): led by the Digital transformation agency (Strategic priority is medium)
Multi-leadership Coordination Governance		Alternative 2 (To-be): led by the Digital Transformation agency and Ministry departments (Most critical Priority)

Capacity Building of Government Officers

One of the key challenges is the capacity building, directly stemming from the informatisation planning, development, and ICT implementation skills, as well as in the technical expertise, but indirectly it has to do with the change management to develop more advanced skills to conduct a policymaking using the digital method, tools, and techniques such as data analytics, etc.

Discussion Points

Core competency of government is to provide public services to citizens, by using digital tools, method, and techniques, etc. Digital capacity building is one of the most critical pillars in the national development strategy. However, it is not explicitly described in the various national strategy documents.[110]

Dedicated or non-dedicated organisations need to be responsible to plan, design, deliver, and evaluate associated training and reflect results in the corresponding performance indicators.

Overall, quality of training programmes is not at a sufficient level to contribute to raising the digital skills of public employees. Training programs need to focus on business transformation, instead of too technical terms, i.e. introduce business process re-engineering capacity, promote, design, and refine suggestions, reduce processing cycle time for public officers, reduce manual interactions for supporting documents, support external reporting and statistics, secure personal data, and privacy protection, etc. Furthermore, trainings on change management are required for the decision-makers, starting with top-level management.

G. Addendum

Following the completion of the regional conference several areas for capacity development activities were identified. Such areas have been grouped into clusters and presented below.

Group I: Promoting digitalisation in the seven participating countries

1. For practitioners to define digitalisation requirements, structuring them, and placing them into communication
   - Universal design processes – analysing services to be digitalised
   - Increasing operational efficiency through digitalisation
   - Integration of e-services developed independently and consolidation of core databases
2. Reuse of best practices or assets among the seven participating countries
   - Information and cybersecurity modalities and systems
   - Digital payment systems for obtaining public services
   - Citizen feedback platforms

Group II: Support immediate references for best practices originating from Korea

1. Expediting legal or policy-level flexibility
   - Digital government policy frameworks
   - Open data policy frameworks
   - Interoperability modalities
2. For CIOs and training programmes
   - Whole of government approaches for digitalisation
   - Change management programmes for e-government decision makers and top levels officials to understand the digital transformation processes

[110] Kazakhstan is the only country which has a notion of digital capacity building in the national development strategy. Kazakhstan 2050 Strategy covers education, economic matters, and human resource capacity development.

Appendix 1: On-line survey questionnaire

Section 1: National Development Priority	
No	**Question**
1.1	To what extent the national development policy prioritises initiatives that contribute to encouraging the adoption of innovative practices in government operations and in the provision of public services?
1.2	Are such initiatives among the top priorities of the country?
1.3	Is funding for such initiatives earmarked for mid- to long-term implementation?
Section 2: ICT governance	
2.1	Does a national organisation exist that regularly reviews the planning, execution and evaluation of development project that emphasise the use of innovation in government operations and the digitalisation of public services including their provision through differentiated channels of delivery?
2.2	Is there a dedicated organisation established to coordinate and oversee implementation of innovation and digitalisation policy?
2.3	Is there an inter-departmental entity in place that facilitates communication among different ministries and other government organisations that are involved in the execution and implementation of such development projects?
Section 3: Availability of CIO and ICT technical staff experts	
3.1	Are Chief Information Officers and Information and Communication Technology staff and/or experts present in each Ministry and/or other government organisations?
3.2	Are the responsibilities and roles of such individuals clearly defined?
Section 4: Availability of IC Education and Training and Capacity Evaluation for Government Staff	
4.1	To what extent, if any, ICT education and training programmes are conducted for all government employees?
4.2	Does an organisation exist that is responsible for ICT education and training for government employees or ICT education and training are conducted independently by each government entity?
4.3	What is the completion rate of ICT education and training programmes in each ministry and each of other government organisations associated with innovation and digitalisation policy implementation?
Section 5: Legal Framework	
5.1	Does legislation exist that regulates the introduction of innovation and digitalisation in government operations and public service delivery? *If yes, relevant legislation needs to be mentioned, and if possible, attached to this survey. Such legislation should include all relevant areas, e.g., e-government policy, public information sharing, cyber security, digital IDs and signatures, private protection, e-commerce, etc*
Section 6: Existence of Technical Standards related to Digitalisation	
6.1	Specify standards in existence if any. If such standards exist, then
6.2	Are they maintained by a designated standardisation agency?
6.3	Do interoperability, statistics classification, e-document, e-commerce technology, information security and other standards exist?
6.4	If yes, to what extent? *Please list them separately for each category*

Section 7: Digital Divide	
7.1	Does a central organisation exist to promote digital inclusion, to plan education educational programmes and to conduct trainings for citizens?
7.2	Are such programmes, if they exist, executed regularly?
7.3	What is the coverage of communication devices (e.g., computers, tablets, smart mobile phones) devoted to ICT education for citizens, as well as for public education?
Section 8: Network and cloud computing infrastructure	
8.1	What is the coverage rate of wired and wireless communication in the country?
8.2	What is the broadband coverage rate in the country?
8.3	What is the mobile subscription rate in the country?
8.4	What is the number of telephones – land and mobile – per thousand, number of internet connections per thousand in the country?
8.5	What is the average cost of telecommunication and internet services?
8.6	Where does government store mission-critical data on the nationwide cloud, if any or in local servers?
8.7	What types of government services are provided from the Government Cloud (G-Cloud) on-premises, if any?
Section 9: Number of public services provided digitally	
9.1	Business-related services (starting and maintaining a business, property registration, taxation services, e-procurement, etc)
9.2	Citizen-related services (provision of certificates, personal documents, taxation services, administrative procedures, etc
9.3	Do citizen-service offices exist? If yes, (4) what type of services they offer and what channels of delivery do they use?
Section 10: Government Adoption of Emerging Technologies	
10.1	How many government projects are initiated to adopt emerging technologies? Internet-of-Things (IoT), artificial intelligence (AI), Big Data Analytics, blockchain, etc?
Section 11: Indices Scores	
11.1	Please provide the e-government index score for the past five years
11.2	Please provide the open data barometer for the past five years
11.3	Please provide any other relevant indices scores for the past five years
Section 12: Involvement in International Development Projects on Innovation and Digitalisation	
12.1	Have any government organisations in your country participated in development programmes on innovation and digitalisation sponsored or implemented by the Republic of Korea, or any other country?
Comments:	
Please provide any additional information and any comments you may wish in this section of the survey questionnaire	

Appendix 2: In-depth interview questionnaire

National Development Priorities
– To what extent are digitalisation initiatives embedded in strategy and policy documents of the country? List such documents where digitalisation initiatives are included. – Are they an integral part of the national mid- and long-term policy priorities? – Have they been described as priorities in presidential speeches? – Has adequate financing been secured in the state budget for the mid-term at least? – What is the case for your country? – Provide some information to describe the current state of affairs in the previous areas. To what extent digitalisation initiatives have been implemented? What are the catalysts and obstacles in their implementation?
– What are the most important ICT related thematic initiatives that are considered a priority by the government? For example, sharing of public administrative information, digital service delivery, e-education, e-health, etc. – Which stage of development and implementation are they at? – On-time, delayed, postponed. Why? – Describe some of the initiatives that show continuity in their implementation and achievement of their priority targets? – Does proclamation of ICT as a priority area have an impact in the actual project planning and implementation?
ICT Governance
– Does the country have an organisational structure in place to support the thematic areas constituting a priority in the national development path of the country? – In other words, is there an entity – or entities – that are designated / mandated to oversee and coordinate the implementation of such initiatives? – If there are such structures, provide the rationale for their choice. In other words, why one was chosen over another? – At what level such structures are answerable to? To the President? Government? Minister? More than one Minister? – If no such structure(s) exist, how digitalisation policy formulation and implementation is coordinated? – Are organisational structures adequate for the purpose or do they need to be improved? If yes, in what way? – How is the collaboration with organisational structures and Ministerial ICT initiatives coordinated? Do these organisational structures have planned meetings with an agenda? Does any escalation process exist?
Availability of CIO and ICT technical staff experts
– Does the position of a Chief Technical Officer exist? – Does the position of a Chief Security Officer exist? – Does the position of a Chief Data Officer exist? – What is the role and responsibilities of each position? – Have roles and responsibilities been clarified clearly or are there overlaps causing confusion? – If there are no such positions, who assumes the respective responsibility in a government organisation? – Are ICT technical experts engaged in government organisations to assist and facilitate the digitalisation process?

Availability of ICT training and capacity building for government personnel
– Is training on digitalisation and ICT provided to government personnel? – Is such specialised training provided on a periodic basis or is it a one-off exercise? – Is it limited to ICT related departments and units personnel? Does it cover the whole of government personnel? – Is there a dedicated organisation(s) which are responsible for planning, delivering, and evaluating such training? – How is the training budget allocated? By each Ministry or consolidated to a dedicated organisation? – Have capacity development programmes been devised for the purpose? – What topics do they include? – If such training is provided, is it linked to career development? – If such training is provided, in what aspects do you think it should be improved? – If no such training is provided, explain why.
Legal Framework
– Does the country possess an adequate and appropriate legal framework to proceed with digitalisation operationalisation? – For instance, is there a legal framework in place that allows for exchange of information among government entities of a person's certain details to fulfil the requirements for the provision of a public service? In other words, not requiring a citizen to submit supporting documents, since these may be obtained through inter-governmental exchange of information. – Or, for instance, is there legal framework in place to support digital signatures to validate electronic documents? – Overall, is legal framework adequate to support the seamless operationalisation of digitalisation initiatives? In what areas do you think that it should be improved?
Existence of Infrastructure and Technical Standards related to Digitalisation
– Is the necessary infrastructure in place to support the digitalisation process? Adequate and sufficient internet connectivity? Network communication among government organisations? Data centres and databases that can communicate with each other. – Have standards frameworks been developed and operationalised? In what areas? In other words, are there interoperability standards in place? Security standards? privacy protection standards? other? – What kind of shared services are provided and how is the service-delivery monitored? (i.e. Government Integrated Data Centre (G-IDC) is under the Ministry responsible for telecommunications, and are all network and hardware services controlled by the Ministry responsible for Information and Communication Technologies? Or does each Ministry possess and control its own infrastructure?) – Is cybersecurity one of them?
Volume of public services provided digitally
– What is the volume of public services that are delivered digitally? – What are the services that are delivered digitally? – What is their number in proportion to the total number of public services available to citizens? – What channels are used for their delivery? Websites? Special applications? Mobile apps? SMS? – Are these services accessible by citizen or enterprises at an affordable price? – How is the satisfaction of citizens measured?

Appendix 3: List of on-line survey respondents

No	Affiliation	Country
1	Project Coordinator, Management Department, E-Governance Infrastructure Implementation Unit - CJSC	Armenia
2	Head of Department, Civil Service Office	Armenia
3	Head, Analysis and Project Development Department, Civil Service Office	Armenia
4	Rector, Academy of Public Administration	Armenia
5	Lecture, Academy of Public Administration	Armenia
6	Digital Transformation Expert, State Agency for Public Service and Social Innovation	Azerbaijan
7	E-Gov Project Manager, State Agency for Public Service and Social Innovation	Azerbaijan
8	Head, Strategic Research Division, State Agency for Public Service and Social Innovation	Azerbaijan
9	Senior Consultant, Strategic Development Department, State Examination Centre	Azerbaijan
10	Head, Partner Relations and Communications Department, E-Gov Development Centre	Azerbaijan
11	Associate Professor, Department of Economic and Business Administration, State University of Economics	Azerbaijan
12	Head, Digitalisation Department, Ministry of Healthcare	Kazakhstan
13	Vice Rector, Strategic Development, Research and International Partnerships, Academy of Public Administration	Kazakhstan
14	Director, Institute of Management, Academy of Public Administration	Kazakhstan
15	Executive Director, Graduate School of Public Policy, Nazarbayev University	Kazakhstan
16	Head, Human Resources Management Information Systems Department, State Personnel Service	Kyrgyzstan
17	Head of Department, State Agency for Local Government, and Interethnic Relations	Kyrgyzstan
18	Former Rector, Academy of Public Administration	Kyrgyzstan
19	Head, Department of Public Administration and National Economy, Academy of Public Administration	Tajikistan
20	Lead Inspector, Office of International Cooperation, Agency for the Development of Public Services	Uzbekistan
21	Chief Executive Officer, Smart Government	Uzbekistan

Appendix 4: List of in-depth interviews' respondents

No	Affiliation	Country
1	Director, E-Governance Infrastructure Implementation Agency (EKENG)	Armenia
2	Head, Project Management Department. EKENG	Armenia
3	Head, Digitalisation Department, Ministry of High-Tech Industry	Armenia
4	Digital transformation Expert	Azerbaijan
5	Deputy Head, Civil Service Bureau	Georgia
6	Deputy Chairman, National ICT Holding 'Zerde"	Kazakhstan
7	Executive Secretary, National ICT Holding "Zerde"	
8	Head, Department of International Cooperation and Training, State Agency for Civil Service Affairs and Local Self-Government	Kyrgyzstan
9	Chief Specialist, Ministry of Industry and New Technologies	Tajikistan
10	Director, State Institution "Centre for Digital Economy Research"	Uzbekistan

Appendix 5: List of legal documents by country

A list of legal documents defining and/or regulating digital governance follows. An effort has been made to provide a brief explanation what aspects of digital governance the legal instrument focuses on.

Armenia

- Law No ZR-11-N (23 September 2003) "On Freedom of Information". It provides the basis for open access to government information, including directives, decisions, and legislation.
- Law No ZR-40-N (14 December 2004) "On Electronic Document and Electronic Digital Signature". It regulates issues related to electronic documents and forms, as well as the use of electronic digital signature.[111]
- Law No ZR-176-N (24 August 2005) “On Electronic Communications”.[112]
- Law No ZR-172-N (4 May 2007) "On Public and Personal Notification via the Internet". It regulates the conditions and procedures for public notifications via the Internet on government programs, including electronic public procurement.
- Law No HO-49-N (13 June 2015) “On Protection of Personal Data”.
- Government Decree No 1104 (12 October 2012) "On approval of the implementation of the site e-gov.am" It marked the beginning of transparency of government activities, and it combined all available state electronic services within the framework of a "single window" on one site.
- Government Decree No 14 (10 April 2014) “Strategic Programme for the Development of E-Government 2014-2018”.
- Government Decision No 1093-N (31 August 2015) “On Prescribing the Security, Interoperability, and Technical General Requirements for the Electronic Systems used by State and Local Self Government Bodies for Electronic Service Provision and Operation”.
- Government Decree No N-183-L (11 February 2021) “Digitalisation Strategy of the Republic of Armenia 2021-2025”.[113]
- Government Resolution of the Government of the Republic of Armenia No 174-N (17 February 2011) "On Approval of the Procedure for Submitting and Providing Public Notices to the Person Responsible for the Website, Posting Public Notices on the Website and the Timing of Archiving Information, as well as on Approval of the Electronic format of Announcements Subject to Public Notification via the Internet".
- Government Resolution No 442-N (March 2014) "Strategic Programme of Long-term Development of the Republic of Armenia 2014-2025". It is worth noting that on the basis of this Strategic Programme, the E-Government Implementation Concept (2014) and the Anti-Corruption Strategy 2015-2018 were developed and approved.
- Government Protocol Decree No 11 (19 March 2014) “Concept of informatization of the activities of local self-government bodies and the development policy of the local information society”.
- State Programme for the Development of Education of the Republic of Armenia 2011-2015 (23 June 2011).

Azerbaijan

[111] https://www.arlis.am/documentview.aspx?docid=1547
[112] https://www.arlis.am/documentview.aspx?docid=152672
[113] https://www.arlis.am/DocumentView.aspx?docID=149957

- Presidential Decree No 1885 (March 2018) “On transition to digital government”.[114]
- Presidential Decree No 263 (30 September 2018) “On Approval of the Rules for the Formation, Implementation, Integration and Archiving of State Information Reserves and Systems” and some E-Government related measures.[115]
- Presidential Decree No 881 (January 2019) made mandatory for all government institutions to appoint a senior manager as the Chief Innovation Officer. It also regulated innovation management among government entities.
- Presidential Decree No 1325 (April 2021) set national goals for digital transformation across the country.
- Law No 998-IIQ (11 May 2010) “On personal information”.
- Law No 602- IIQ (9 March 2016) “On electronic signature and electronic document”
- Law No 314 (27 October 2018) “On measures to electronics internal management processes in state bodies”.
- Law No 718 (3 June 2019) “On measures to create a government cloud (G-cloud) and provide "cloud" services”.
- Law No 22 (29 January 2020) “On approval of rules of the organisation of operation of the information system on activity anti- foreign technical intelligence”.
- Law No 428 (29 October 2020) “On Government Information Systems Transition Plan to the Government Cloud”.
- Presidential Order “National Action Plan for the Promotion of Open Government 2020-2022”.[116]

Legislation that covers cybersecurity and some technical issues are not made public for security reasons.

Kazakhstan

- Law No 347-VI SAM (25 June 2020).
- Law "On Informatization" (2015, amended 2021).
- Law "On Public Services" (2013, amended 2021).
- Law “On Personal Data and their Protection” (2013, amended in 2022).
- Law “On Electronic Documents and Electronic Digital Signatures” (2003, amended in 2020).
- Law "On Science" " (2011, amended 2021).
- State Programme "Digital Kazakhstan“ 2018-2022” (2017, amended 2019).
- Concept Of Cybersecurity "Cyber Shield of Kazakhstan" (2017).
- National Project “Technological Breakthrough Through Digitalisation, Science, and Innovation” (2021).
- Concept for the “Development of the Industry of Information and Communication Technologies and the Digital Sphere” (2021).

Kyrgyzstan

- Law “On Electronic Management” (2017).

Tajikistan

- Law “On Innovation Activity" (2012).

[114] http://www.e-qanun.az/framework/38229
[115] http://www.e-qanun.az/framework/40020
[116] http://www.e-qanun.az/framework/44619

Uzbekistan

- Decree of the President No PD-6079 (05.10.2020) “On Approval of the Digital Uzbekistan 2030 Strategy and Measures for its effective implementation”.
- Decree of the President No PD-5349 (19.02.2018) “On Measures to Further Improve the Field of Information Technologies and Communications”.
- Resolution of the President No RP-4699 (28.04.2020) “On Measures for the Widespread introduction of the Digital Economy and E-Government”.
- Decree of the President No PD-6191 (23.03.2021) “On Additional Measures to Further Create Favourable Conditions for the Population and Business Entities when Using Public Services, Reducing Bureaucratic Barriers in this Direction”.
- Decree of the President of the Republic of Uzbekistan on Additional Measures for Accelerated Development of the National System of Public Services Delivery (2020): https://lex.uz/ru/docs/4720391
- Decree of the President of the Republic of Uzbekistan: https://nrm.uz/products?folder=546042_okazanie_gosuslug&products=4_prakticheskoe_nalogooblojenie
- Laws database of the Ministry for Development of IT and Communications of the Republic of Uzbekistan: https://mitc.uz/uz/pages/Documents/615
- Decrees and Decisions of the President of the Republic of Uzbekistan: https://mitc.uz/uz/pages/Documents/623
- Decrees and orders of the Government of the Republic of Uzbekistan: https://mitc.uz/uz/pages/Documents/622
- Documents in the field of entrepreneurship: https://mitc.uz/uz/pages/Documents/1208
- Law of the Republic of Uzbekistan “On e-government”.
- Law of the Republic of Uzbekistan “On Informatisation”.
- Law of the Republic of Uzbekistan “On Electronic Digital Signature”.
- Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No 365 (17.12.2015) “On measures to form central databases of individuals and legal entities and introduce a unified information system for identifying users of the Electronic Government system”.
- Decree of the Cabinet of Ministers No 256 (22.11.2005) "On the improvement of the regulatory framework in the field of informatization".

Appendix 6: Internet and Telecommunications Infrastructure by Country

	Armenia	Azerbaijan	Georgia	Kazakhstan	Kyrgyzstan	Tajikistan	Uzbekistan
Population (July 2021, est.)	3,011.609	10,282,282	4,933,674	19,245,793	6,018,789	8,990,874	30,842,796
Internet users (July 2018, est.)	1,966,942	8,017,120	3,151,218	14,789,448	2,222,732	1,889,632	15,705,402
Percentage of population	64.7	79.8	63.9	78.9	38.0	21.9	52.3
Broadband – fixed subscriptions (2020)	430,407	1,995,474	997,785	2,616,500	269,091	6,000	4,820,009
Subscription rate per 100 inhabitants	14.5	19.7	25.0	13.9	4.2	0.8	14.4
Internet services (2020)	Broadband, 4G	Broadband, 4G	Broadband, 4G	Broadband, 4G	Broadband, 4G	Broadband, 4G	Broadband, 4G
Fixed telephone lines (2020)	427,539	1,652,688	378,498	2,616,500	298,855	479,000	3,550,069
Subscription rate per 100 inhabitants	14.4	16.3	9.5	16.5	4.7	5.4%	10.6%
Mobile telephone lines (2020)	3,488.797	10,344,300	5,100,101	25,177,000	8,622,565	9,904,000	33,387,000
Subscription rate per 100 inhabitants	117.7	102.0	127.9	134.1	134.4	111.5	102.0

Appendix 7: Readiness criteria

Level	General Status	Political Status	Structural Status	Technical Status
High	Highest level of readiness, all, or some parts of improvement theme already under implementation. – Political will is already available, with themes already included in national plans, strategy, and budget, – Organisational, legal, capacity support structure is available and ready, – Pre-requisite infrastructure already completed, – Relevant standards and guidelines are readily available, – Industry requirements have been met.	– Leadership has expressed strong will for development of thematic area(s), – Theme(s) clearly designated a priority in national strategy and plans, – Appropriate budget to support the thematic activities.	– Organisational structure that is necessary to support the thematic area is available (with sufficient mandate) and has been designated to address the relevant activities, – National capacity to support/apply thematic activities are sufficient with necessary training structure, – Legal framework sufficient to support thematic activities.	– Infrastructure such as electricity, network connectivity, data centres, etc. that is required as a pre-requisite is available or completed, – Relevant standards including interoperability, security, privacy protection, etc. well established, – Relevant industry related requirements met or exceeded.
Medium	Somewhat ready for thematic area, some requirements still need to be met to start implementation. – Political will is available but needs additional buy-in, only some activities are included in plan and budget, – Organisational, legal, and capacity support structure is available but insufficient and needs to be improved, – Some pre-requisite infrastructure needs to be developed,	– Leadership has expressed some will for development of thematic area, – Theme identified but not prioritised in national strategy, – Some plans with some budget available to support the thematic activities.	– Organisational structure that is necessary to support the thematic area is partially available, – Roles and responsibilities have not been fully clarified yet, – There are major gaps in national capacity to support/apply thematic activities, – Additional development of training structure,	– Infrastructure such as electricity, network connectivity, data centres, etc that is required as a pre-requisite are partially available or under development, – Relevant standards including interoperability, security, privacy protection, etc have

Level	General Status	Political Status	Structural Status	Technical Status
	– Some relevant standards and guidelines are available, but more needs to be developed, – Some industry requirements need to be improved or developed.		– Legal framework is necessary to support thematic activities.	been identified but not yet developed completely, Relevant industry related requirements are lacking and need to be improved.
Low	Thematic area is not ready for implementation; many requirements still need to be met to start implementation. – Political will is unavailable or unexpressed, relevant activities are not included in plan and budget, – Organisational, legal, and capacity support structure is not available, – Most pre-requisite infrastructure needs to be developed, – Relevant standards and guidelines are not available, – Most industry requirements need to be developed.	– Leadership has NOT expressed will for development of thematic area, – Theme not included in national strategy and plans, – NO appropriate budget to support the thematic activities.	– Organisational structure to support the thematic area is NOT available, – National capacity to support/apply thematic activities are NOT available, – Legal framework is not sufficient to support thematic activities.	– Infrastructure such as electricity, network connectivity, data centres, etc. that is required as a pre-requisite is NOT available, – Relevant standards including interoperability, security, privacy protection, etc. are NOT established, – Relevant industry related requirements have NOT been addressed.
Unavailable / NA	All three categories are not available, or not applicable	Very beginning stages.	Very beginning stages.	Very beginning stages.