ReSPA
Regional School of Public Administration
BUILDING TOGETHER GOVERNANCE FOR THE FUTURE

Co-funded by the European Union

Western Balkan Regional Study on Digitalisation in Government

Authors

Mihkel Lauk, Tabular OÜ

Juhani Lemmik, Kimmel Consulting OÜ

Experts who contributed to the study

Albania
Laura Reka

Bosnia and Herzegovina
Srdjan Nogo

Kosovo*
Dritan Elshani

Montenegro
Milica Jankovic

North Macedonia
Rozalinda Stojeva

Serbia
Dragana Bajic

This activity is managed by Olivera Damjanovic, ReSPA Programme Manager

1 * This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo declaration of independence."

Contents

Acronyms and terms

ADISA – Agency for the Delivery of Integrated Services of Albania

AI (artificial intelligence) - the science and engineering of making intelligent machines, especially intelligent computer programs. It is related to the similar task of using computers to understand human intelligence, but AI does not have to confine itself to methods that are biologically observable.[2]

AL – Albania

Base(ic) registries - According to the European interoperability Framework 2.0, base registries are 'reliable sources of basic information on items such as persons, companies, vehicles, licences, buildings, locations and roads' and 'authentic and authoritative, and form, separately or in combination, the cornerstone of public services'. Sometimes called also as Authoritative Sources, i.e. recognised by an appropriate set of governance entities.

BiH – Bosnia and Herzegovina

BD BiH- Brčko District of Bosnia and Herzegovina

Blockchain - blockchain technology is also referred to as Distributed Ledger Technology (DLT) because it comprises a shared digital ledger that can be controlled by multiple users rather than a central authority. The distributed Ledger is similar to a database but can be dispersed globally and run by any individual through the Internet. Blockchain based smart contracts can be partially or fully executed or enforced without human interaction for financial services, healthcare, supply chain applications, among others.

Business Architecture - Formal models and diagrammatic representations of governance structures, business semantics and value streams across the extended enterprise. Business architecture seeks to formalise alignment between business and business, and business and ICT through various views, such as Business Strategy, Business Capabilities, the Value stream, the Business Knowledge and Organisational view.

Business Process Management (BPM) – employs methods to discover, model, analyse, measure, improve and optimize business strategy and processes

CERT – computer emergency response team

DESI – Digital Economy and Society Index

Digital by Default – Online service delivery as the primary option to interact with citizens and businesses

Digital by Design – Embedded digital technologies by scratch into governments' efforts to enable omnichannel service delivery

Disruptive technologies - technologies related to emerging technologies that displace established products, market, or networks by altering the way agents interact with each other and operate with a broader system. Examples include artificial intelligence come up the Internet of Things come up blockchain, cloud computing, among others.

eDocument - is a document created in electronic format and exchanged between parties in electronic manner used to facilitate transactions or share information. Distinct from PDF or image files, e-documents are machine readable and typically exchanged via software or online platforms rather than email.

EIF – European Interoperability Framework

EIP – European Interoperability Platform

2 McCarthy, J. What is Artificial Intelligence? Stanford University. 2007 November 12. Available at: https://www-formal.stanford.edu/jmc/whatisai.pdf

Electronic ID (eID) – authentication and authorisation service in digital environment

Electronic signature - data in electronic form which is attached to or logically associated with other data in electronic form and which is used by the signatory to sign, where the signatory is a natural person. Like its handwritten counterpart in the offline world, an electronic signature can be used, for instance, to electronically indicate that the signatory has written the document, agreed with the content of the document, or that the signatory was present as a witness.

Electronic seal - data in electronic form, which is attached to or logically associated with other data in electronic form to ensure the latter's origin and integrity, where the creator of a seal is a legal person (unlike the electronic signature that is issued by a natural person)

FBiH – Federation of Bosnia and Herzegovina

eInvoicing – solutions making it possible to accept and automatically process electronically created invoices

ePayment – dedicated infrastructure for making electronic payments while using digital services

ICT – Information and Communication Technologies

IDDEEA –Agency for the Identification Documents Registries and Data Exchange of BiH

ITIL – Information Technology Infrastructure Library

JRC – Joint Research Centre of the European Commission

Key Enablers – the extent to which digital tools such as electronic identification (eID), eDocuments, ePayment, digital signature, Authentic Sources and Digital Post enable identification and communication between the user and a government service

KPIs – Key Performance Indicators. Indicators through which progress towards objectives is measured and that are at least to significant extent under the control of an organisation or entity whose contribution is measured. Usually equipped with targets (level of expected performance) and baseline (current level of performance)

Life event - a package of government services, usually provided by multiple agencies that support citizens or entrepreneurs through key points of their lives, such as the birth of a child or starting of a business.

ME- Montenegro

MK – North Macedonia

MPALSG – Ministry of Public Administration and Local Self Government Serbia

MSTDHEIS – Ministry of Scientific and Technological Development, Higher Education and Information Society of Republika Srpska entity (BiH)

NAIS - the National Agency for Information Society of Albania

NIFO – National Interoperability Framework Observatory

PKI – public key infrastructure. PKI is a set of roles, policies, hardware, software and procedures needed to create, manage, distribute, use, store and revoke digital certificates and manage public-key encryption.

Register – trusted and authentic source of information under the control of public administration or organisation appointed by government.

Single Sign On - functionality that allows users to obtain access to multiple websites without the need to login multiple times and creating multiple login credentials

RS – Republic of Serbia

Value stream – end-to-end set of activities that deliver value to external and internal stakeholders. It requires that an organisation, public or private, has a clear idea what it delivers as a value, such as a service, to the users.

WB – Western Balkans (Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia, Serbia)

XK – Kosovo

Executive summary

In 2018, ReSPA commissioned a comparative study on service delivery[3] to take a close look at ReSPA Members and Kosovo at the operational level of service delivery to understand the situation and to identify possible joint future strategic actions. The current Western Balkan Regional Study on Digitalisation in Government looks at the segment of the 2018 study related to infrastructural elements, called key enablers of digital service provision in that study and adds several elements as building blocks for a well-functioning digital government. These infrastructural elements all contribute in some way to an effective and efficient service delivery. Hence, this study will show how governments in the Western Balkans are currently approaching digital transformation and assess the extent to which their public administration institutions are focused on and progressing in the development of digital government infrastructure and respective policies, whenever possible drawing comparisons to the 2018 situation. The key question is: "What does it take to manage the government operations digitally?" This perspective leaves out the efforts made to design and deliver digital services, nor does it deal with the usability of public services which would be the outcome of having proper digital infrastructure in place based on which to design services in a user-friendly manner.

The aspects that are looked at in the study are the following:

- Governance of digital transformation;
- Interoperability of registries and application of 'once-only' principle;
- Data quality and availability in digital format;
- Document exchange between government institutions;
- Catalogues of public services;
- National service portals;
- E-payment;
- Digital signature and timestamping.

The first aim of the study is to review the metrics that have been used to capture various aspects of digitalisation in government. Various international indexes and measurement frameworks are discussed and their applicability to individual Western Balkan administrations is mapped. It turns out that there is currently only one study, the OECD/SIGMA regular assessments based on the Methodological Framework[4] and particularly its section on service delivery which includes all the administrations in the Western Balkans to provide a full comparative picture. Only one administration, Montenegro, is currently included in all the studies discussed. Also, the domestic measurement arrangements are reviewed. These reveal that in most of the administrations besides Albania, there is not enough focus on measuring various aspects of digital governance and service delivery to systematically take stock of and adjust the course for better service provision across channels (digital and analogue), maturity level of digital services, costs, and other aspects. Some measurement attempts (e.g. the number of transactions over interoperability solution) also reveal the importance of semantics for creating a common understanding of what exactly is being measured and why.

The second aim of the study is to provide a brief insight into how each administration has approached the matter and what updates have occurred since 2018 for each of the aspects in the list above. In general, the progress has been significant in all the economies but the extent to which these have materialised in tangible benefits and progress in improved services varies a lot[5]. For example, the introduction of e-payment into the online service provision through national/central//&? service portal has been the last element to complete the possibility for fully transactional service. While digital signature still does not function across the WB region without unnecessary hassle, some administrations have already started utilising it (particularly. for businesses) to the extent which allows to oblige the use of digital channels as the only way of consuming selected services while the others are still in the process of setting it up properly.

National/central serviceportals have been put into good use in all the administrations by bringing more and more services to that platform, although in most of the cases there remain also other portals for the provision of specialised services. The link to the catalogues of public services has often not been established in a manner which would take advantage of the automation between the descriptions of services in the catalogues to take immediate effect in the portal once updated. Perhaps more importantly, the service catalogues are not yet put into use (with exceptions) as management tools to govern the service delivery improvement across the government through applying public services portfolio management concepts (see below).

What is critical for supporting the application of the 'once only' principle is the interoperability of registries which has progressed well in most of the WB administrations. At least base registries are fully digital and complete in the majority of administrations and the number of interconnected registries has grown significantly. However, where the progress has not been so strong yet is the rolling out of government-wide document management systems to facilitate exchange of documents between government institutions, and them and the clients.

The third aim of the study is to provide an overview of emerging topics, such as the application of new technologies (artificial intelligence, blockchain) but also how the administrations manage open data, or cybersecurity – two topics that were not part of the 2018 study. This section also investigates each administration's efforts (or sometimes lack thereof) in building their capacities to capitalise on these new opportunities (emerging technologies), but also necessities (cybersecurity). Apart from the topics presented in the previous section, there is more variability between the administrations of the Western Balkans in having mobilised the resources for coping with these emerging topics from complete inactivity to full-swing action (e.g. AI) or first steps to solid progress (e.g. cybersecurity). Nevertheless, these are all the topics likely to stay relevant for the future, hence the need to set a baseline for future comparisons.

The study concludes by laying out a way forward for the improved governance by presenting two models of relevance in the ICT management and service delivery context – public services portfolio management and enterprise architecture frameworks. The former helps to set the governance of public services onto more solid basis by applying a maturity model for progressing from more rudimentary to systematic management of services not as individual entities but as interrelated ones in need for common approach consisting of standardised description of services, assigned individual responsibility, measurement of agreed aspects, and continuous improvement. This part concludes with the presentation of a reference model for the management of ICT in a government-wide or individual public organisation context whereby business side[6] and ICT function have to define or reconfigure their respective roles and empower the business side more than ever before to assume a greater role in driving ICT-involved projects.

3 Comparative Study on Service Delivery in the Western Balkans (2018). Available at: https://www.respaweb.eu/download/doc/Comparative+Study+on+Service+Delivery.pdf/2342ffd1fe9e64da16d225f545eef521.pdf

4 Methodological Framework for the Principles of Public Administration. OECD/SIGMA, May 2019. Available at: https://www.sigmaweb.org/publications/Methodological-Framework-for-the-Principles-of-Public-Administration-May-2019.pdf.

5 Note again that the aspect of how the enablers and infrastructure elements transcend to better services has not been studied but can be inferred in some cases.

6 This refers to standard terminology of ICT project management where 'business' side deals with the substantive, mission-oriented goals of an organisation while ICT as a support function delivers value by providing ICT services to the business side.

1. Introduction and objectives of the study

1.1. Purpose of the Study

In 2018, ReSPA conducted a Comparative Study on Service Delivery in the Western Balkans[7]. The study covered a comprehensive range of areas pertinent to service delivery, such as **policy, legal and institutional framework**; **laws of administrative procedures**; **quality management**; **accessibility**; and **digitalisation**. Since the 2018 study was so broad, it did not cover any of these areas in sufficient detail to provide insights for understanding the dynamics of reforms. Hence, the ReSPA has decided to conduct more specialised follow-up studies in service delivery. In 2021, the OECD/SIGMA carried out a detailed study on the implementation of the laws of general administrative procedures[8] to provide a comparative analysis of the new laws to examine their compliance with good administrative practices and review the application of the laws in practice. ReSPA also conducted a **Periodical Regional Quality Management Analysis**[9] which will be updated biannually as one of the functions of its Regional Quality Management Centre. The first such analysis was published early 2023 and digitalisation is the next broad area to be covered.

The aim of the Western Balkans Regional Study on Digitalisation in Government is threefold. The first aim of the study is to review the metrics that have been used to capture various aspects of digitalisation. There are numerous measurement frameworks developed internationally (e.g., the UN E-Government Index), in the European Union (e.g., eGovernment Benchmark) and for the Western Balkan region (e.g., OECD/SIGMA Methodological Framework of the Principles of Public Administration).

The second aim of the study is to provide an overview of the **key changes that have taken place in the realm of digital public administration in the Western Balkans since 2018**. The study will thus provide a comparative regional overview of progress achieved in the application of digitalisation to public service delivery in Albania, Bosnia and Herzegovina, North Macedonia, Montenegro, Serbia and Kosovo.

The third aim of the study is to provide an overview of emerging topics which were not part of the 2018 study, such as the application of new technologies (artificial intelligence, blockchain) but also how the administrations manage open data and cybersecurity. This section also investigates each administration's efforts (or sometimes lack thereof) in building their capacities to capitalise on these new opportunities, such as emerging technologies, but also necessities, such as cybersecurity, without which it would be difficult to build trust towards digital government.

For the sake of clarifying the scope of the study, the concept of digitalisation needs to be clarified at the start. The study follows broadly the framework established by the 2018 Comparative Study on Service Delivery in the Western Balkans which looked at the mechanics of digital government – what enablers, such as key technologies and methods, are needed to drive digitalisation of government and particularly digital service delivery (see Figure 1). It looks at the government's performance in meeting the expectations of the citizens but does not concern itself with individual services. Over time, the digitalisation process fundamentally changes the way government functions internally and vis-à-vis its citizens, involving the elements of reinvention and innovation, which often is referred to as digital transformation (as opposed to 'mere' digital optimisation)[10].

7 Comparative Study on Service Delivery in the Western Balkans (2018). Available at: https://www.respaweb.eu/download/doc/Comparative+-Study+on+Service+Delivery.pdf/2342ffd1fe9e64da16d225f545eef521.pdf

8 Implementation of the laws on general administrative procedures in the Western Balkans. Available at: http://www.sigmaweb.org/publications/implementation-laws-administrative-procedure-western-balkans-sigma-june-2021.htm

* This designation is without prejudice to positions on status, and is in line with United Nations Security Council Resolution 1244/99 and the Advisory Opinion of the International Court of Justice on Kosovo's declaration of independence

9 https://www.respaweb.eu/download/doc/Periodical+Regional+QM+Analysis+booklet.pdf/aee2ca3a0519b3847a0413297dcc42bc.pdf

10 See, for example, Gartner. What is Digital Government? Available at: https://www.gartner.com/en/topics/digital-government.

Digitalisation is a "moving target". When the European Commission launched its eGovernment Benchmarking Framework 2012-2015 to support the implementation of the eGovernment Action Plan, it did not define digitalisation at all. The definition from 2015 eGovernment Benchmarking Report states that **digitalisation** has been introduced to measure a Public Administration's efficiency and effectiveness **in internal procedures**[11]. This is an internal perspective on the functioning of state institutions. One could argue that while there are various function-specific solutions available to improve the efficiency, such as human resource information systems, financial management information systems, document management systems etc., they mostly do not pertain to the improvement of service delivery to the citizens. The definition of digitalisation from the 2022 eGovernment Benchmarking report[12] states that the digitalisation [indicator] captures the **extent to which governments [are capable of to] deliver digital public services**, which reflects the online provision of public services.

This study will show how governments in the Western Balkans are currently approaching digital transformation and assess the extent to which their public administration institutions are focused on and progressing in the development of e-service delivery models and respective policies. Specifically, the study will investigate and assess progress in the following areas:

A brief update of the policy context and on current level of preparation and implementation of government plans for making services digitally available **and the potential for digitising services and processes;**

The state of national eGovernment portals and the availability of digital services with a particular emphasis on the **management of service catalogues;**

The current level of use of digital enablers and building blocks, such as eID, eSignature, ePayment, Single Sign-On, and eDocument to improve digital service delivery;

The state of base registries and to what extent are they **interoperable** (organisationally, technically, semantically and legally) to support the application of **"once only" principle**; mechanisms to facilitate co-operation and data-sharing between institutions;

The level of provision and use of open data to enable more responsive, inclusive, and accountable governance following an "open by default" approach;

The **application of new technologies**, such as **artificial intelligence** and their use cases;

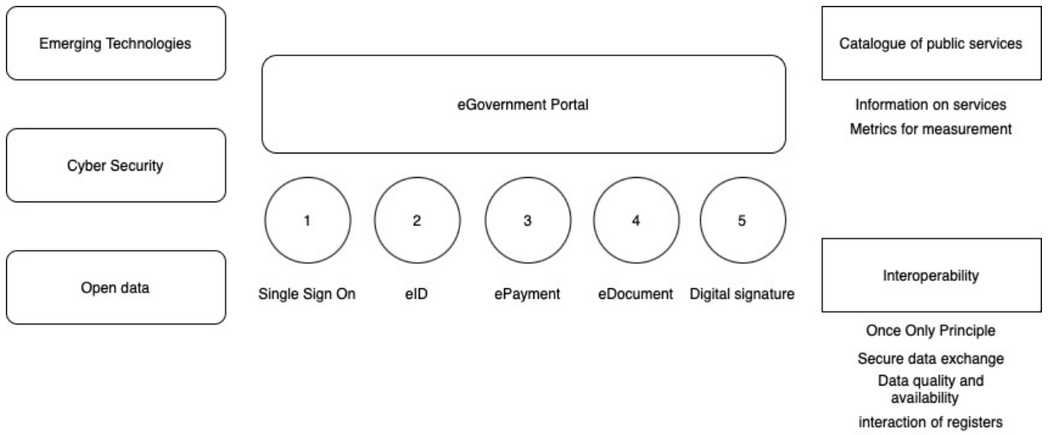
What have the governments done to **keep their information systems secure** and what is the situation in the area of **cyber security;**

11 European Commission. Future-proofing eGovernment for a Digital Single Market. eGovernment Benchmark Insight Report. Available at: https://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=10032.

12 European Commission. eGovernment Benchmark 2022. Synchronising Digital Governments. Available at:

The different components of the study are captured on Figure 1.

Figure 1. Components of the study on the Digitalisation in Government in the Western Balkans



The key questions driving the choice of the building blocks and enablers is: What does it take to manage the government operations fully digitally? In the service delivery context 'Fully digital' means a service without the need for a single physical contact between the user and the administration, nor for a single document to be submitted on paper. All the building blocks (elements which are assigned number 1-5 on Figure1) add convenience, speed, and sophistication to the delivery of government services. Although they are technical in nature, they all also have a user interaction aspect to them which may attract or scare off users off from the use of digital services. While the service design aspect is incredibly important, this study does not look into it as this would require a much more focussed attention to each one of them. Besides usability aspect, cyber security also needs to be considered in order to provide assurances that data cannot be accessed and used for illegitimate purposes or digital identity breached by unauthorised persons.

The study will be divided into four parts:

- Overview of the indicators based on which the performance of the WB administrations is measured, and gaps in measurements;
- Overview of progress in digitalisation since 2018;
- Emerging topics in digitalisation;
- Conclusions and a way forward.

2. Measuring digitalisation performance

2.1. Global measurement

2.1.1. The United Nations E-Government Survey

The United Nations E-Government Survey has been carried out since 2001 every second year. Its assessment methodology allows to assess the maturity of e-governments captured by the E-Government Development Index (EGDI) for 193 United Nations Member States, categorized into four value groups (very high, high, middle and low). E-government rankings are developed based on the composite value of EGDI, consisting of three sub-indexes which in turn consist of further sub-categories:

1. The OSI;
2. The OGDI;
3. TII;
4. HCI.

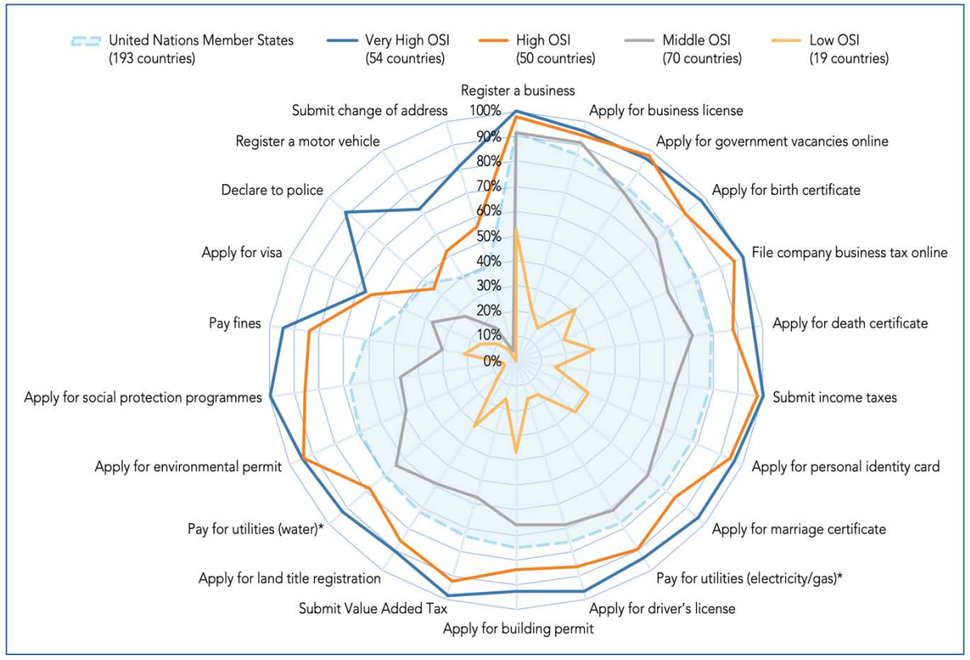
The Online Services Index (OSI) is composed of the following components:

- Service provision (45%);
- Technology (5%);
- Institutional framework supporting e-government development (10%);
- Content provision (5%);
- E-participation (35%).

The services provision sub-index of the OSI assesses a wide range of features, including the availability of various online transactional services, how government services are accessed (through one main portal or multiple dedicated portals), the existence and functionality of e-procurement platforms, the integration of GIS or geospatial data and technologies in online services provision, and the availability of sector-specific services and services for people in vulnerable situations[13]. The list of online transactional services analysed consists of 22 services both for businesses and citizens. It is a good benchmark for any government to aim at full digitalization of services. Technology sub-index looks at the national online portals and their functionalities and features. One of the novelties in the 2022 survey is whether individuals and businesses can use the national portal to access or modify any data the government has a record that pertains to them.

13 UN E-Government Survey 2022, Chapter 1: Global Trends in E-Government. Available at: https://desapublications.un.org/sites/default/files/publications/2022-09/Chapter%201.pdf

Figure 2. Percentage of countries offering each type of online transactional service, by OSI level, 2022



Source: 2022 United Nations E-Government Survey

In the 2020 EGDI, the Open Government Data Index (OGDI) was piloted as a supplementary index of the EGDI. The framework of OGDI is based on three pillars: Policy, Platform and Impact.

Telecommunications Infrastructure Index (TII) is an arithmetic average composite of four indicators:

- Estimated Internet users per 100 inhabitants;
- Number of mobile subscribers per 100 inhabitants;
- Number of wireless broadband subscriptions per 100 inhabitants;
- Number of fixed broadband subscriptions per 100 inhabitants.

Conceptually, the TII has remained largely unchanged since 2002, except that since 2020 the index does not contain any longer the number of fixed-telephone subscriptions.

Human Capital Index (HCI) consists of four components:

- Adult literacy rate;
- The combined primary, secondary and tertiary gross enrolment ratio;
- Expected years of schooling;
- Average years of schooling.

Digital literacy indicators could not be used for this survey due to not having enough data on digital literacy. However, this is a useful indicator for considering the maturity of digital society. In the EU, digital literacy is measured by EUROSTAT and the people with at least basic digital literacy skills among the population of 16-74 is considered a crucial indicator[14].

14 How many citizens had basic digital skills in 2021? Eurostat (2021). Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220330-1

2.1.2. The World Bank GovTech Maturity Index

The World Bank runs the GovTech Maturity Index (GTMI). The GTMI was developed as part of the GovTech initiative to introduce a measure of GovTech maturity in four focus areas – supporting core government systems, enhancing service delivery, mainstreaming citizen engagement, and fostering GovTech enablers – and to assist practitioners in the design of new digital transformation projects[15]. The latest (2022) report carries the title Trends in Public Sector Digital Transformation and is the simple average of the normalized scores of four components:

- CGSI: The Core government systems index (17 indicators[16]) captures the key aspects of a whole-of-government approach, including government cloud, interoperability framework and other platforms;
- PSDI: The Public Service Delivery Index (9 indicators) measures the maturity of online public service portals, with a focus on citizen centric design and universal access ability;
- DCEI: The Digital Citizen Engagement Index (6 indicators) measures aspects of public participation platforms, citizen feedback mechanisms, open data, and open government portals;GTEI: the GovTech Enablers Index (16 indicators) captures strategy, institutions, laws, and regulations, as well as digital skills, and innovation policies and programmes, to foster GovTech.

2.2. Measurements aligned with European Union indicator sets

Digitalisation has become one of the panaceas for governments and the European Union alike in response to the COVID-19 pandemic, which led to shut-downs of in-person work in public and private institutions. Digitalisation was the way to work around the limitations caused by constraints to physical movement and contact. The European Union came up with the Recovery and Resilience Facility (RFF)[17] of 724 billion euros for the Member States where at least 20% of the funding in the country Recovery and Resilience Plans should be allocated to the measures fostering digital transformation both in the private and public sector. While the WB administrations are not eligible for funding from the RFF, it demonstrates the need to invest significantly into digitalisation to catch up with the EU Member States considering that the WB administrations lag behind in their level of digitalisation.

The European Union in 2022 set forth the **Digital Decade Policy Programme 2030**[18] (hereafter Digital Decade). The policy programme establishes digital targets and objectives in the realms of digital skills, digital infrastructure, digitalisation of business and of public services. The 2030 targets and objectives will be pursued through an annual cooperation cycle, which will take stock of progress along previously defined trajectories and Key Performance Indicators (KPIs). The European Commission shall monitor progress against the targets relying on the **Digital Economy and Society Index (DESI)[19].** DESI monitoring among the EU Member States has been carried out annually since 2014. The first Western DESI Index 2022 Report was developed under the RCC umbrella, and provided DESI calculation for 2021 and 2022[20]. However, its dimensions and indicators will be aligned with the digital targets set out in the Digital Decade. Currently, DESI's key areas are:

- Human capital;
- Connectivity;
- Integration of digital technology; and
- Digital public services.

Of DESI 2022 indicators, 11 measure targets are included in the Digital Decade.

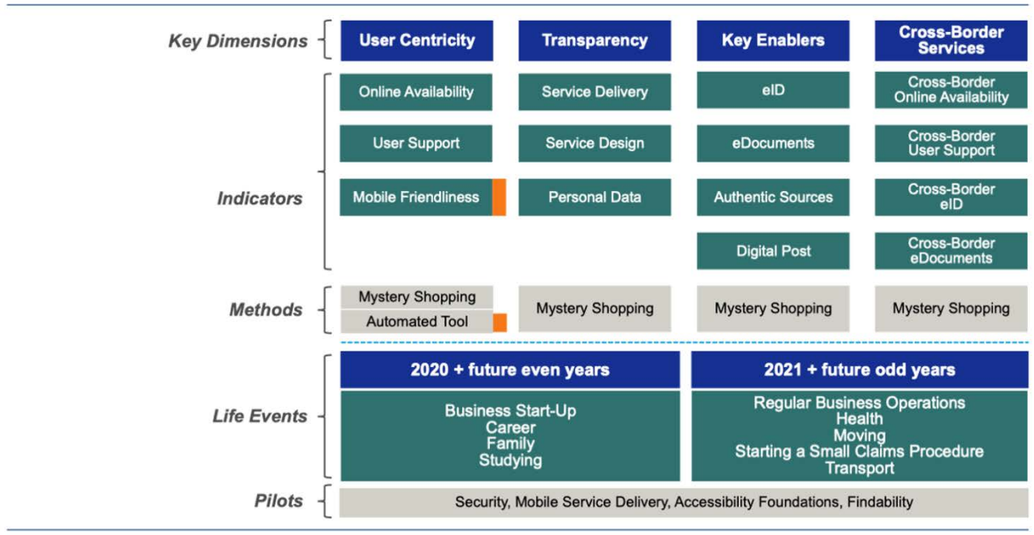
15 World Bank. GovTech: Putting People First. Available at: https://www.worldbank.org/en/programs/govtech/gtmi.
16 For the full set of indicators, see GovTech Maturity Index Data Dashboard: https://www.worldbank.org/en/data/interactive/2022/10/21/govtech-maturity-index-gtmi-data-dashboard
17 https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en
18 https://digital-strategy.ec.europa.eu/en/library/digital-decade-policy-programme-2030
19 https://digital-strategy.ec.europa.eu/en/policies/desi
20 https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report

Another important EU-wide study is the **e-Government Benchmark**, which was initiated in 2011. The eGovernment Benchmark is an annual survey which is a key to tracking continuous improvements in online public services[21]. It entails the following four key dimensions:

- User-centrity of public services;
- Transparency of public services, personal data and public authorities;
- Availability of key enablers that drive eGovernment services;
- Cross-border mobility indicating availability of services for foreigners.

These four key dimensions consist of 14 underlying indicators, broken down into 48 survey questions. To provide a comprehensive overview of how countries are performing in eGovernment, 95 services, across nine life events were analysed. **Life events** could be seen as packages of government services, usually provided by multiple agencies, that support citizens or entrepreneurs through key points of their lives, such as the birth of a child or starting of a business[22]. The government benchmark covers eight life events. Data on the Business Startup, Career, Studying and Family life events is collected in even years. In odd years the life events assessed are: Regular Business Operations, Health, Moving, Transport and Starting a Small Claims Procedure.

Figure 2. eGovernment benchmark method framework



Source: eGovernment Benchmark 2022. Synchronising Digital Governments

A study of a more technical aspect of digital government is the **European Interoperability Framework (EIF)** Monitoring Mechanism. It stems from the ISA[2] programme's[23] obligation to monitor the implementation of the EIF. It is an integrated framework for monitoring, evaluating and reporting on the implementation of the EIF within the European Countries relying on 77 key performance indicators[24]. Reporting has been conducted for the years 2019, 2020 and 2021. The EIF offers to public administrations 47 concrete recommendations on how to improve governance of their interoperability activities, establish cross-organisational relationships, streamline processes supporting end-to-end digital services, and ensure that both existing and new legislation do not compromise interoperability efforts[25].

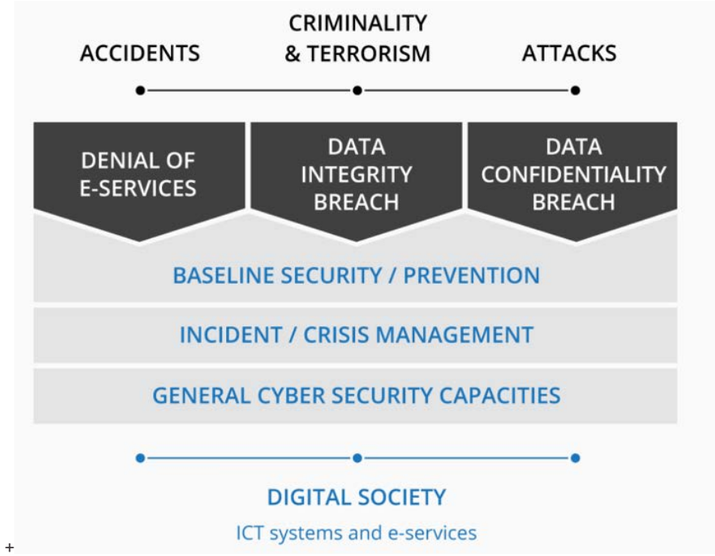
21 https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2022
22 *Ibid.*
23 European Commission ISA2 programme. Available at: https://ec.europa.eu/isa2/home_en/
24 European Commission, National Interoperability Framework Observatory. Available at: https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/eif-monitoring
25 The data file with the complete EIF model and EU MS results is available here (Under 'Member' States Results' by year: https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/eif-monitoring.

The OECD/SIGMA also covers aspects of interoperability in its assessments, looking at the adequacy of interoperability infrastructure and the interoperability of basic registries[26]. For the EU Member States and the UK, there is a dashboard created by Co-VAL project which also provides information on some aspects of interoperability[27].

The E-Governance Academy's (eGA) National Cyber Security Index (NCSI) measures the preparedness of countries to prevent cyber threats and manage cyber incidents[28]. The indicators of the NCSI have been developed according to the national cyber security framework. At the top of the figure, the fundamental cyber threats are presented:

1. Denial of e-services – services are not accessible;
2. Data integrity breach – unauthorised modification;
3. Data confidentiality breach – secrecy is exposed.

Figure 3. Components of National Cyber Security Index (NCSI)



Source: eGovernment Academy

These threats directly affect the normal functioning of national information and communication systems and, through the ICT systems, electronic services including critical e-services. To manage these cyber threats, a country must have appropriate capacities for baseline cyber security, incident management, and general cyber security development. The index has been developed in five steps:

1. Identification of national level cyber threats;
2. Identification of cyber security measures and capacities;
3. Selection of important and measurable aspects;
4. Development of cyber security indicators;
5. Grouping of cyber security indicators.

Besides the NCSI score (on the scale of 100 as the maximum), also Digital Development Level (DDL) score is provided, based on the ICT Development Index and Networked Readiness Index. The difference between NCSI score and the DDL score demonstrates if the country's cyber security development is in accordance with its digital development, above or below it.

26 OECD/SIGMA Methodological Framework for the Principles of Public Administration. Available at: https://www.sigmaweb.org/publications/Methodological-Framework-for-the-Principles-of-Public-Administration-May-2019.pdf
27 Co-VAL dashboard. Available at: https://www.co-val.eu/dashboard/.
28 eGovernent Academy. National Cyber Security Index. Available at: https://ncsi.ega.ee.

2.3. Measurements applicable to the Western Balkans

Below is the summary of coverage of the measurements presented above to the Western Balkans administrations. In addition, three more measurements presented in the Table 1 below will be discussed in part four of this study. Of six administrations, only Montenegro is covered by all the measurements and of the 7 measurements listed, only two cover all the six administrations.

Table 1. Coverage of Western Balkans administrations in major comparative e-government measurements

Title of Survey	Albania	Bosnia and Herzegovina	Montenegro	North Macedonia	Serbia	Kosovo
UN e-Government survey						
World Bank GovTech Maturity Index (GTMI)						
EU Digital Economy and Society Index (DESI)[29]						
EU e-Government Benchmark						
NIFO European Interoperability Framework Monitoring Mechanism						
SIGMA assessments and Data Portal (service delivery)		Forthcoming				
eGA National Cyber Security Index						
Global Cybersecurity Index						
Government AI Readiness Index						
EU Open Data Maturity Report						

Source: Authors' creation

The latest United Nations e-Government Survey was carried out in 2018. Overall picture for the Western Balkans is presented in Table 2 below. According to the 2022 Survey, the regional leader is Serbia who has retained its lead from 2018. Three administrations, Serbia, Albania and Bosnia and Herzegovina, have improved their position since 2018 while two administrations have fallen behind despite their improvement in overall EDGI value. This demonstrates how heavily the administrations across the globe are investing into digital government. Montenegro's improvement over the four years has been the slowest and it has fallen behind Albania during these years. In 2022, both Albania and Montenegro surpassed the level of digital government of Serbia of 2018 which means that they fall behind about 3-4 years. While both Serbia and Albania have made a significant progress in Online Services Index, Montenegro and North Macedonia have actually regressed and Bosnia and Herzegovina's progress has been modest, particularly given its low position overall.

Table 2. 2022 and 2018 United Nations e-Government Survey results for the Western Balkans

2022/2018	AL	BiH	ME	MK	RS	XK
EGDI Rank	63/74	96/105	71/58	80/79	40/49	N/A
EGDI Value	0.7413 0.6519	0.6256 0.5303	0.7260 0.6966	0.7000 0.6312	0.8237 0.7155	
OSI[30] value	0.8182 0.7361	0.4898 0.4306	0.5528 0.6667	0.7020 0.7153	0.8514 0.7361	
HCI[31] value	0.8022 0.7877	0.7489 0.7217	0.8383 0.8172	0.7562 0.6924	0.8332 0.7896	
TII[32] value	0.6037 0.4318	0.6382 0.4385	0.7868 0.6059	0.6417 0.4859	0.7865 0.6208	

Source: UN e-Government Knowledgebase

The Latest World Bank GovTech Maturity Index (2022)[33] classifies Albania and Serbia into very highly developed Group A, Montenegro and Kosovo into highly developed Group B and Bosnia and Herzegovina into medium developed Group C. Albania, Kosovo and Serbia have all made a step up while the others have remained at the 2018 level. Serbia and Albania stand out in the Western Balkans on all the indicators while the latter comes up on top on all the indicators. Two administrations, Bosnia and Herzegovina and North Macedonia, have regressed in score since 2018. The differences between WB administrations are the smallest (with one exception) in Public Service Delivery Index (PSDI) while the differences in GovTech Enablers Index (GTEI) are quite significant.

Table 3. 2022 and 2018 World Bank GovTech Maturity Index results for the Western Balkans

2022/2018	AL	BiH	ME	MK	RS	XK
Maturity Index Group	Very High High	Medium Medium	High High	High High	Very High High	High Medium
GTMI[34] Value	0.752 0.748	0.271 0.377	0.564 0.539	0.570 0.666	0.895 0.722	0.633 0.455
CGSI[35] value	0.707 0.606	0.464 0.421	0.652 0.417	0.583 0.493	0.802 0.597	0.647 0.430
PSDI[36] value	0.857 0.859	0.285 0.534	0.705 0.631	0.795 0.688	0.890 0.751	0.852 0.533
DCEI[37] value	0.735 0.857	0.160 0.319	0.418 0.616	0.535 0.687	0.979 0.851	0.577 0.528
GTEI[38] value	0.709 0.669	0.176 0.319	0.481 0.491	0.367 0.794	0.910 0.688	0.456 0.327

Source: World Bank

While monitoring DESI originally covered only the EU member states, in 2018 and 2019 a study was carried out in the Western Balkans and Turkey which to a large extent used the same thematic dimensions as DESI, but not always the same indicators[39]. It allowed these administrations to compare their level of development not just with the EU Member States, but also with each other. The Western Balkans and Turkey Market Report (aligned with the DESI methodology) covers all the WB administrations.

29 Based on the Monitoring the Digital Economy and Electronic Communications Services in the Western Balkans and Turkey. Market Report. 2019. Follow-up Study Report. Available at: https://www.rcc.int/files/user/docs/3%20-%20DESI%202019.pdf.
30 Online Services Index
31 Human Capital Index
32 Telecommunications Infrastructure Index
33 GovTech Maturity Index: Trends in Public Sector Digital Transformation.
34 GovTech Maturity Index
35 Core Government Systems Index
36 Public Service Delivery Index
37 Digital Citizen Engagement Index
38 GovTech Enablers Index
39 Monitoring the Digital Economy and Electronic Communications Services in the Western Balkans and Turkey. Market Report. 2019. Follow-up Study Report.

Besides the 27 EU Member States, the 2022 eGovernment Benchmarking report also covers Albania, Montenegro, North Macedonia, Serbia and Turkey as the EU candidate countries, plus European Free Trade Association countries. This report presents the findings for data collected in 2021 and 2020. Mystery Shopper approach – trained citizens from the participating countries – is used to collect data, and automated open tools complement that approach to assess Mobile Friendliness, Findability, Accessibility Foundations and Web Security.

Once again, Serbia comes on top in the WB region with Albania not far behind. According to this methodology, Albania is doing the best on key enablers (criteria of eID, eDocuments, Authentic Sources, and Digital Post). Note that while in general the WB administrations are falling behind compared to the EU average, both Montenegro and Albania are doing better than EU average on cross-border services (consisting of criteria, such as Online Availability, User Support, eID and eDocuments).

Table 4. 2022 EU e-Government Benchmarking results for the Western Balkans

2022	AL	BiH	ME	MK	RS	XK	EU average
Country overall eGovernment maturity (%)	46	N/A	38	35	49	N/A	68
User Centricity[40] (score)	74		69	66	77		88.3
Transparency[41] (score)	31		31	26	45		59.5
Key Enablers[42] (score)	55		26	29	54		68.5
Cross-border services[43] (score)	23		26	19	18		23

Source: eGovernment Benchmarking Report 2022. Synchronizing Digital Governments.[44]

The European Interoperability Framework (EIF) Monitoring Mechanism covers Montenegro and North Macedonia. The Interoperable Europe Policy proposes mandatory interoperability assessments to evaluate the impact of changes in IT systems and related digital services.

SIGMA monitoring assessments cover all the Western Balkan administrations and while their scope is service delivery more broadly, they do look at digital government building blocks and enablers as part of (digital) service delivery framework. SIGMA created in 2023 a Data Portal[45] with measurement results from all the assessments 2017-2021 in all the WB administrations except Bosnia and Herzegovina (for now). SIGMA has in 2023 also revisited its Principles of Public Administration[46] by adding a specific principles not only within Service Delivery and Digitalisation to cover more comprehensively these aspects of digitalisation which are not relevant only to service delivery, but to digital governance more broadly. This step signifies an evolution of the digitalisation agenda which goes beyond service delivery by bringing in topics such as open data, emerging technologies, cybersecurity, and digitalisation policy. The amended Principles are accompanied by a detailed assessment framework which sets forth indicator framework for measurement of progress in both the EU candidate and potential candidate countries, as well as the EU Neighbourhood policy countries. It will become one of the most relevant and usable indicator sets for capturing progress in the area of digitalisation in the WB.

40 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
41 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
42 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
43 Cross-border services indicates to what extent the citizens can use online services in another country.
44 eGovernment Benchmark (2022) Factsheets. Available at: https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2022
45 SIGMA Principles of Public Administration Data Portal: https://par-portal.sigmaweb.org.
46 Forthcoming. The revised Principles of Public Administration were on public consultation until 6 February 2023.

The E-Governance Academy's National Cyber Security Index (NCSI) covers all the WB administrations except Kosovo (soon to be added). The global ranking based on the scores is updated every 2nd year. In Albania and Serbia the cyber security is significantly more advanced than their overall digital development while in Bosnia and Herzegovina and Montenegro the situation is reverse – their cyber security is significantly below the level of digital development. In North Macedonia, the two are on par with each other[47].

The last two indexes, the Government AI Readiness Index and the Global Cyber Security Index, will be discussed in sections 4.1 and 4.2, respectively. Also, the EU Open Data Maturity Report will be discussed in section 4.3.

2.4. What use to make of measurement frameworks

For international comparability, the referred studies are useful for benchmarking an administration and its performance with others and over time. The WB administrations would benefit if all of them would be involved in the selected studies. In case of EU-run studies, this should be feasible to accomplish over time. However, although the international studies help to understand the effectiveness of policies related to various aspects of digitalisation, they are not very helpful in understanding how various components contribute to the digitalisation of public services (see Figure 1 for a reference model).

For internal management purposes, the WB administrations could use either a well-developed standardised measurement framework, such as the SIGMA forthcoming digital government indicator set (see Annex 1 of this report) as a well-rounded toolkit to measure performance in all crucial areas of digital government, or a tailor-made indicator set to grasp the perspectives in digital government and service delivery relevant for that administrations. Some administrations in the region already have developed an extensive set of indicators in the framework of their public administration reform strategies and their action plans, which nevertheless may not be sufficient in getting a detailed and frequent updates of the situation. Of course, this information is useful to the extent that it will be used in taking management decisions and therefore needs to match the ambitions of the Government in undertaking digitalisation and service delivery reforms.

For example, Albania has defined a scale of five levels of maturity of electronic services[48] against which all the services are assessed with the ultimate goal to reach high maturity levels for close to 100% of the services. Service delivery performance used to be monitored by two institutions: ADISA who collected data on service delivery performance from 12 key agencies and proceeded with putting together a monthly report for the Situation Operational Office (SOO) within the Prime Minister's Office. AKSHI sent SOO the data on digitalisation of services and their provision through e-Albania portal. For example, data on the number and share of online applications was produced. The reports were delivered to the responsible Deputy Prime Minister and the Prime Minister on the needs basis[49].

47 eGovernment Academy. NCSI Index. Available at: https://ncsi.ega.ee/ncsi-index/.
48 These five levels are: level 1 – one-way communication between the public institution and the user through the provision of information only; level 2 – in addition to information, the user is provided an opportunity to download an application, but the application itself can only be submitted offline; level 3- interaction between the public institution and the user enabling to complete and submit the application digitally; level 4 – full two-way interaction between the public institution and the user, enabling the latter to complete and submit the application digitally, as well as receiving a response digitally, or completing the entire public service procedure online; level 5 – service provider takes action on behalf of the service user in order to provide a personalised service to the user (proactive service provision).
49 SIGMA Monitoring Report on Albania 2021. Available at: https://www.sigmaweb.org/publications/Monitoring-Report-2021-Albania.pdf.

Overall, according to the metrics that SIGMA uses to assess the quality of central monitoring of service delivery performance the situation in the WB has not improved much comparing 2017 to 2021. This might be a testimony to a lack of systematic effort to measure progress towards digitalisation, although the development of monitoring systems for public administration reforms and strategic documents have been noted across the region, including augmenting the number of data from larger number of institutions including those directly involved in the digitalisation.

Table 5. Central monitoring of service delivery performance, 2021

	ALB	XKV	MNE	MKD	SRB
Responsibility for monitoring service delivery performance is a function formally assigned to a central institution or unit (1 point)	✓	✗	✗	✗	✗
A clear government-wide methodology has been established to guide the production and reporting of performance metrics by individual ministries (1 point)	✓	✗	✗	✓	✗
Performance metrics on total volume of yearly transactions are reported for a significant share of user-oriented transactional services (1 point)	✓	✗	✗	✗	✗
Performance metrics on cost (such as average cost of transaction for each service) are reported for a significant share of user-oriented transactional services (1 point)	✓	✗	✗	✗	✗
Performance metrics on take-up of digital channels for each service (i.e. total volume of yearly online transactions) are reported for a significant share of user-oriented transactional services (1 point)	✓	✗	✗	✗	✓

3. Progress made in the Western Balkans in setting in place digital service delivery building blocks

3.1. The potential to digitalise public services

There is a growing expectation from the users that government services should be readily accessible through digital channels as more and more services that we daily consume become digitally available.

Do citizens explicitly expect for government to be more or totally digital or they expect that government is more efficient irrelevant to ways and means how the service is being offered. One of the examples is mobile or electronic banking. Although all (or almost all banks in Bosnia and Herzegovina have eBanking solutions, still majority of the users are preferring to use classic way. Possible reasons can be lack of trust and similar but this also can be the case for public services. Also most of the political parties usually have eGv or digitalisation of government as goals of their agenda but it is of low priority, maybe because the voters still are not considering digitalisation as a key issue. Therefore, the governments have to create both the infrastructure for that to happen, as well as the services that can be used through digital channels. The 2018 RESPA Service Delivery study took note of the components that must be in place to be able to provide digital services. They were divided into enablers and building blocks: the former being necessary components to deliver user-friendly, fully digital services while the latter represent common infrastructural elements.

3.1.1. Governance of digital transformation

SIGMA 2022 Regional Overview of Monitoring Reports[50] in the WB concludes that: '*A predictor of overall progress across the public governance domains since 2017 is the level of continued and consistent political direction and leadership. Mature administrations are expected to deliver public services and scheduled reforms even in the absence of political leadership, so that major reforms will not suffer or falter from neglect. The public administrations that advanced the most overall – Albania and Serbia – benefited from sustained political support and rising levels of public trust.*'

Key questions related to governance are about the general policy on service delivery and the manner in which digitalisation supports it, strategy and the roadmap to implement change, organisation which is set up to design and execute the strategy, implicitly also referring to the resources committed to make the digital transformation happen. These elements are captured in Table 6 below.

Table 6. Key elements of governance of digital transformation in government

Administration	Does the government have a digitalisation strategy? (2022/2018)	Does the government have a de facto responsible institution for digitalisation policy and CIO? (2022/2018)
AL	Yes/Yes Digital Agenda of Albania 2022-2026	Yes/Yes // Yes/Yes National Agency for Information Society (NAIS)

50 SIGMA 2022 Regional Overview of Monitoring Reports. Available at: https://www.sigmaweb.org/publications/Regional-Overview-Western-Balkans-Monitoring-February-2022.pdf.

BiH	Yes/Yes Public Administration Reform Strategy 2017-2027 [51]and its Action Plan	Yes/Yes // No/No **BiH level:** Ministry of Transport and Communication General secretariat of CoM Agency for Identification Documents, Registries and Data Exchange (IDDEEA) **Republika Srpska level:** Ministry of Scientific and Technological Development, Higher Education and Information Society, Agency for Information Society. **Federation of BiH level:** General Secretariat of the FBiH Government, Federal Ministry of Transport and Communications, Federal Ministry of Justice **Brcko District level:** Department for Informatics BD BiH, Department for Public register BD BiH, Judical commission BD BiH, Office of the Public Administration Reform Coordinator of the Government of the BD BiH
ME	No/Yes Digital Transformation Strategy 2022-2026 Strategy for the Information Society Development (2016-2020)	Yes/Yes // No/No 2016-2020 Ministry of Public Administration (MPA) 2020-2022 – Ministry of Public Administration, Digital Society and Media Since May 2022: MPA
MK	Yes/Yes Public Administration Reform Strategy 2018-2022. National ICT Strategy 2021-2025	Yes/Yes // No/No The Ministry of Information Society and Administration (MISA) is responsible for all issues pertaining to IT, including the policy and strategy for eGovernment and the modernisation of the Macedonian public administration.
RS	Yes/Yes E-Government Development Programme 2020-22 E-government Development Programme proposal 2023-2025[52] E-Government Development Strategy 2015-2018[53]	Yes/No // Yes/No Office for Information Technologies and Electronic Government
XK	Yes/No E-Government Strategy 2023-26	No/No // Yes/No Formally the Ministry of Internal Affairs and Agency for Information Society, supported by the Government CTO and his digital transformation unit

51 PAR Strategic Framework implementation has been prolonged until 2027, https://parco.gov.ba/hr/rju/o-rju-2/strateski-okviri-za-rju

52 https://www.ite.gov.rs/extfile/sr/2090/StrategijarazvojaeUpravesaAP2015-2018-1.pdf

53 https://www.ite.gov.rs/extfile/sr/2090/StrategijarazvojaeUpravesaAP2015-2018-1.pdf

In general, these reforms run from the vicinity of the Prime Minister tend to be more successful than those that are initiated by a line ministry. This is the case of Albania and Serbia where for years digitalisation has been led from the vicinity of the Prime Minister. Serbia has had the Office for Information Technologies and Electronic Government as a central body dealing with digital transformation in close co-operation with the Public Policy Secretariat. Similarly, in Albania it has been the National Agency for Information Society (NAIS) dealing with government ICT management. In Serbia, administrative simplification agenda was driven by the Public Policy Secretariat while in Albania service standardisation and simplification was managed by the Agency for the Delivery of Integrated Services (ADISA). In both cases, the two institutions, one dealing with service delivery transformation and the other providing ICT support, worked together. Importantly, both tandems were empowered by the political level to undertake difficult changes in government.

Bosnia and Herzegovina predominantly utilises the model whereby a line ministry is responsible for digitalisation (at the State level and in Republika Srpska entity) and Ministry of Traffic and Communication at the level of Federation of Bosnia and Herzegovina entity where General Secretariat of the Government of Federation of Bosnia and Herzegovina also plays an important role. The strategic framework consists of PAR Strategy only, except in Republika Srpska where there is also a designated digital service delivery strategy. While there is coordination structure represented at main administrative levels, at operational level there are Supervisory teams, including one for Service delivery. It is worth noting that there are few specific working groups enabling vertical and horizontal coordination, such an example is Working Group for interoperability.

Still this does not provide a solid enough institutional or strategic framework for making steady progress in the area of digitalisation that would require more co-ordination between the levels. SIGMA 2022 assessment revealed the need for consolidation and strengthening of central ICT units at each level and the assignment of digitalisation to a position which could serve as the Chief Information Officer.

In Montenegro and in North Macedonia, both service delivery reforms and digitalisation agenda have been led by a line ministry, respectively Ministry of Public Administration and Ministry of Information Society and Administration. Broadly speaking, the same model has been used in Bosnia and Herzegovina. As demonstrated by Table 3, the amount of human resources available to these ministries compared to specialised agencies has been relatively lower. What is also noticeable is that Albania, Montenegro and Serbia have had underneath the general Public Administration Reform Strategy more specific, technically oriented digital government strategies which have helped to articulate technical requirements for delivering the infrastructure required to serve digital service provision.

Albania: example of leadership and commitment

Albania started with digitalisation reforms in 2015., under the Prime Minister office and was initially led by the Minister of State for Innovation and Public Administration. Albania established a clear strategy for improved service delivery through the envisaged network of one-stop shops, run in a standardised citizen-friendly manner across the country, and the target of digitalising 100% of administrative services after reengineering and simplifying them first. Such a clear vision provided a clear direction to all the efforts into improved service delivery.

It also embarked upon administrative simplification to streamline service delivery before starting digitalising the administrative services. Albania's success relies to a large extent on competent management of the service delivery reform (not just digitalisation) and investment of significant resources into the transformation efforts, such as through the Agency for Delivery of Integrated Services (ADISA) and the National Agency for Information Society (NAIS).

For example, in Albania it was decided early on that all the services have to be described and digital services provided through a central portal e-Albania. It avoided the proliferation of various government websites and helped with a standard format of description of public services. Already in early 2017, successful implementation of the interoperability platform allowed the country to provide 467 e-services through the portal which by now has been extended to 2257 services. Importantly, it was made conceptually clear what a digital service means (gradation from information to fully transactional service according to the UNPAN classification https://publicadministration.un.org/egovkb/portals/egovkb/Documents/un/2003-Survey/unpan016066.pdf). In 2021, 1207 electronic services in e-Albania portal were of level 3 or 4.

The NAIS was authorised for reviewing and approving of all new government IT systems prior to their funding, ensuring that principles related to service delivery, such as reuse of already existing data (the 'once only' principle), are implemented. While in 2017 42 information systems were connected to the interoperability technical solution, currently 58 systems are connected.

It also started a rigorous process of data collection on the progress of transformation regarding individual services, resulting in monthly and quarterly progress reports to the Office of the Prime Minister's Delivery Unit. Over time, the metrics has been expanded to ADISA also introduced central tools and guidelines for measuring user satisfaction provided through physical channels and developed a quality assurance framework implemented in key central government institutions first and spread further along the way.

Kosovo also developed an e-Government Strategy. Since developing the technical infrastructure and tools is expensive, significant amount of additional funding (in the form of a loan) also has been used in Albania and Serbia to boost the digital transformation. Kosovo was in early 2023 negotiating a World Bank loan for digitalisation which would give it a chance to undertake reforms more rapidly and comprehensively.

In 2021, Kosovo established a position of the Government CTO as adviser to the Prime Minister with a small designated Digital Transformation Team attached to him. Kosovo case is quite complicated because the formal responsibility for the digitalisation of public administration lies with the Ministry of Internal Affairs (MoIA), itself a product of amalgamation of the Ministry of Public Administration with the MoIA, and the technical capacity lies in the Agency for Information Society under the MoIA. In addition, Kosovo established in 2023 two high-level co-ordination bodies: the Commission of the Government for digital transformation led by the Prime Minister, and underneath it the Technical Committee of Government for digital transformation led by the Government CTO. Not every ministry participates in the work of these bodies, but those which have capacity and competence in setting the strategic direction for digital government development, such as the Ministry of Finance, Labour and Transfers, Ministry of Economy, or Agency for Information Society which serves the entire government. Kosovo has adopted E Governance Strategy of Kosovo 2023-2027 to set the vision and direction for reforms in this area.

3.1.2. Interoperability of registries and application of once-only principle

All the administrations in the WB have introduced the interoperability framework as a concept consisting of four elements: legal, organisational, semantic, and technical interoperability. Interoperability frameworks have been captured through government-approved documents in all the administrations.

Figure 4. Interoperability aspects of EIF

LEGAL				
Compliance with legislation	Bridging legislation	Service terms and conditions	Data sharing principles	
ORGANISATIONAL				
Organisational structures	Collaboration	Service level policies	Governance processes	Business models
SEMANTIC				
Vocabularies	Code lists	Glossaries	Identifiers	
TECHNICAL				
Network for data transport	Interconnection architecture	Standards for data exchange	Security	

Source: Access to base registries. Good practices on building successful interconnections of Base Registries (2016)

Serbia in 2020 updated the technical interoperability standard[54] which complies with several EU programmes and policies:

- eIDAS Regulation No 910/2014;
- IDABC Programme – European Interoperability Framework for Pan-European eGovernment Services[55];
- A Digital Agenda for Europe[56];
- ISA Programme – interoperability solutions for European public administrations, businesses and citizens (Decision nr. 922/2009/EC);
- The European e-government Action Plan 2011-2015;
- European Interoperability Strategy EIS;
- European Interoperability Framework v1.0;
- European Interoperability Framework v2.0.

54 List of Interoperability Standards. Version 2.1. Available at: https://www.ite.gov.rs/extfile/sr/2003/LISTA_STANDARDA_Tehnicke_Interoperabilnosti%20v%202.1.pdf

55 https://joinup.ec.europa.eu/sites/default/files/custom-page/attachment/2021-11/EIF%20V1.0.pdf

56 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245R(01)&from=EN

There is a clear link between the number and sophistication of services available through the e-government portal – or through other channels – and the number of registries connected (see Table 7).

Table 7. Number of registries connected to the interoperability platform and number of transactions over interoperability platform

Administration	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
AL	58/47	265 million	Yes[57]
BiH	29/20	N/A	Yes
ME	19/0	91,026[58]	No
MK[59]	N/A[60]/N/A[61]	1,484,018	Yes
RS	55/20	2,239,710[62]	Yes
XK	32[63]/7	30,498,800	No

There is a difference on how the administrations interpret the number of transactions over interoperability framework (not to be confused with number of services delivered to the citizens and businesses). In the Albanian interoperability of registries, transaction is every call of every web service exposed through the government gateway. Transactions include both a human intervention sending enquiries to registries (e.g. in all cases of pre-filled fields in the application form, when applying for a service) and machine-to-machine enquiries (interaction among systems).

To make sure that the registries are managed economically (i.e. they do not duplicate data unnecessarily), a good practice is to have a register of registries which contains information about all the official registries kept by each and every government body.

In Albania, the National Agency for Information Society (NAIS) keeps a register of databases containing information on all the state databases and their primary and secondary data fields, and the data exchanged over interoperability platform.

Pursuant to the Law on e-Administration (2019), the "registry of registries" called 'Metaregistry' in Montenegro has been established.

In North Macedonia, the government is developing and putting into use the registry of registries along with the Register of Authorizations. It will be part of the broader Electronic System of Registries (eSIR) that will be used for management of several digitized registries, where only authorized users from the institutions will have access to the solution and the data. The main objective for the establishment of registry of registries is to have records and evidence of all registries and data for the purpose of which they are defined and established; the laws stipulating them; the competent authorities responsible for them; and other key data.

Serbia has by legislation mandated a metaregister which is supposed to serve as the register of registries, but in practice it has not been established yet (the aim is to launch it in 2024). The aim is to help prevent exchange of incomplete or obsolete data, and to eliminate unnecessary duplicate data fields in various registries.

In Bosnia and Herzegovina and Kosovo there is no such register.

Most of the administrations in the region use Microsoft platform as their government service bus. This means there is a central server through which all the queries are performed. Montenegro employs open source Service Mix platform with two central servers that are loaded in a balanced manner. According to Table 7, the number of annual queries varies tremendously, such as between Albania and any other administration[64]. It is a question what the figures in the table truly represent – only queries from outside the public sector or queries overall, including machine-to-machine and human intervention-requiring enquiries. What the statistics above does not demonstrate either are the most frequent queries which would be relevant to understand which register queries and hence services are most frequent.

How to eliminate administrative service by turning it into a data exchange relying on registries

All the WB administrations issue birth certificates as an administrative service. They may be required by foreign embassies and other foreign state institutions, or by private sector entities, but frequently also by other public sector bodies. As the next step in the progression of turning birth certificates into a digital service, it would be possible to eliminate the need for birth certificates altogether by making the personal data accessible to the interested parties. One such a typical situation is the application to university. If a university where a prospective student applies would have a possibility to make a query to the civil registration or population register, they would be allowed to access data on a person to verify her or his identity, family status and other relevant aspects in a secure and controlled manner. A log would be kept on such a query to make it possible to trace back who made the query and when to make it verifiable that there was a legitimate cause for enquiry by that person.

Through SIGMA monitoring assessments it has been raised as an issue by several administrations that due to difficulties in securing funding for development and maintenance work of the technical infrastructure of the government service bus, there has been slower than expected progress in connecting the registries.

It is prudent to require that the information systems are designed so that they offer analysis and reporting capabilities. If there are several users to the same information system, the public body managing the information system would also need to cater to the needs of other users so that these can also extract reports necessary for their own decision-making. Initially it may be sufficient if such requests are catered to *ad hoc*, but for future development initiatives should enquiry needs already be built in the design phase.

3.1.3. Data quality and availability in digital format

SIGMA assessments according to the Methodological Framework[65] looks at key aspects of the quality of base registries – if they are in digital form and exhaustive (i.e., 100% of register information is stored in digital form) and if access to the registries is possible through a data exchange infrastructure. SIGMA assessments include the following base registries: population, business, vehicles, and land. The EU NIFO survey also adds tax register to the above four to complete the list of base registries.

SIGMA review of 2022 revealed that there has been a steady improvement in terms of digitalisation of base registries in the WB, although administrations differ in terms of the extent to which the base registries are fully digital. In all the administrations business registries have been the first base registries to be digitalised from early on[66]. Population registries[67] are also fully digital in all the administrations since 2021. Vehicle registries are fully digital in all the administrations except in North Macedonia and land registries have been the slowest to be fully digitalised, still not available in Albania and Montenegro.

Access to registries over government interoperability solution reflects broadly the same pattern: population registries exchange data with other registries over the government common interoperability solution in all the administrations since 2021 and access to business registries in the same manner is also possible in all the administrations. Access to land registries is possible over interoperability solution except in Montenegro and access to vehicle registries is the least developed, being available only in Albania and Kosovo.

57 The current interoperability system is compliant with EI 1.0 and the Upgrade of the interoperability platform is expected to be compliant with EI 2.0.
58 Note that the figure was low due to cyber-attacks in ME; in 2023, up to 1 September, already 2,571,488 transactions were made.
59 As of 20 December 2022.
60 In 2022, there were 52 connected institutions and 705 webservices available.
61 In 2018, there were 27 connected institutions and 103 webservices available.
62 Covers period 1 January to 15 December 2022. Data provided by the Office for IT and eGovernment (23 December 2022)
63 As of 28 April 2023.
64 In comparison, in Estonia (population 1.3 million), 167 million queries were initiated per month (97% of these by the public sector) and over 3000 services were available over the central data exchange platform X-Road.
65 SIGMA Methodological Framework for the Principles of Public Administration (for IPA countries). Avialable at: https://www.sigmaweb.org/publications/Methodological-Framework-for-the-Principles-of-Public-Administration-May-2019.pdf.
66 Example in BiH http://bizreg.esrpska.com/Home/PretragaPoslovnogSubjekta https://bizreg.pravosudje.ba/pls/apex-/f?p=183:20:205323349227145
67 Note that in administrations where population register does not exist, civil register was looked at instead.

In Bosnia and Herzegovina, there are several fragmented registries which taken together can be considered as an equivalent of population register. They all are operated by the IDDEEA and the data is fully digital and exhaustive. However, the authoritative data is in some cases stored at the municipal level.

Table 8. Existence of registries in digital format and access to them over interoperability infrastructure[68]

	2016	2017	2018	2019	2020	2021	2022
The population registry is fully digitised and is exhaustive, i.e. 100% of register information is stored in digital form, without exclusive paper records	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
The business registry is fully digitised and is exhaustive, i.e. 100% of register information is stored in digital form, without exclusive paper records	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
The vehicles registry is fully digitised and is exhaustive, i.e. 100% of registry information is stored in digital form, without exclusive paper records	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
The land register is fully digitised and is exhaustive, i.e. 100% of registry information is stored in digital form, without exclusive paper records	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
Access to the population registry is possible through a data exchange infrastructure that follows the government's common interoperability framework	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
Access to the business registry is possible through a data exchange infrastructure that follows the government's common interoperability framework	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
Access to the vehicles registry is possible through a data exchange infrastructure that follows the government's common interoperability framework	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK
Access to the land registry is possible through a data exchange infrastructure that follows the government's common interoperability framework	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK	AL, ME, MK RS, XK

Legend. Green – exists; Red – does not exist; Grey – data not available

Source: Authors' compilation

68 Note some inconsistencies in time-series due to variations in data collection practices. Data for Bosnia and Herzegovina were not available.

Several WB administrations have recently (North Macedonia in 2019, Serbia in 2020) established population registries to concentrate data on all the characteristics of population from dispersed registries. This helps to manage data more effectively with eliminating duplication and errors, as well as making data more accessible.

3.1.4. Document exchange between government institutions

Document exchange between government institutions is necessary to support the application of the 'once only' principle. As stated in the SIGMA study on the application of laws on general administrative procedure in the Western Balkans[69], the obligation of the state to exchange data internally and the possibility of communicating electronically is established in the Laws on Administrative Procedure (LAPs) and does not depend on fulfilling any additional preconditions. As discussed in section 3.1.2. on Interoperability, data exchanges between – or access to data in – registries is a necessary precondition for the real-life application of 'once only' principle.

Usually, data exchange between registries does not specify the type of data exchanged, but it would be useful to be specific about one type of information – documents. The reason for that is that document management is a separate discipline from machine-to-machine data exchange which deals with taking care of the documents throughout their entire life-cycle – from creation to use to archiving to termination. Documents may be digitally created or on paper, and they need to be equipped with proper metadata to give them a context – who created them, in what conditions, in relation to what other documents, what parts do they consist of, are they of the final version etc. Documents are usually managed through document registries, and they finally end up in archive, digital or paper based. In such cases, the documents to be exchanged will have to be digitalised first and then shared with another government institution.

Albania has taken seriously the application of 'once-only' principle by creating an information system for document exchange, called the e-Signed Documents Circulation System (SQDNE), between government agencies for the documents which are not available in digital format. The system uses digitally signed document exchanges for speeding up process of obtaining evidence from other government agencies *ex officio* to relieve the citizens from the need to act as couriers between government agencies. The documents are uploaded to the system after being digitised and are accessible to another government agency. A second important functionality of the SQDNE system is monitoring the time to delivery of public services. Specific accounts have been created for the Agency for Dialogue and Co-Governance that has the mandate to monitor the time to delivery of public services, as well as to receive and address complaints from citizens/businesses.

In Bosnia and Herzegovina, ministries and government agencies choose their own document management system. There are no attempts to co-ordinate this work by setting document and their exchange standards or to make the document management systems interoperable. However, by law an electronic document has the same legal validity as a paper document when certain conditions are met.

Also, Montenegro has had since 2011 eDocument management System (eDMS) which was used to manage documents by 20 government institutions. Only in 2018 was it enabled the functionality to exchange documents between ministries and the Secretariat for Legislation in the domain of submitting regulations for publication in the Official Gazette. Digital signature is used to sign the documents by the government. A new technical solution for electronic document management is underway.

In North Macedonia, in 2019 the Law on Electronic Management and Electronic Services and the Law on Electronic Documents, Electronic Identification and Trust Services where adopted. These laws make possible the mutual exchange of documents between public bodies *ex officio* and give legal value to electronic documents.

In Serbia, software solution e-Registry Office (*ePisarnica)* has been envisaged[70] as the central information system for

69 SIGMA Paper No. 62. Available at: https://www.sigmaweb.org/publications/implementation-laws-administrative-procedure-western-balkans-sigma-june-2021.htm.

70 Decree on the Office Operations of State Administration Authorities, Official Gazette 1/20, 32/21, 14/2023. Available at: https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/viewdoc?uuid=c82b5371-760b-4ad0-99d7-365311781470&regactid=435125&doc-

document management in the public administration, available to all state bodies and local self-government units, but due to lack of funding it has not yet been made operational. Meanwhile, office operations are still largely carried out in the traditional way. Many authorities use case management systems, but many of these systems are rudimentary and limited to an electronic ledger without digitising and storing documents. Moreover, the solutions used are different, which makes solving the interoperability problem even more difficult[71].

In Kosovo, all the ministries and government agencies are free to choose their own document management system. The Tax Administration has used Electronic Data Interchange platform to receive documents, such as annual income tax declaration and annual financial report of the companies in electronic format. However, it is not in universal use so the Business Registration Agency for example still requires hard copies of signed documents from the entrepreneurs. Document management is co-ordinated by the Archive Office.

3.1.5. Catalogues of public services

There are two types of catalogues in the WB developed for the purpose of management of public services: one related to the collection of administrative procedures (Serbia) and the others related to the collection of administrative services.

In Bosnia and Herzegovina, there was an attempt of establishing the service catalogue for G2G services that is being offered by the Council of Ministers of Bosnia and Herzegovina General Secretariat. Around 227 service of Council of Ministers of Bosnia and Herzegovina were identified, described, categorised and structured, portal platform was established as part of Council of Ministers' web system, but was never published due to lack of legislative and operational preconditions necessary for sustainability of this portal. Portal was organised on life events and services concept (citizen in focus). Also Service catalogue for Brčko District of Bosnia and Herzegovina were published as an example of practice. However, this initiative has stalled over the last couple of years .

In Montenegro, the Law on Electronic Government obliges the public bodies to publish a catalogue of e-services on their websites and to submit it to the Ministry of Public Administration to publish the consolidated catalogue on the Government portal. The MPA started to establish the catalogue in 2021 and as of 31 May 2021, there were 96 e-services listed. In 2022, a project was launched in co-operation with the UNDP to expand on the catalogue of services based on 5 pilot institutions, central and local, of services that are not necessarily electronic. More than 50 descriptive attributes for each service are collected. However, this experience has demonstrated that there are challenges involved, such as a lack of commitment from the institutions and no suitable software solution.

In North Macedonia, the Catalogue of Public Services has 1,497 entries. As defined in the Law for Electronic Management and Electronic Services, *"Catalogue of services for the purposes of this law is a single register of services, which clearly and unequivocally states: the competent authority that provides each individual service, the law from which the service derives and the responsibility of the authority, the conditions that must be met for use of each individual service, as well as the evidence required for using the specific service, based on the law"*. In fact, the Catalogue of Public Services is an electronic database where data for all public services is entered, kept and managed in a structured format. Besides data mentioned in the definition such as basic data, competent authorities and legal grounds; deadlines, data about the payments, legal remedies, types and categories, life events, contact data, points for application, FAQ, data about versioning, short and long descriptions, etc. are being collected and kept. Considered as a tool, the catalogue is available to authorised public authorities' personnel only.

789 out of the 1,336 services data entered to the Catalogue of Public Services are published on the National e-services Portal's public section. Prior to publication, entered data is verified by the authorized officials (civil servants) from the competent authorities and finally approved by the MISA. Translations of the entered data in two languages are stored in the Catalogue.

type=reg.

71 Ex-post Evaluation of the E-government Development Programme 2020-2022.

In Serbia, the Digital Register of Administrative Procedures was launched in June 2021 through the ePaper Programme. The register has a public interface to the web portal, containing detailed information on over 2,300 procedures for business entities and, as of 2023, 212 procedures for citizens.

In Kosovo, in early 2023, the catalogue was in the process of being developed and contains 658 services . There is no information available about the maturity level of digital services. Kosovo has also a register of permits and licenses because its Deregulation Programme envisaged the need to eliminate the unnecessary permits and licenses specifically. The former is managed by the MoIA, the latter by the Office of the Prime Minister.

Showcasing the digitalisation of services across the public administration in Serbia: ePaper Programme[72]

Through the ePaper Programme, authorities responsible for administrative procedures first described the procedures in a uniform manner, following a common methodology and training, and therefore built a collection of more than 2.6 thousand administrative procedures for business entities in Serbia, at the central and provincial government levels. Based on this joint effort, a unique digital database of administrative procedures was formed in 2021. The Register is publicly available, currently displaying comprehensive and detailed set of information for 2.3 thousand services for businesses provided by 93 administrative bodies. This includes both online and offline services. Information includes who the procedure is intended for, forms for download, necessary documentation to be submitted, address and working hours in case of an offline service, service fees, payment instructions, deadlines for service completion, information on the appeals procedure. Services available online can be initiated directly at the Portal, thanks to its connection to the eGovernment Portal.

The catalogue of procedures served the leading agency, the Public Policy Secretariat (PPS), to develop a plan on simplification/optimisation and digitalisation of public services. A specific methodology guides the simplification under the ePaper project. Teams co-ordinated by the PPS analyse administrative procedures and develop recommendations for simplification. A special checklist helps carry out the analysis. It includes questions as the following: whether forms can be pre-filled or filled out online, whether deadlines can be shortened, whether information can be obtained ex officio, whether requested fees correspond to actual costs, etc. The process can have three possible outcomes: 1) deregulating i.e. abolishing entire procedures, 2) streamlining multiple procedures and/or eliminating overlaps or inconsistencies and 3) reducing costs through simplifying forms, reducing administrative fees, etc.

By 2021, 352 administrative procedures were fully optimized, of which 21 were abolished. This resulted in savings for the business sector in the amount of over 30 million euros. The share of total administrative burden in GDP was reduced from 3.26% in 2016 to 2.92% in 2021.

Another component of the programme relates to digitalisation of the most frequent services. Under the programme, 64 administrative procedures under the jurisdiction of 6 public administration bodies were digitized.

The PPS developed a new programme for the period 2022-2025. The PPS also prepared the Guidelines for the selection of priority procedures for digitalization. Administrative procedures that will be digitized will be selected based on their technical readiness for digitization (existence of up-to-date digital registries and records, the possibility to connect to the service bus) as well as on the basis of the potential positive effect that the digitization of these procedures will have on economic entities and citizens. Digitization of 200 administrative procedures and 20 business episodes was planned.

72 Programme for simplification of administrative procedures and regulations "ePaper" for the period of 2022-2025. Available at: https://ekonsultacije.gov.rs/viewPdfAttachment/d886c303-b69d-4fa2-ae1c-6f989610a4db.pdf/commentGathering/25/4/undefined/1

3.2. Digital infrastructure

3.2.1. Service Portals in WB Administrations

There has been a clear move towards concentrating digital services to a portal that would serve as a one-stop shop for both citizen-oriented and business-oriented services. Initially it has not meant that all the alternative websites of individual service providers would be shut down as many have invested substantially to make them work, particularly tax and customs agencies which serve businesses as their main clientele who have entered digital service use earlier than citizens, are more capable of using digital services and value secure and hassle-free digital services highly. Only in Albania there is a clear policy to concentrate all the services to the national portal.

It is certainly useful from a user perspective to find information about the services from one place, particularly if the information is organised according to the logic of life events that are easy to follow. Even if individual websites of various government agencies will be retained for service provision, links from the portal make it easier to get to the right place. Also, if digital identification and authentication will be carried out on the national portal, it sets the security standard which is sufficient for all the transactional services and relieves the agencies from the need to keep up the identification and authentication infrastructure (single sign-on).

Table 9. Existence of e-government portal and its main characteristics

Administration	E-government Portal	Number of Services	Number of registered users
AL[73]	e-albania.al	1,227	2,800.000
BiH	https://www.vijeceministara.gov.ba	227	98,180[74]
ME	www.euprava.me	403[75]	106,326
MK	https://uslugi.gov.mk/	835[76]	87,161
RS	https://euprava.gov.rs	340	1,588,101
XK	ekosova.rks-gov.net	150	753,000[77]

Albania took a radical decision of diverting all service requests from citizens and business to an electronic channel, the government portal e-Albania[78], from 1st January 2020. The institutions' service windows and the ADISA's one-stop shops converted into assistance desks for citizens and businesses to open an account on e-Albania and supporting them with the online application. Another decision was taken by the Government to close all the front offices (including one-stop shops) for services which do not require physical presence and push the citizens towards independent use of the portal. This is one of the reasons why Albania has by far the highest rate of population registered as users on the government portal. However, how this reform changed the accessibility to administrative services, particularly to vulnerable groups, is not studied.

Bosnia and Herzegovina developed a portal with 227 services of the Council of Ministers, which were described, categorised, and made available through a central portal. However, the information was never published due to lack of legislative and organisational preconditions.

Montenegro has a central portal euprava.me but several institutions run also separate websites for their services, such as the Ministry of Education, Science and Innovation, the Revenue and Customs Administration, The Ministry of Interior and others.

73 Central government services only.
74 2021 data: https://bhas.gov.ba/data/Publikacije/Saopstenja/2022/SBR_01_2021_Y1_1_BS.pdf.
75 Of these, 307 are informative and 96 are two-way services. No services are available through web forms or as transactional services.
76 As of 20 December 2022.
77 As of 26 January 2023.
78 Prime Minister's order No. 158 of November 25, 2019.

In North Macedonia, the 835 e-services provided through the main e-government portal are from 39 government agencies. There are examples of pre-filled webforms from North Macedonia.

Kosovo has set a target to digitalise 350 public services by the end of 2025. It took a giant leap towards increasing the number of users of e-Kosova portal by making registering for COVID-19 vaccination possible only through the government portal.

For most of the service catalogues there is no information which ones keep consistent account in their service portfolios of the maturity level of services. In Albania, however, this information is consistently collected where the services are divided into five levels of maturity and each service has been rated according to the maturity level. Also, Montenegro and Serbia were able to provide this information, they both use a four-level scale. In Serbia, all services on the eGovernment portal are at the sophistication level three or four. 26% of all services are available as complete online transactions (level four).

This information is useful because it allows to determine which services require a higher level of security (transactional services) and which ones do not require secure access beyond minimum level (informational services). Furthermore, if the catalogue of services will be used for interfacing service descriptions and other information to the public, such as through the government portal, there needs to be a mechanism in place to ensure that the information is kept up-to-date and easily understandable (plain language).

3.2.1.1. Digital ID

Secure digital identity is the cornerstone for operating in digital environment. Digital services cannot be provided unless there is some kind of a mechanism to identify a person beyond reasonable doubt. The relative strength of digital ID determines the range of services that are potentially available to the public due to the varying degree of risk and potential adverse impact of undertaken actions online.

According to the SIGMA 2022 Monitoring Report[79], when in 2003 the ID card with a chip was introduced across the territory of Bosnia and Herzegovina, it was intended also to carry the certificates for electronic signature. However, the infrastructure has not been developed to make it work, although the central agency IDDEEA was accredited as qualified trust service provider in the meaning of eIDAS[80]. Instead, due to the need for electronic signature for businesses being greater than for citizens, tax authorities at the state, Federation of Bosnia and Herzegovina and Republika Srpska levels have each developed their own systems, not relying on the ID card but devising their own technical solutions. In Republika Srpska entity, since 2021 there is an obligation for legal entities to submit all tax declarations electronically through the web portal, using an electronic signature based on certificates installed on the computer, available free of charge, was introduced. The tax authorities have thus become certification authorities. Republika Srpska also did not put the certificates for electronic signature on the ID card but developed its own solution.

In Montenegro, digital identity is provided by the Ministry of Interior for free issued on ID card which has both the certificate for electronic identification and the certificate for a qualified electronic signature. This system has been assessed to be of substantial degree of security. Alternatively, Montenegrin Telecom also issues eID (called Ctrust eID) for fee both for natural and legal persons. This solution is based on two authentication factors (username and password, and dynamic authentication factor one-time password). Currently, there are about 290,000 users. According to the Law on Personal Identity Card, all citizens of Montenegro will have such ID card from 2025. Both actors are registered in the Register of Electronic Identification Systems, managed by the Ministry of Public Administration[81].

79 The Principles of Public Administration. Monitoring Report 2022 on BiH. Available at: https://www.sigmaweb.org/publications/Monitoring-Report-Bosnia-and-Herzegovina-May-2022.pdf
80 IDDEEA was accredited as QTSP under eIDAS standards, legally there are no obstacles for issuing eID with certificates necessary for digital identity. State level institution responsible for indirect tax is also QTSP and is offering qualified signatures for the legal entities. These signatures can be used for VAT related services, customs services and for singing the document in other electronic communications according the eDocument legislation.
81 https://www.gov.me/clanak/elektronska-identifikacija-i-elektronske-usluge-povjerenja

In North Macedonia, there is not a state-run digital identity while e-certificates are provided by two private entities. Both qualified signature creation devices, such as PKI token are in use, as well as software solutions in PKI cloud.

In Kosovo, digital ID is vested into the ID-card as the personal identification document which carries the certificates that can be used for digital identification and giving electronic signatures. However, in practice it is not in use due to the problems with maintaining the software and until recently also the lack of services that could be accessed by the digital identity.

Despite the importance of digital ID in building the e-government infrastructure, surprisingly little is studied how the digital identity ecosystems work in the WB. Since in successful administrations both the public and private sector contribute to the success of digital identity systems, it is a rather complex interplay between various players. The OECD adopted its Recommendation on the Governance of Digital Identity[82] in June 2023 as a first attempt to harmonise the principles among its member states. It emphasizes the following principles:

1. User-centred design and inclusiveness towards developing digital identity systems;
2. Portability towards eID solutions in terms of technology, location (in-person, remote) and sector (both public services as well as wider economy);
3. Accessibility and affordability;
4. Protection of privacy and prioritisation of security to ensure trust in digital identity systems;
5. Catering to cross-border use scenarios by supporting international co-operation;
6. Strategic approach to digital identity and clear definition of roles and responsibilities across the digital identity ecosystem.

Likewise, the EU is promoting cross-border use of digital identity. Within the European Union, eIDAS Regulation[83] regulates the internal market for Trust services in the EU, contributing to the implementation of the European Digital Single Market. More concretely, the eIDAS Regulation establishes the cross-border recognition of national electronic identification schemes, in cases where Member States have notified these electronic identification schemes. This allows to recognise each other's digital signatures which is a real value with regard to economic transactions, as well as service delivery situations.

SIGMA has throughout its assessments in the WB checked since 2017 if the legislation is compatible with eIDAS. In 2021, Bosnia and Herzegovina's and Kosovo's legislation was not eIDAS-compliant, neither was Albania's as the cross-border acknowledgement of digital signatures was a missing element in legislation, whereas in Montenegro, North Macedonia and Serbia the legislation is eIDAS-compliant.

3.2.1.2. Single Sign-On

Single Sign-On (SSO) is a solution to make accessing government websites requiring digital identification easier for a user. It works as a single entry point through a central access management setup which is used to identify a person prior to taking him or her to whatever government website may be offering a public service.

SSO is developed only in Serbia where through an account on the national eID portal (eid.gov.rs) users can access several government portals: eGovernment portal, eHealth, local tax administration portal, eInvoice, My first salary, and My eGradebook, and Serbian Business Registries Agency[84]. Work is in progress to enable SSO for more portals, such as the Central Register of Compulsory Social Insurance, Pension and Disability Insurance Fund, and eTax portal. The eID Portal enables mobile authentication through the ConsentID mobile application which is a novelty.

82 OECD (7 June 2023). Recommendation on the Governance of Digital Identity. Available at: https://www.oecd.org/gov/digital-government/draft-oecd-recommendation-on-the-governance-of-digital-identity-public-consultation.pdf.
83 Regulation (EU) No 910/2014. Available at: https://eur-lex.europa.eu/legal-content/ES/TXT/?uri=uriserv:OJ.L_.2014.257.01.0073.01.ENG.
84 Eid.gov.rs.

In Albania, where almost all the digital services are available from the central portal e-Albania, SSO is by default built into it. Tax administration which had its own credentials previously now uses e-Albania credentials.

In Montenegro, the information system for identification and authentication (NS-eID) has been set up to allow for authentication and authorisation of users when using electronic services (idp.gov.me). It is a solution which will be integrated into various government service provision frameworks and utilizes different technical measures of access, such as username/password, ID card, certificate for qualified electronic signature or seal of various qualified providers of electronic trust services.

In Bosnia and Herzegovina, Kosovo, and North Macedonia there is no SSO.

3.2.2. E-Payment

In 2018, e-payment solutions were in place in Albania and Serbia.

In Albania, electronic payment can be completed in the e-Albania portal, through the government payment platform, connected to banking institutions. For anyone who owns a credit or debit card of any bank inside or outside Albania, it is possible to make online payments.

In Bosnia and Herzegovina, in 2018 the Public Administration Reform Coordinator's Office (PARCO) at the State level developed a Proof of Concept of e-payment, eID and single sign-on solutions for all the administrative levels, but this has not moved further since then. However, the Law on Administrative Fees of Bosnia and Herzegovina does not envisage the possibility of paying administrative fees electronically. In Republika Srpska, Federation of Bosnia and Herzegovina and Brčko Distrikt of BiH the legal situation is similar, although the Law on Internal Payment Transactions in Republika Srpska and in Federation of Bosnia and Herzegovina allows electronic payment.

Montenegro integrated the Information System for the Collection of Administrative Fees into the eGovernment portal to allow for payments online. In the pilot phase, four services of the Ministry of Justice were made available for the citizens to pay for online. Payments can also be executed electronically for the services which are not available in electronic format.

In North Macedonia, e-payment was implemented for the first time in 2018, and is being upgraded and improved over time, following the technologies that are available. At the beginning through the introduction of card payment, then electronic banking, so that today the North Macedonia also has m-banking. Payment for public services such as electricity bills, water bills, property taxes, customs and other related charges was leading the way of e-payment.

In Serbia, the electronic payment system ePayment+, in effect since 2017, was designed to provide the possibility of integrating the administrative fee payment procedure with independent applications of institutions that independently offer electronic services. This means that institutions have the possibility to completely automate the process of submitting electronic requests, including online payment, and thus make it easier for citizens and businesses to interact with the administration. If the institution has no aims to independently develop electronic services that would be integrated with the ePayment+ system, then it can create an electronic service on the eGovernment Portal. Electronic services created this way also use the ePayment+ system. In 2021, the Government launched the ePayment Portal. It currently enables fee payments for 300 services of the Ministry of Interior and one service of the Tax Administration. Apart from this, citizens can also pay administrative fees with payment cards and iPay option through the eGovernment Portal, Local Tax Administration Portal, ePayment of court fees (Ministry of Justice), eForeigner residence, eRegistration Portal (Register of Companies), Central Register of Facilities (Ministry of Agriculture) and the Institute for intellectual property.

In Kosovo, there is no e-payment system integrated into the e-Kosova portal yet. The solution developed by the Tax Administration of making arrangements with individual banks to connect to them directly is not feasible for the rest of the administration due to the high costs involved. As long as e-payment integration is not solved, there is little room for fully digital services.

3.2.3. Digital signature and timestamping

While digital identity provides the means to be authenticated in government digital environments, digital signature is the tool for allowing for digital transactions where a person's will is registered in a digital format, thus not requiring the physical. According to eIDAS Regulation, there are three levels of assuredness regarding electronic signature: simple, advanced and qualified, each providing an increased level of assuredness compared to a previous one.

Table 10. Types of electronic signature according to eIDAS

Simple electronic signature	An electronic signature is defined as "data in electronic form which is attached to or logically associated with other data in electronic form and which is used by the signatory to sign". Thus, something as simple as writing your name under an e-mail might constitute an electronic signature.
Advanced electronic signature	An advanced electronic signature is an electronic signature which is additionally: • uniquely linked to and capable of identifying the signatory; • created in a way that allows the signatory to retain control; • linked to the document in a way that any subsequent change of the data is detectable. The most commonly used technology able to provide these requirements relies on the use of a public-key infrastructure (PKI), which involves the use of certificates and cryptographic keys.
Qualified electronic signature	Qualified electronic signature is an advanced electronic signature which is additionally: • created by a qualified signature creation device (QSCD); • is based on a qualified certificate for electronic signatures; • it is equivalent to a handwritten signature.

Source: European Commission eSignature Knowledge Base[85]

In Albania, digital signature exists since 2015 but its use in signing digital documents has been particularly boosted over the last three years with the adoption of the 'digital by default' approach to service delivery. In 2021, more than 17,000 digital signature certificates were released by NAIS. The RSS signatures are integrated into more than 20 state information systems.

E-seal has been used in the public service delivery since 2017. There are 55 fully automated digital services in e-Albania portal that automatically generate a document without human intervention. These documents are electronically sealed and placed in the 'My space' section of an individual's account. The authenticity of the printed e-sealed document can be verified by scanning the QR code included in the seal. It is estimated that a total of 23 million e-sealed documents have been generated through e-Albania since 2017.

85 European Commission's eSignature Knowledge Base. Available at: https://ec.europa.eu/digital-building-blocks/wikis/display/ESIGKB/What+are+the+levels%2C+simple%2C+advanced+and+qualified+of+electronic+signatures

In Bosnia and Herzegovina, the IDDEEA eID system was certified by the International Accredited Conformity Assessment Body to become a qualified trust service provider (QTSP) in 2021. It was accredited in 2022 by the Ministry of Transport and Communications (MTC) of Bosnia and Herzegovina. Likewise, the Indirect Taxation Authority (ITA) of Bosnia and Herzegovina is accredited and registered by MTC as QTSP since 2021. This means that taxpayers have been able to apply to the ITA to obtain digitally qualified certificates, as well as to use electronic services developed by ITA since July 1, 2021. In Republika Srpska, the legislation supports digital signature and the Ministry of Scientific and Technological Development, Higher Education and Information Society issues qualified electronic signatures to individuals and legal entities. Tax Administration of Federation of Bosnia and Herzegovina allows to fulfil tax obligations electronically.

In Montenegro, the Law on Electronic Identification and Electronic Signature is in place since 2017. Only from 1 June 2020 did the Ministry of Interior start issuing digital certificates with national ID cards to citizens not charging extra for the activation and use of the digital signature function[86] (287,076 certificates were issued by July 2023). As of July 2023, also the Post Office of Montenegro (both to legal entities and citizens, costs 80 EUR; 36,657 qualified electronic signature certificates had been issued), CoreIT (to legal entities and citizens, costs 80 EUR; 24,397 qualified certificates for electronic signature or seal had been issued) and the Montenegrin Telecom (to both legal entities and citizens, 9,044 certificates had been issued) issue certificates for electronic signature or seal. In addition, the Ministry of Public Administration issues certificates for advanced electronic signature (to state administration authorities, free of charge; 859 digital certificates had been issued) and the Central Bank of Montenegro issues advanced electronic seal for internal needs (free of charge, 352 digital certificates had been issued).

In North Macedonia, there are a few institutions where "digital by default" is applied. Namely, the Central Registry and the Agency for Real Estate Cadastre are working with digital signatures/digital stamps used for signing the documents by civil servants. Also, documents received as a result of e-services provided by a citizen or business on the national e-services portal are signed with electronic signature of an authorized civil servant and/or sealed with an electronic seal and timestamp from the competent institution.

In Serbia, there are 6 qualified trust service providers registered for the issuing of qualified electronic signature certificates and one registered for the cloud signature.[87] The law regulating digital signature[88] is in line with eIDAS and the requirements are the same for all trust service providers. The signature creating devices are varying, from the chipped ID card provided free of charge, to smart cards, USB tokens, to the mobile app for signing in the cloud. There should be no discrimination for accessing government services when it comes to the provider who issued the certificate.

In Kosovo, there is currently no working solution for digital signature. Although the legislation to harmonise the digital signature with the EU eIDAS regulation has been put in place, there is no technical solution for deploying the digital signature. SIGMA 2021 Monitoring Report concluded that although it would be easiest to use the existing ID card as the vehicle for digital signatures, Ministry of Economy believes that this solution would be suboptimal as, in an era of ubiquitous smartphones and Internet connections, users would additionally need to purchase an NFC card reader which is unnecessarily expensive.

When it comes to the legal effect (e.g. signing a contract between private entities), digital signature has the equivalent legal effect of a handwritten signature by law. The exception is if a special law provides that certain legal affairs cannot be made in electronic form. The exception is if "contracts and other legal affairs are specifically envisaged by the special law to be drafted in the form of authentication of signatures, publicly certified (notarized) documents, or in the form of a public notary record". These should be concluded "in accordance with the regulations governing the authentication of signatures, validation and drafting of documents on legal affairs."

86 SIGMA Monitoring Report on Montenegro. 2021. Available at: https://www.sigmaweb.org/publications/Monitoring-Report-2021-Montenegro.pdf

87 https://epotpis.mtt.gov.rs/eng/trusted-qualified-providers-register/

88 https://epotpis.mtt.gov.rs/download/law-on-electronic-document-electronic-identification-and-trust-services-in-electronic-business-official-gazette-rs-94-17/?wpdmdl=544&refresh=641d723178e051679651377

4. Emerging topics on digitalisation

Since the digital government agenda relies on both technological development and policy agendas in constant evolvement, since the 2018 ReSPA Service Delivery Study was produced, there are several topics which require attention that were not covered in that study. Most notably, open data governance, cyber security, and emerging technologies, such as artificial intelligence and blockchain, deserve some attention. When considering emerging technology, the choice is somewhat arbitrary as there are other technologies that become of interest to the public sector, such as cloud computing or virtual and augmented reality.

However, not all these technologies are projected to be disruptive to the public sector although they are of great interest to the public sector. The European Commission aims to enable access to secure, sustainable, and interoperable cloud infrastructure and services for European businesses, acknowledging the rapid global increase in data volume[89]. The EU supports the development of cloud computing with research and innovation, which will be relevant both for private and public sector. For example, it envisages that the European cybersecurity agency ENISA will develop European cybersecurity certification scheme for cloud services which provides increased assurance to businesses, public administrations and citizens that their data is secure wherever they are stored or processed. Cloud computing has been more disruptive to business models of certain sectors and industries, such as online education market, than at an organisational level where it has merely replaced functions that already existed[90]. That means education institutions may have to adjust their value proposition accordingly. What this indicates is that cloud computing may become of greater interest in the future as the public sector 'business models' will also become genuinely affected by such technology.

4.1. Artificial Intelligence and blockchain

Both artificial intelligence (AI) and blockchain are considered emerging technologies which have a considerable potential for making the public sector smarter, i.e., more agile, efficient, user-friendly in its service delivery, and consequently, hopefully, more trustworthy (OECD, 2019). Both technologies are considered as potentially disruptive, or 'general purpose technologies', which means that they have a potential to impact a wide range of economic and social activities in a profound manner. Certain AI applications are already in everyday use, such as navigation apps using AI to optimize the route to the destination, identification of objects such as faces on pictures and videos, smart assistants in our phones, media recommendations and spam filters. In the public sector, there are a growing number of use cases of application of AI. The European Commission' Joint Research Centre (JRC) has collected more than 680 use cases of AI from the Member States into the EU Artificial Intelligence Observatory[91]. In the OECD Observatory of Public Sector Innovation, there are currently 88 use case of AI and this number is growing.

There is no universally agreed definition of what AI encompasses, because it is a moving target due to the notion of 'intelligence' changing over time. According to the EC AI Act (2021), *"Artificial intelligence system means software that is developed with one or more of the techniques and approaches listed in Annex I and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments they interact with"*. The JRC provides a useful classification of AI. The main classification of cases falls under one of the four categories: learning, communication, reasoning, and perception. At the subdomain level, up to four categories can be combined by their main and secondary adherence. For example, a chatbot might be classified under Communication -> Natural language processing -> Machine learning -> Searching. In addition, a process type and application type are also provided for each use case of AI in the JRC AI database.

89 European Commission. Shaping Europe's digital future. Avaialble at: https://digital-strategy.ec.europa.eu/en/policies/cloud-computing.

90 See, for example, Joe McKendrick's article in Forbes. 'Is cloud computing truly, truly disruptive?'. Available at: https://www.forbes.com/sites/joemckendrick/2016/02/26/is-cloud-computing-truly-truly-disruptive/?sh=3ed44ace4295.

91 European Commission, Joint Research Centre (JRC) (2021): Selected AI cases in the public sector. European Commission, Joint Research Centre (JRC) [Dataset]. Available at: https://data.jrc.ec.europa.eu/dataset/7342ea15-fd4f-4184-9603-98bd87d8239a.

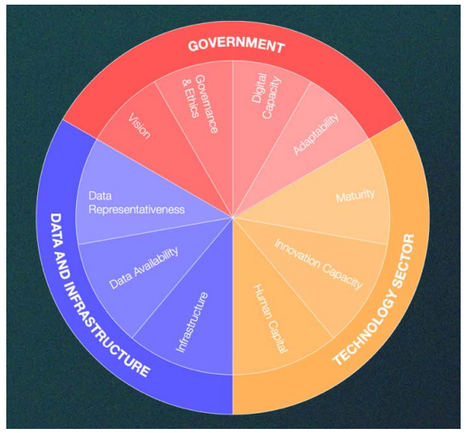
Table 8. AI taxonomy

AI Classification[92]	AI Classification Subdomain
Learning	Machine learning
Communication	Natural language processing
Reasoning	Automated reasoning
	Knowledge representation
Perception	Computer vision
	Audio processing
	Connected and automated
	Optimisation
	Planning and scheduling
	Robotics and automation
	Searching

Oxford Insigths has published annually the Government AI Readiness Index since 2017. In its 2022 edition it covered 181 countries[93]. The index consists of 39 indicators across 10 dimensions, which make up 3 pillars:

- The Government pillar - a government should have a strategic vision for how it develops and manages AI, supported by appropriate regulation of the attention to ethical problems (**governance and ethics)**. Moreover, it needs to have strong internal **digital capacity**, including the skills and practises that support its **adaptability** in the face of new technologies.
- The Technology pillar - a government depends on good supply of AI tools from the countries technology sector, which needs to be **mature** enough to supply the government. The sector should have high **innovation capacity**, underpinned by a business environment that supports entrepreneurship and a good flow of free search and development spending. Good levels of **human capital** – the skills and education of the people working in this sector – are also crucial.
- The Data and Infrastructure pillar - AI tools need lots of high-quality data (**data availability**) which, to avoid bias and error, should also be representative of the citizens in a given country (**data representativeness**). Finally, this data's potential cannot be realised without the **infrastructure** necessary to power AI tools and deliver them to citizens.

Visually presented, the index looks like the following[94]:



92 Definitions and taxonomy of AI has been presented in the JRC Technical Report „AI Watch. Defining Artificial Intelligence 2.0. Towards an operational definition and taxonomy for the AI landscape", page 5. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC126426.

93 Oxford Insights. Government AI Readiness Index 2022. Available at: https://static1.squarespace.com/static/58b2e92c1e5b6c828058484e/t/639b495cc6b59c620c3ecde5/1671121299433/Government_AI_Readiness_2022_FV.pdf

94 Methodology is presented in the Report's Annex 1.

In the Index, Serbia positions the highest (59.), North Macedonia (71.), Montenegro (76.), Albania (82.) and Bosnia and Herzegovina (112.) follow. Kosovo is not yet part of the Index.

Currently, there are no examples of deployment of AI technologies into the delivery of public services from Albania or Kosovo. However, the Digital Agenda Albania 2022-2026 addresses the interest in introducing new technologies, such as AI and blockchain, into the improvement of service delivery. One of the first projects is the preparation of a virtual assistant to guide the citizens in getting information about the services[95]. In Bosnia and Herzegovina, a chatbot was developed in two cities and deployed to assist with responding to citizens' requests via a webpage. Serbia has plenty of cases of AI (see Table 9 below) and there is also a designated National AI Development Strategy, one of a kind the in the WB region.

Table 9. Existence of AI strategy and use cases of big data or AI

Administration	Does your administration have AI strategy?	Use cases of big data or AI in government
AL	Digital Agenda 2022-26 intends to integrate modern technologies, such as blockchain and AI, into the improvement of quality of service delivery	One project in the State Agency of the Cadaster being developed to limit of the possibility to manipulate with registered properties.
BiH	No references to AI in policy documents	Chatbot Municipal Intelligent Assistant in cities of Bjeljina and Laktaši[96]
ME	No references to AI in policy documents	No reported cases
MK	No references to AI in policy documents	No reported cases
RS	The National AI Development Strategy 2020-2025[97]	National Platform for AI (2021) Immunization Management System Viber chatbot Covid-19 Infor Serbia Chatbot IVA (Contact Centre of National Inspections) Chatbot Municipal Intelligent Assistant in Sombor and Šabac Chatbots in eGovernment portal, websites of the Republic Geodetic Authority (cadastre services) and the Ministry of Education (scholarship, school enrolment) OKO SOKOLOVO parking control system in the City of Belgrade
XK	No references to AI in policy documents	No cases

Blockchain is another innovative technology that has a great potential to change the paradigm towards digital government. While in the public domain blockchain is associated a lot with crypto currencies, there are more and more daily applications for this technology both in the private and public sector. Blockchain essentially is a peer-to-peer network which allows people and organisations to agree on and permanently record information without a third-party authority as the database gets replicated over all nodes who are equal partners. In 2022, an overview by the EU Joint Research Centre tapped into an inventory of 167 blockchain technology use cases from European governments[98]. It provides a generalised overview of use cases from the public sector, such as reflecting and accrediting legal property transactions (such as in a real estate or land register), issuance of academic credentials (such as verified credible bachelor-s, master's and PhD credentials) cross-boarder, identity management and asylum process management. McKinsey adds cases, such as social benefits management, and patent protection[99].

95 PM at the event of the closure of physical offices. Link (p 7).

96 Joint project with Serbian municipalities of Sombor and Šabac supported by the German Federal Ministry of Economic Cooperation and Development.

97 AI Development Strategy in the Republic of Serbia for the period 2020-2025, Official Gazette RS no. 96/2019 https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/viewdoc?uuid=43d94c01-6bc3-4f5f-a4ba-9c22d3f3b88a&regactid=429661&doctype=reg

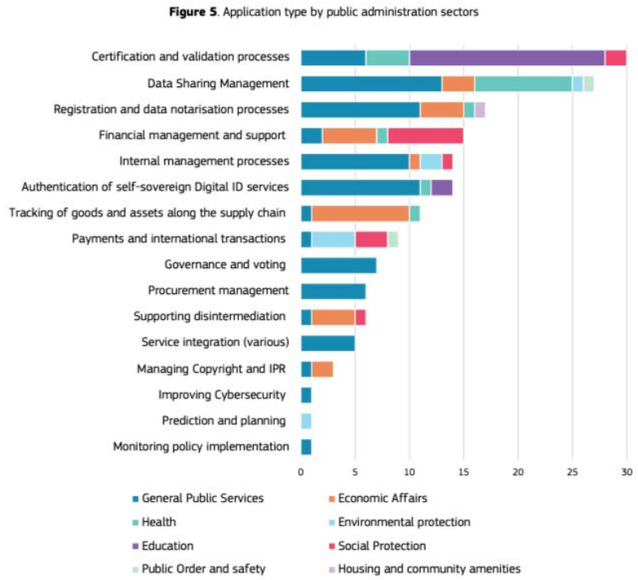
98 Bosch, J.M., Tangi, L. and Burian, P., European Landscape on the Use of Blockchain Technology by the Public Sector, EUR 31332 EN, Publications Office of the European Union, Luxembourg, 2022. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC131202.

99 McKinsey. How governments can harness the potential of blockchain. Accessible at: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/tech-forward/how-governments-can-harness-the-potential-of-blockchain (Accessed on 15 February 2023).

According to the OECD report on emerging technologies, only a few member countries have a specific blockchain strategy. Apart from private sector applications, current experiments of blockchain in public sector have largely continued to follow up mostly centralised governance logic, where the government retains a vast amount of decision making power[100] (so-called private permissioned blockchains). This is due to the need to verify a user's identity to process a transaction.

The following figure illustrates the application of blockchain by application type and administrative sector.

Figure 6. Application of blockchain by application type and administrative sector



Source: JRC

No administration in the Western Balkans has a designated a blockchain strategy. However, in May 2020, the Serbian MPALSG published the "Study on the Feasibility of Using Blockchain Technology in Public Administration of the Republic of Serbia", prepared by a team of Korean experts, lecturers at Serbian-Korean Information Access Center, as part of the joint project between the MPALSG and the National Information Society Agency of the Government of the Republic of Korea.[101] The study proposed introduction of blockchain technology into the integrated administrative system, land administration, agricultural product management and export customs clearance system.

Blockchain is an advanced technology which requires an advanced technology governance capability. The purpose, as always with ICT, is not to deploy a certain technology but to be able to find for it the best possible use given the existing circumstances. There is a need to define a business case, assess technology compatibility, and the required investment. McKinsey[102] also recommends developing proofs of concept and blockchain infrastructure for the most obvious use cases. Benefits, both quantitative and qualitative, such as reduced cost or time saved or improved security or accountability, should guide the decision-making. Once such use cases have proved their value, there is a potential to apply blockchain technology to more complex cases. At the same time, challenges, such as hacking into a blockchain to gain control over its decision-making, are dynamic and need to be constantly reassessed and responded to.

100

101 https://mduls.gov.rs/wp-content/uploads/Blockchain-study-ENG.pdf.

102 McKinsey. How governments can harness the potential of blockchain. Accessible at: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/tech-forward/how-governments-can-harness-the-potential-of-blockchain (Accessed on 15 February 2023).

4.2. Cybersecurity

Cybersecurity was not part of the 2018 Comparative Study on Service Delivery. Digitalisation inherently increases cyber security risks that require attention already in the design phase of information systems, but also regarding the use of information technology. In addition to 'regular' cybersecurity threats which are common to every digitally advanced organisation and administration, cybersecurity also dominates at the security policy agenda of international organisations and individual administration as the Russian war in Ukraine has destabilised the global security landscape. Various international organisations, such as the NATO, European Union, have therefore strengthened their attention to building resilience and cybersecurity among their Member States. The EU has also prepared support for a select number of Western Balkan administrations that are considered to be particularly risk-exposed due to their alignment with the EU sanctions on Russia.

In 2022, the European Commissioned a Cybersecurity Identification and Formulation Study on the Western Balkans. The objective of the study was to assess the current cybersecurity capacity building needs in the six Western Balkan IPA beneficiaries in the light of the EU *acquis*, policies, and best practices, and to identify opportunities for EU engagement with a view to strengthening cybersecurity and resilience. Assessments focused on six key areas of national cybersecurity: (1) institutional framework and governance; (2) legal framework; (3) risk management in national cybersecurity; (4) cybersecurity of critical information infrastructure; (5) the capacities of cyber incident response teams (CSIRTs/ CERTs); and (6) education and awareness raising[103].

The assessment consisted of desk research and field assessment along with interviews and focus group meetings. The questionnaire was based on several existing assessment models and reference frameworks, including the eGA National Cybersecurity Index (NCSI)[104], European Union Agency for Cybersecurity's ENISA's CSIRT Maturity Assessment Model[105], and ENISA's National Capabilities Assessment Framework[106]. The questionnaire was then relied on to assess the level of maturity of cybersecurity capabilities, to examine cybersecurity commitment, and help the IPA partners to identify areas for improvement.

Table 10. Ranking and result of five WB administrations in eGA National Cyber Security Index

Administration	Position in Global Ranking	Score
AL	51	62.34
BA	112	28.57
ME	95	35.06
MK	58	58.44
RS	21	80.52

Source: https://ncsi.ega.ee.

Besides the eGA study, there is the Global Cybersecurity Index measuring commitment to cybersecurity since 2015, conducted by the International Telecommunication Union (ITU). Their latest report is from 2020 and covers 193 ITU Member States and the State of Palestine. The Index maps 82 questions across five pillars:

- Legal measures;
- Technical measures;
- Organisational measures;
- Capacity development measures; and
- Cooperation measures.

In the global ranking, North Macedonia shows up at position 58, Serbia at 39, Albania at 80, Montenegro at 87, and Bosnia and Herzegovina at 110. Kosovo is not part of the index yet. Each administration has been scored on all five dimensions and their relative strengths and weaknesses have been listed briefly.

103 eGovernment Academy (2022). Cybersecurity Identification and Formulation Study on the Western Balkans. Project Report.

104 National Cyber Security Index: https://ncsi.ega.ee Covers All: BA, ME, MK, and RS

105 ENISA SIM3v1 Self-assessment tool: https://www.enisa.europa.eu/topics/incident-response/csirt-capabilities/csirt-maturity/csirt-survey.

106 ENISA National Capabilities Assessment Framework: https://www.enisa.europa.eu/topics/incident-response/csirt-capabilities/csirt-maturity/csirt-survey.

A quick insight into the WB situation in cybersecurity area shows that four administrations of six in the Western Balkans have a national cybersecurity strategy, either as a separate document or incorporated into a wider strategy.

Table 11. Cybersecurity strategy and governance

Administration	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
AL	The Digital Agenda of Albania (2020) has cybersecurity as a chapter with four objectives: protection of information infrastructure, education and awareness, child safety in cyberspace, and improving domestic and international cooperation.	Cybersecurity Council not functional National Authority for Electronic Certification and Cyber Security	National Authority on Certification and Cyber Security (AKCESK)
BA	No state level strategy[107]; Policy for Cybersecurity (Federation of Bosnia and Herzegovina); MoD has cybersecurity strategy and action plan (2017)	Formally assigned to Ministry of Security and the Ministry of Transport and Communication	At state level: Ministry of Security (since 2017 CERT is only for CoM BiH, state level CSIRT/ CERT yet need to be established.)
ME	Cybersecurity Strategy 2022-2026 (2021)	Information Security Council	Since 2019 National Security Authority, previously MPA
MK	National Cybersecurity Strategy and Action Plan 2018–2022 has five objectives: cyber resilience; capacities and culture; combating cybercrime; cyber defence; and cooperation and information exchange; lacks governance and legislative aspects, performance measures	National Cyber Security Council and Operational Implementation Body not functional	Agency for Electronic Communications
RS	Strategy for the Development of Information Society and Information Security (2021) addresses, inter alia, the information security of citizens, economy, and 'ICT systems of special importance'. Cybersecurity is also interwoven into other strategies	Ministry of Trade, Tourism and Telecommunications/ Regulatory Agency for Electronic Communications and Postal Service	Regulatory Agency for Electronic Communications and Postal Services
XK	Cyber Security Strategy under preparation	Cybersecurity Agency (2023)	Regulatory Authority for Electronic and Postal Communications

Source: eGovernment Academy. Cybersecurity Identification and Formulation Study on the WB and authors' updates

4.3. Open data governance

Opening up government data is seen as a mean to creating new economic value through putting the data into productive use in the form of new services and insights. Open data also contributes to greater transparency and accountability of governance. While public access to government information has been traditionally the method to keep up those values, with the proliferation of data in government operations and the uptake of the idea of open-source code in the

107 In October 2019, guidelines were presented for the strategic framework of cyber security in Bosnia and Herzegovina, which is the result of the work of an informal working group of experts from different administrative levels (Council of Ministers of BiH, Republika Srpska, Federation of BiH) and areas of activity in Bosnia and Herzegovina. Universities, representatives of telecom operators, electricity ...), gathered under the auspices of the OSCE Mission to Bosnia and Herzegovina. The strategic framework for BiH is based on the NIS1 directive, and the ENISA best practice guide, as well as on the positive practices of EU countries and neighboring countries that have previously adopted national strategies and established appropriate mechanisms in response to cyber attacks.

computer science communities, producing and making it available in a standardised format makes it a usable commodity both for the private sector, as well as the government itself. International forums, such as Open Government Partnership[108] and Open Data Watch, have contributed to the increased awareness of the opportunities provided by open data, but also the work needed to make it useful through data interoperability and standard classification systems (metadata)[109].

The EU Open Data Maturity Report 2022[110] presents open data maturity assessment results against four dimensions: Policy, Impact, Data portal and Quality of data. Four of the WB administrations were represented in the study of 34 administrations overall. While Serbia is the regional leader in open data, it falls into the category of 'Followers', third maturity level overall, in comparison of the 34 administrations, getting close to the 'Fast trackers' category. The rest of the WB administrations in comparison, Albania, Bosnia and Herzegovina and Montenegro, all fall into the 'Beginners' category. All the WB administrations are strongest in the Policy category with a relatively solid policy framework in place while Impact and Quality categories tend to be the weakest. Portal usage, on average, is the strongest criterion across the WB indicating that there is a great interest in open data in all the administrations involved.

Table 7. Open data portal and the number of datasets available

Administration	Link to open data portal	Number of datasets	Maturity level and score (%)
AL	https://opendata.gov.al/	91	Beginner/ 34
BiH[111]	https://cbbh.ba/Content/Read/1133	N/A	Beginner/18
ME	https://data.gov.me/[112]	166[113]	Beginner/49
MK[114]	https://data.gov.mk/en/ https://ovp.gov.mk/	607[115]	N/A
RS	https://data.gov.rs/sr/datasets/adresni-registar-shi-farnik/[116]	2178[117]	Follower/66
XK	https://opendata.rks-gov.net	214[118]	N/A

Albania has introduced the Law on Open Data and Reuse of the Public Sector Information in 2022 which partially transposes the EU Directive on Open Data and the Re-use of Public Sector Information. The government open data portal is managed by the NAIS. The number of datasets available is still low.

The open data portal at the level of Bosnia and Herzegovina was piloted but is currently not publicly available.

In addition to this portal, there are several local open data portals available. One notable example is the portal for the city of Prijedor, which provides access to 174 datasets.

108 Open Government Partnership, an international initiative from 2011, which mission is to provide a domestic and international platform to empower reformers inside and outside of government who are seeking to open up their governments. As of early 2023, there were 78 national/central and 106 local governments as members taking part in OGP.
109 See, for example, Badiee et al. (2021). Available at: https://opendatawatch.com/publications/open-data-for-official-statistics-history-principles-and-implentation/.
110 EU Open Data Maturity Report 2022. Available at: https://data.europa.eu/en/publications/open-data-maturity/2022?pk_campaign=launch&pk_source=li#country-overview (accessed 15 January 2023).
111 In addition, a pilot project for the Council of Minister of BA has been prepared but not yet operational. The materials are available at this link: http://podaci.gov.ba/en/ There are two operative Open data portals in IDDEEA https://odp.iddeea.gov.ba/home and in city of Prijedor https://opendataprijedor.ba/
112 Established 2018 (See OGP: https://www.opengovpartnership.org/members/montenegro/commitments/ME0067/)
113 As of 23 July 2022. Before the cyber-attack on Montenegro, there were 197 data sets available on the open data portal.
114 As of 20 December 2022.
115 As of 31 December 2022.
116 Established mid-2017 (see https://www.opengovpartnership.org/wp-content/uploads/2020/12/Serbia_Action-Plan_2020-2022_EN.pdf)
117 As of 20 March 2023.
118 As of 31 December 2022.

Montenegro has a decent number of datasets available in open data format and according to the Open Data in Europe 2022 report, its maturity level of open data governance is the second highest in the region, although still less that 50% of the possible score. Its relative strengths are related to data quality, deployment quality and open data implementation .

The open data portal of North Macedonia is readily accessible at https://data.gov.mk. This portal offers a comprehensive collection of open datasets, with a total of 607 datasets available from 74 different organizations, among which there are several potential datasets that could be considered high value data sets.

In Serbia, opening of governmental data is regulated in the Law on Electronic Government from 2018. The open data portal of Serbia is the most advanced in the WB, providing the access to 2,178 datasets sourced from 113 different organizations and offering a wide range of information spanning various sectors.

The Open Data Portal, opendata.rks-gov.net is the official catalogue of 214 open datasets published in Kosovo. All institutions are obliged to open and publish their data in this platform. The Portal is managed by the Agency of Information Society - Ministry of Public Administration.

Albania (since 2011), Bosnia and Herzegovina (2014), Montenegro (2011), North Macedonia (2011) and Serbia (2012) are members of the Open Government Partnership. All of them have addressed open data through their action plans.

5. Taking stock of digitalisation in the Western Balkans and a way forward

It is evident, based on the indexes and studies referred to earlier in this study, that the WB administrations have made progress since 2018 when the initial ReSPA Service Delivery study was carried out. However, the information demonstrating the progress is not condensed into a dashboard-type presentation to take stock of both digitalisation efforts and their impact on the digital service availability and quality. As we saw earlier, only one WB administration, Albania, has a proper measurement framework in place run by the government – not for the government – which allows to detect progress and challenges.

SIGMA Data Portal with data from 2021 Monitoring Reports illustrates this point. Only Albania has set in place a comprehensive performance monitoring framework which captures relevant aspects of service delivery performance (see Table 2). Albania has also been collecting information about the maturity level of each digital service and knows the percentage of administrative services digitalised – 95% - across government, reflecting its ambition to digitalise 100% of them. Also, Serbia monitors the performance of online transactions but not as comprehensively as Albania.

Due to limitations of the SIGMA methodology, there is no information about what data is collected regularly on other aspects of digitalisation by the governments themselves (see section 2.4. of the study). The situation will improve vastly when SIGMA starts to use the renewed set of Principles of Public Administration and the corresponding indicator set on digitalisation. It will allow to assess digital government readiness and maturity, both concepts that get into the heart what the original ReSPA service delivery study intended to capture, but adding a greater focus to that attempt.

Digitalisation can be seen from the system perspective (so to speak macro view), as captured by the SIGMA Digitalisation Principles, or from the organisational and individual service perspective (micro view), which is captured to some extent by the SIGMA Service Delivery Principles. Corresponding to those two perspectives, next we will explore the toolsets which help to improve the governance of digitalisation in the Western Balkan context.

5.1. Public services portfolio management

One of the key conclusions from ReSPA 2018 Digitalisation Study is that the public services management maturity was still low. It is not much different from the situation in the European Union Member States some years ago when a similar conclusion could be drawn. Some administrations that had realised this limitation were eager to improve their public services management. Estonia, an EU Member State, put forth one of the more systematic attempts to take stock of the existing situation and set forth a path to improvement. In 2014, a study on 'Integrated Portfolio Management of Public Service' was commissioned the purpose of which was manifold: to develop common principles and methodology on how to describe public services (vocabulary of public services or meta-database, its data model, and technical architecture); create a framework based on single vocabulary (benchmark model) for creating an integrated dynamic portfolio of the state's public services: the concept of the catalogue and architectural alternatives, their comparative assessment on the infotechnological, organisational, and legal implementability.

The results of the study became a de facto benchmark for developing tools at the EU level to support the standardization of concepts and vocabulary to unify the approach to service delivery across the SMember states. The EU, under the European Interoperability Framework Initiative, developed a metamodel called Core Public Sector Vocabulary Application Profile (CPSV-AP) . It allows to agree on concepts, such as 'service', 'process', 'responsibility for service management' and other relevant elements to facilitate a common understanding and subsequent reuse across the Member States, especially given the drive for cross-border service delivery.

As we saw in section 3.1.5., in the WB, there have been several attempts to create public service catalogues, sometimes also called portfolios of administrative procedures.

The purpose of the portfolio would be to manage services in an integrated manner, considering common elements that can be standardised and shared (forms, procedures; enablers, such as e-payment, digital signature), linkages between services that can be integrated with each other, such as turning them into life-events, reviewing the service processes with the view to simplification, or taking stock of the level of maturity of digital services. The idea behind the catalogue is to map as many administrative services as possible – based on an agreed definition of a 'service' – in a standardised manner. Of course, the catalogue itself will not deliver these values, it is a tool in the hands of digitalisation teams, central to the government or otherwise (e.g., at the level of a sector, such as health or education, or an individual organisation) to turn the collected information into action.

However, apart from Albania which has put the service catalogue into visibly effective use, there have been not many successful attempts to make the best use of such catalogues. One of the limitations of such catalogues has been the fact that service management thinking behind the service catalogues has not taken root at the organisational level which would have led to the management of services as a portfolio. Moreover, in the WB the dominant thinking is still in terms of administrative procedures instead of administrative service. Legalistic culture is detrimental to user-centric thinking which would allow for re-designing the procedures and processes based on the user needs and preferences instead of the administrative comfort. Therefore, some of the catalogues have turned out to be those of 'administrative procedures'. Although there are numerous examples of re-engineering and simplified administrative procedures/services, the overall thinking is still not carried from the notion that every government body delivers a set of services and has to manage them from the perspective of continuous improvement. Thought about this way, services constitute a value to its users (another government entity also can be a user), otherwise they are not necessary to be continued.

The study 'Integrated Portfolio Management of Public Services' defined the benefits of portfolio management in the following manner:

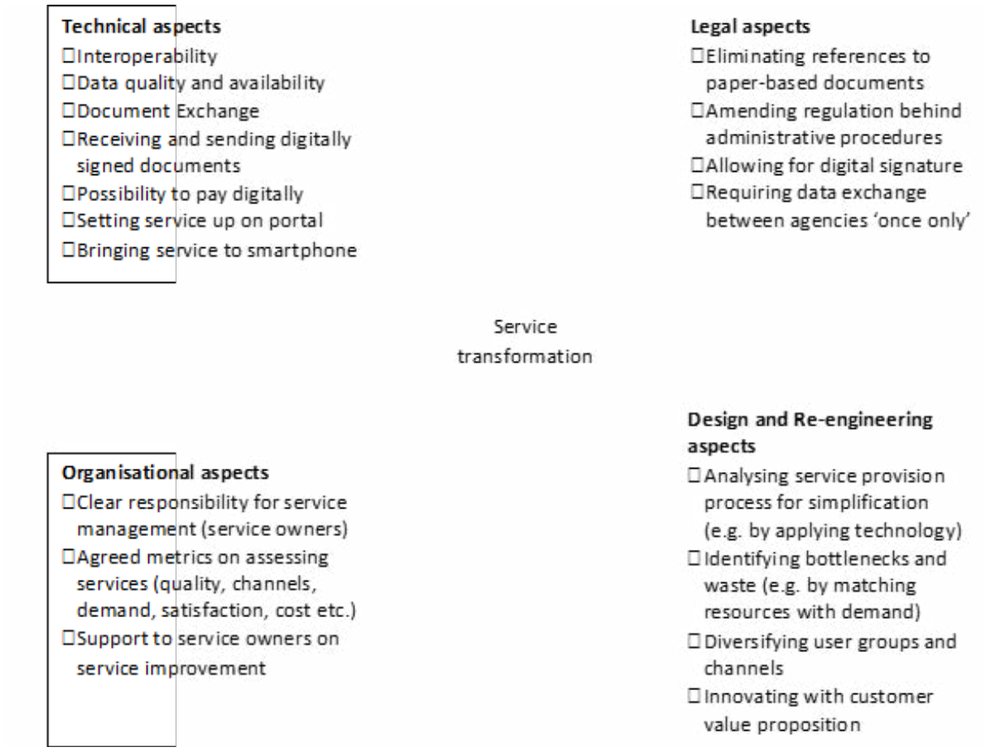
> If authorities that are responsible for the services (service owners) describe the information about public service provision in a uniform manner and in the agreed language, it can lead to various benefits over time. For instance: services are developed in a more balanced way because it enables impacts of the development to be assessed better; overlapping services are reduced because they can be identified; service development is coordinated and organised better because several authorities benefit from single effort; and finally, service development via portfolio management supports their more cost-effective and transparent functioning.

Overall, the portfolio approach can be applied to decide about what each service should become:

- Retain – independent service, well defined through the infrastructure and processes, which corresponds with the organisation's strategy and has an important role in this;
- Replace – service which is not up to necessary minimal level technically and functionally'
- Rationalise – service, which has an element of duplication in it and for optimisation, certain activities would have to be focused on. For example, a service which supports too many different technical platforms or channels (call centre, mobile application, webpage, portal) which are not all in use or necessary. Here belongs also the services which functionality is unclear or which overlap with other services;
- Refractor – services which are technically and functionally necessary but which could be redesigned in a standardised manner using existing technical platforms or by consolidation. For example, a service which does not use centrally provided authentication, but has a unique solution built into it;
- Renew – services, which functionality is good but technical level is subpar. For example, services which function on outdated hardware or software platforms or are not supported by any ICT solution'
- Retire – service which does not correspond to user needs, service provider's objectives or strategy.

The other major aspect in the WB for not having been able to fully capitalise on the service portfolios is the lack of central capacity to leverage change based on the information on the services gathered. This information becomes actionable when there is a central authority with the capacity to utilise this information for service delivery reform purposes. It requires that different aspects of service transformation, such as the legal, organisational, technical, and design and re-engineering aspects, are looked at in an integrated manner (see Figure 7). It means that there has to be regular interaction between the teams or individuals covering these four aspects. Of course, ideally these aspects should be covered by every service providing organisation but in practice it may be difficult to build up the competencies in each of these areas. Therefore, deploying the interdisciplinary teams from a central unit and combining them with the business knowledge of the organisation responsible for the service may be the most realistic approach.

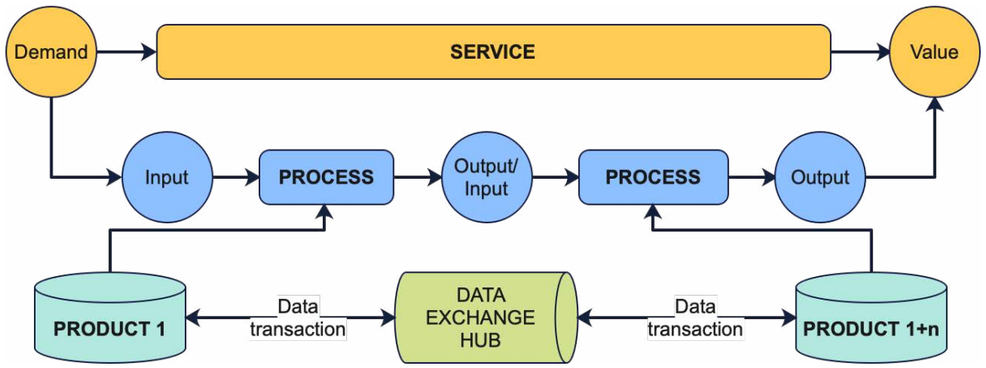
Figure 7. Four aspects of service transformation



Source: authors

It has also become clear that there is a need for further clarity on terminology, particularly for comparison purposes, within administration, as well as between administrations. Administrations are interpreting differently the terms such as service, service transaction. Some administrations count service transactions as value delivery (Albania, Kosovo) to the end customer (business or citizen), others (Montenegro, Serbia) count the data transactions between the product and data exchange hub (see Section 3.1.2.). One value delivery can consist of many data transactions. This leads to the dramatically different numbers for the comparison. The figure below illustrates the different objects in the public service delivery value stream.

Figure 5. Objects of the public service delivery value stream



Source: authors

Not sure if examples below have added vaule for a study

Key definitions in service delivery process view

Service

Means of enabling value co-creation by facilitating outcomes that customers want to achieve, without the customer having to manage specific costs and risks. A service exists only while it is being provided.

Example:

- **Service: railway crossing;**
- **Product: railway crossroad;**
- **Deliverable value to the end user: safety when crossing the railway;**
- **The service exists only in those moments when a person or a vehicle crosses the railway.**

Product

A configuration of an organization's resources designed to offer value for a consumer. The resources can be digital, physical, or human. A product exists continuously regardless of its use or non-use.

Example:

- **Product: railway crossroad;**
- **Human resources: maintenance team, supervision team, etc.;**
- **Physical resources: traffic lights, barriers, sound equipment, servers, network, etc.;**
- **Digital resources: security system, control system, etc.;**
- **The railway crossing must be in order and work 24/7 regardless of whether the beneficiaries (people, drivers) cross the railway or not.**

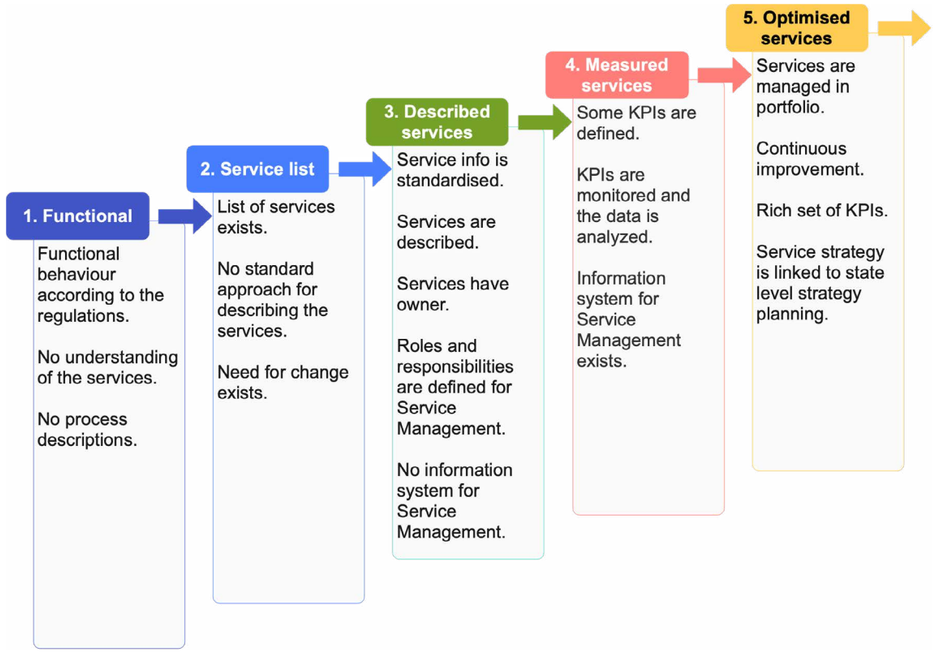
Process

A set of interrelated or interacting activities that transform inputs into outputs. A process takes one or more defined inputs and turns them into defined outputs. Processes define the sequence of actions and their dependencies. One service can consist of many processes.

Finally, it has been difficult in the WB to introduce the concept of 'service owner' to the service management. The concept is carried by the understanding that in order to manage services properly, responsibility has to be assigned for every (administrative) service to a particular person in the organisation. This from the other side requires that the service owners are empowered by the senior management of the organisation to fulfil that role by providing them the support and resources for proper fulfilment of the role. In essence, the service owners cannot be effectively introduced as a stand-alone concept into the management of public organisations, but the entire approach to organisational management of its resources must be modernised.

The level of public service portfolio management can be captured by a maturity model (see Figure 8 below) the purpose of which is to help to guide the administrations in progressing towards better organised service delivery processes supported by more advanced tools to manage their services in an integrated manner leading to continuous improvement.

Figure 8. Maturity model of public services portfolio management



Source: authors

5.2. Enterprise architecture explained

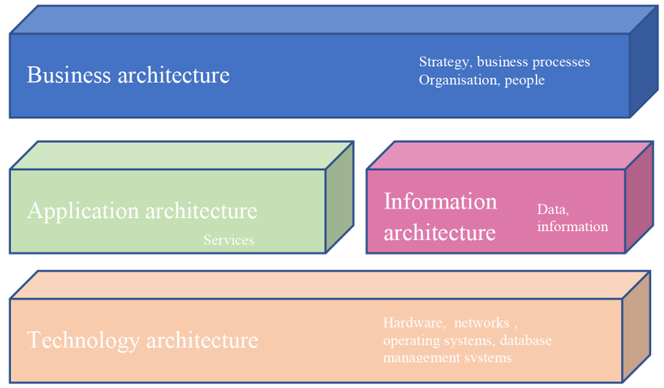
To extend the perspective from managing service portfolio towards more comprehensive models of managing business operations in any organisation, public and private sector, aligned with the business strategy and objectives and supported by the ICT services, let us turn to the body of knowledge covering this subject. The bigger the organisation, the more complex its business operations and resources required to drive them. Government by design is a complex organisation, particularly if looked as one unified entity (from the government information system perspective) rather than a sum of individual smaller units. Therefore, in order to properly manage ICT services and resources, it requires an integrated view on the business operations.

There are various patterns how the new ICT solutions are introduced to an organisation. Very often, IT department has been focused on technology without understanding the larger value of technological solutions to the organisation. From the other side, business units may start designing ICT-solutions without the (timely) involvement of the IT department either because they do not see that they get value from it, or they are just ignorant of the necessity to get them involved. In any case this is detrimental to maximising the value that technology can bring to business operations or leads to wasteful efforts.

This is where **Enterprise Architecture** (EA) as a conceptual framework comes to play. EA is a governance approach to overcome the discrepancy between business and IT alignment. It is a coherent set of principles, methods, and models that are used in the design and realisation of an organisation's structure, business processes, information systems, and infrastructure. Enterprise architecture intends to blend business architecture, data architecture, application architecture and technology architecture (see Figure 9). From the general management point of view, when ICT management is a rather tactical approach to bring value to an organisation, then enterprise architecture is a strategic approach to managing value-creation through these various components, including the ICT, among other things. The purpose is to step out from a project-based approach to ICT to look at a particular governance domain, such as a ministry with its subordinate organisations, or a particular organisation, as an integrated whole to deliver on policy and service delivery objectives. There are various modelling tools to model enterprise architecture, the leading EA standard being The Open Group Architecture Framework (TOGAF).

In practical terms, particularly after the COVID-19 pandemic there is a growing need for ICT staff leading to a lack of ICT personnel in many organisations due to harsh competition. In order for the departing ICT staff leaving with not just the ICT knowledge but also the business knowledge, there is a need to build a system which is resilient to such movements by empowering business side to take a bigger role in identifying development needs.

Figure 9. Conceptual framework of enterprise architecture



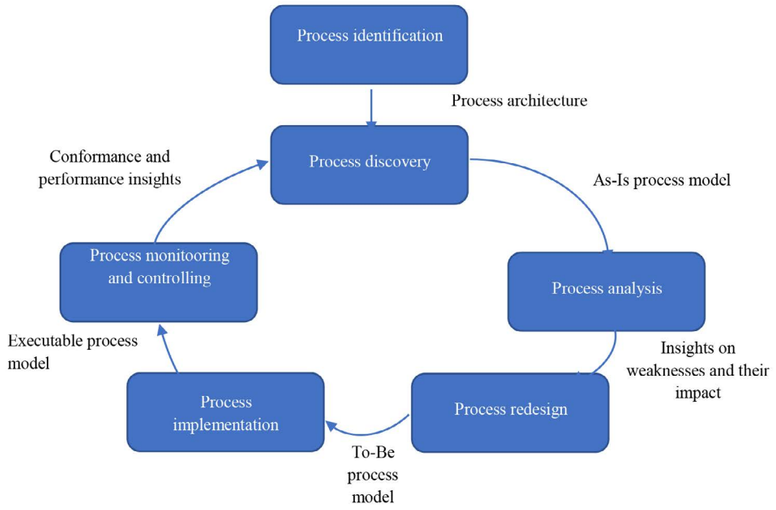
Source: The Open Group (authors' modifications)

Business architecture (BA) is a blueprint of the organisation that provides a common understanding of the organisation and is used to align strategic objectives and tactical demands. The blueprint deals with the structure of the organisation regarding its governance structure, business processes, and business information.. BA represents holistic, multidimensional business views of capabilities, end-to-end value delivery, information, and organisational structure, and the relationship among these business views and strategies, products, policies, initiatives, and stakeholders . It is a concept to analyse operation of existing business function so that if there is any issue then it can be improved, or one can develop a new business function with strong focus on processes and technology. BA is about business solutions and organisational changes to deliver business objectives, a value to its customers. It provides a framework for aligning business strategy with operational execution, and it can help an organisation achieve its goals by improving efficiency and effectiveness.

BA is said to be the foundation of business process management (BPM) and analysis. BPM is about improving an organization's processes by aligning them with its strategy and with the goal of improving efficiency. BPM uses a specific notation language, the Business Process Management Notation (BPMN) to describe the elements in the processes in a standardised manner.

Relating BPM back to the public service portfolio management, it means that defining the processes along the services to be delivered is a necessary step to reviewing and improving these. Also, cyber security regulations may require government agencies to create an inventory of business processes.

Figure 10. BPM lifecycle



Source: Fundamentals of Business Process Management[119]

The level of process thinking in an organisation can be evaluated through a maturity model. The first aspect is to assess to what extent given organisation covers the range of processes that are ideally expected from it. The second aspect is just to assess to what degree these processes are documented and supported.

A popular framework for maturity assessment is the Capability Maturity Model Integrated (CMMI) framework. The basis for a maturity assessment in terms of the five CMMI maturity levels is the coverage of process areas (domain-independent areas are process management, project management, and support) and the degree of their support. There are five maturity levels[120]:

Level 1 (initial): the organisation runs its process is in an ad hoc fashion, without any clear definition of this process is. Control is missing;

Level 2 (managed): project planning along with project monitoring and control have been put into practise. Measurement and analysis are established as well as process and product quality assurance;

Level 3 (defined): at this stage, organisations have adopted a focus on processes. Process definitions are available and organisational training is provided to enable stakeholders across the organisation to be engaged in process documentation and analysis. Integrated project and risk management are in place. Decision analysis and resolution are also in place;

Level 4 (quantitatively managed): at this stage, organisational process performance is tracked. Project management is performed using quantitative techniques'

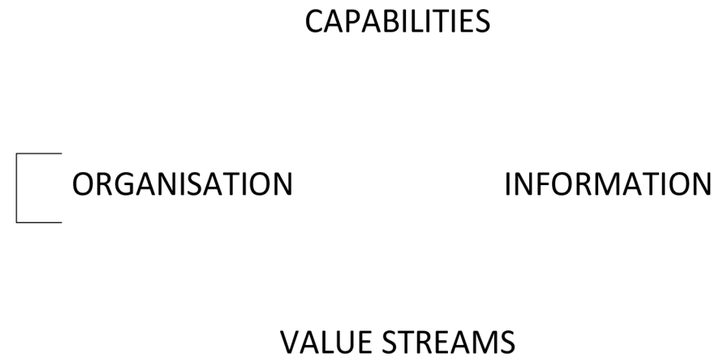
Level 5 (optimising): at this stage of it maturity, the organisation has established organisational performance management accompanied with causal analysis and resolution.

There are a variety of BA frameworks, such as the Zachman Organisation, the Open Group, and the Business Architecture Guild, which identify a set of elements that can be modelled and documented to represent a BA of an organisation. For example, the Business Architecture Guild has built a model of four elements as on Figure 11:

119 Dumas, M., La Rosa, M., Mendling, J., and Reijers, H. A. (2013). Fundamentals of Business Process Management. Available at: https://repository.dinus.ac.id/docs/ajar/Fundamentals_of_Business_Process_Management_1.pdf

120 *Ibid.*

Figure 11. Four elements of Business Architecture



Source: Business Architecture Guild

This framework allows to analyse what is the organisation able to do and where are the gaps between what is required of it vs what is the current situation (the capabilities), how the organisation combines those capabilities to offer value to its customers (the value streams), how the organisation is structured and what information is required for the organisation to operate successfully. It provides a basis for analysing the impact of proposed changes and ensures that senior managers make informed decisions.

The second component in the EA is **Application architecture** (AA) which focuses on organisation's software applications throughout their lifecycle, including their design, development, and maintenance. Applications relate to technologies, platforms, and frameworks supporting the organisation's business processes. AA describes the behaviour of such applications, focusing on how they interact with each other and with users (software architecture deals with technical design of how a system is built). AA also looks at how the data is consumed and produced by the applications. Applications architecture strategy involves ensuring the applications and their integration align with the business strategy of an organization. If the organisation intends to deliver its services exceedingly online, such as in case of digitalization of public services, the AA should ensure that the composite architecture is scalable, reliable, available and manageable.

Information architecture (IA) focuses on organisation's data and information assets, including their structure, storage, and management. It involves data models, databases, metadata, reference data and data integration tools used to support the organisation's application layer. The purpose is to collect the right data and make the best use of once collected data. IA is about mapping where the data is and mapping how the data flows through the organisation. The challenge, but also an opportunity in any organisation is that technology is driving complexity in both data management and how it is used[121].

Technology architecture provides the logical, physical and virtual infrastructure that supports the execution of application services that in turn support information and business functions and services. It is a framework for building an enterprise including networking, hardware, operating systems, database management systems, and application development standards.

5.3. Applying Enterprise Architecture in e-governance

It is a fact that growing level of digitalisation increases costs of ICT in government which is not set off by efficiencies achieved in other areas, such as redundancy in human resources. This is one of the reasons of increased interest in applying architectural concepts also in the government context. In the US, for example, the EA was made mandatory by law in 1996 for all 116 US federal departments and agencies to develop and use the EA for IT investment planning

121 Pritchard, S. (4 Oct 2022). How to design a data architecture for business success. Computer Weekly. Available at: https://tinyurl.com/yr8xfx4t

and decision-making[122]. The key objectives have been of promoting the efficiency, quality, and transparency of public services through the delivery of integrated e-Government applications that take advantage of economies of scale. If EA is not applied, waste and inefficiencies remain and the ICT resources are not put into the best use. According to the PriceWaterhouseCoopers[123], a consultancy, the EA helps in delivering value in response to the following pain areas.

Table 12. EA's benefits in response to business "pain" areas

Current "pain" areas	How EA helps in delivering value
• Mostly manual process is with low level of service automation • This leads to high process turnaround time for end-to-end processing of government services	• Facilitates the transformation of current government processes and services to end streamlined automated process, with standardised reusable citizen-centric services, thereby reducing process turnaround time
• Fragmented and redundant ICT systems and technologies with ministry and agencies (MAs) is working in silos driving their own ICT initiatives • This leads to higher complexity, higher total cost of ownership, and a lack of interoperability	• Consolidates and rationalises a fragmented redundant ICT systems, technologies as well as data structure for cost reduction, reduced complexity and better interoperability of ICT systems across MAs
• Lack of government-wide consistent enterprise IT policies, principles, reference models and standards with MDAs adopting their own desperate standards	• Recommends and maintains government-wide technical standards, architecture principles, reference models and templates in order to facilitate the design, implementation as well as the delivery of ICT capability in a consistent, standardised, cost-effective and timely manner
• Limited interconnection and collaboration across MAs so as to share government data in real time mode	• Improves the agility and interoperability with real time information exchange across MAs, with enhanced transparency, better coordination and communication
• Ad hoc reactive mode of decision making in ICT investments with limited investments in ICT	• Provides a basis for planned decision making in ICT investments
Lack of centralised governance to achieve the following: - Plan and deliver EA initiatives that leads to delay in ICT projects - Maintain and sustain EA standards	• Centralised architecture governance model in order to ensure better architecture planning, decision making and compliance of projects with enterprise standards • Improved efficiency and turnaround time for ICT project roll-out

Source: PriceWaterhouseCoopers

The inevitable aspect of e-governance is that it needs to be sufficiently centralised to provide the benefits of economies of scale (such as through the application of common platforms, ICT systems), application of common standards, and standardised services.

5.3.1. Reference model for integrated management of ICT

The government ICT landscape is largely fragmented in nature, distributed with disparate multi-vendor solutions across ministries and agencies, each maintaining their own architecture standards (if any) in silos. Adopting of a whole-of-government reference architecture model will provide a common, standardised, and consistent taxonomy and framework solution in order to enable reuse and interoperability across government MA-s. It provides a context for decision making and helps MAs to develop ICT capabilities in a way so as to operate across traditional boundaries in order to improve service delivery and deliver responsive ICT solutions[124].

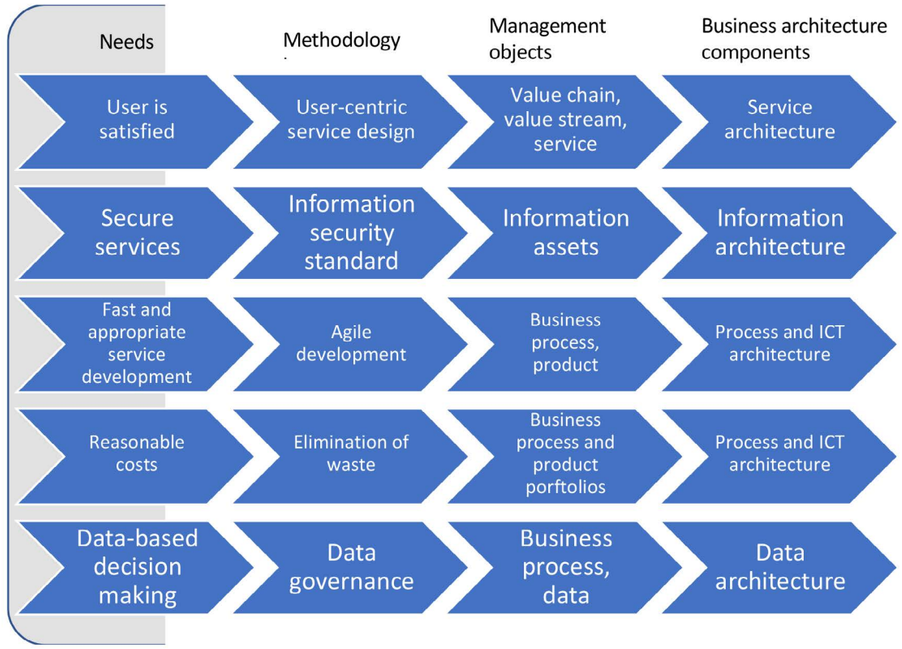
Reference model is a tool to define the roles and functions along two dimensions: business vs IT and government as a whole, ministry as a governance domain, individual organisations in that domain and development projects. It sets forth universal principles which vary at the level of detail depending on at what level referred to above to look at things.

122 US Information Technology Management Reform Act.
123 PwC (n.d.). Smart governance and technology. Available at: https://www.pwc.in/assets/pdfs/publications/2013/smart-governance-and-technology.pdf.
124 Ibid.

Although business and IT have been separated in the reference model, in contemporary technology governance there is no gap between the two. The IT objectives are the same as the business objectives. There is no talk about business services and ICT services, but only business services and business developments, from which some are accomplished by incorporating technology. IT services are interpreted as business services with big IT-need involved. Service management is defined as a set of organisational capabilities that allow to created value in the form of services.

The particular reference model presented below was developed in Estonia for a study on Operating model of ICT developments. The point of departure was to respond to the need to manage better information technological developments. In a broader perspective, it also responds to a variety of needs in any service organisation (see Figure XF on the next page).

Figure 12. Links between organisational needs and methodologies, management objects and architectural components.



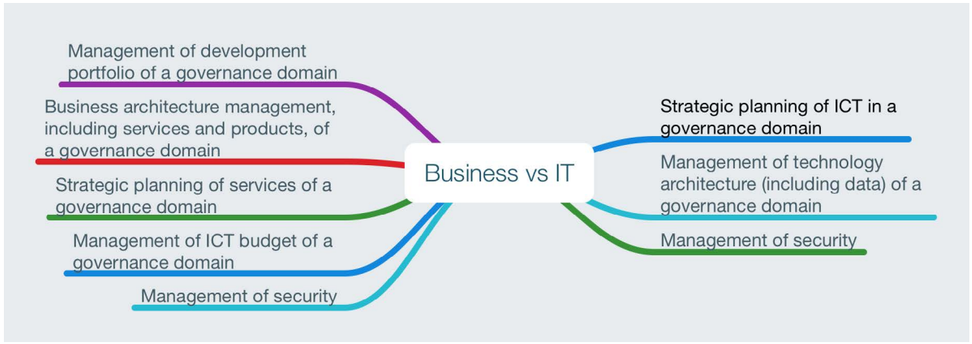
Source: Operating model of ICT developments

The reference model has been informed by several contemporary frameworks, such as ITIL4[125], BisBok[126], and ISO technology governance standards[127].

One of the major questions that any organisation has to respond to is this: What kind of model will work to govern the provision of ICT services and the management of ICT developments? There are two sub-questions to that main question: What is the division of roles and responsibilities between business and ICT? What is the minimum set of roles that need to be covered by the state in order to provide for sustainable management of the model (see Figure 15, page 55)? This is where a reference architecture model can provide guidance either across the domain (such as all the architecture segments from Figure 9), or within a particular domain (e.g. application).

125 ITIL (Information Technology Infrastructure Library) is a framework designed to standardise the selection, planning, delivery, maintenance, and overall lifecycle of IT services within a business. The goal is to improve efficiency and achieve predictable service delivery.
126 Business Architecture Body of Knowledge (also referenced as the BIZBOK Guide or The Guide to the Business Architecture Body of Knowledge). The guide represents an organized body of knowledge, set of disciplines, and best practices for business architects and other practitioners who would like to document and manage a formal business architecture with their organization to address business challenges.
127 ISO 38506:2020 standard on Information technology/governance of IT/ Application of ISO/IEC 38500 to the governance of IT enabled investments.

Figure 13. Reference model of ministry governance domain



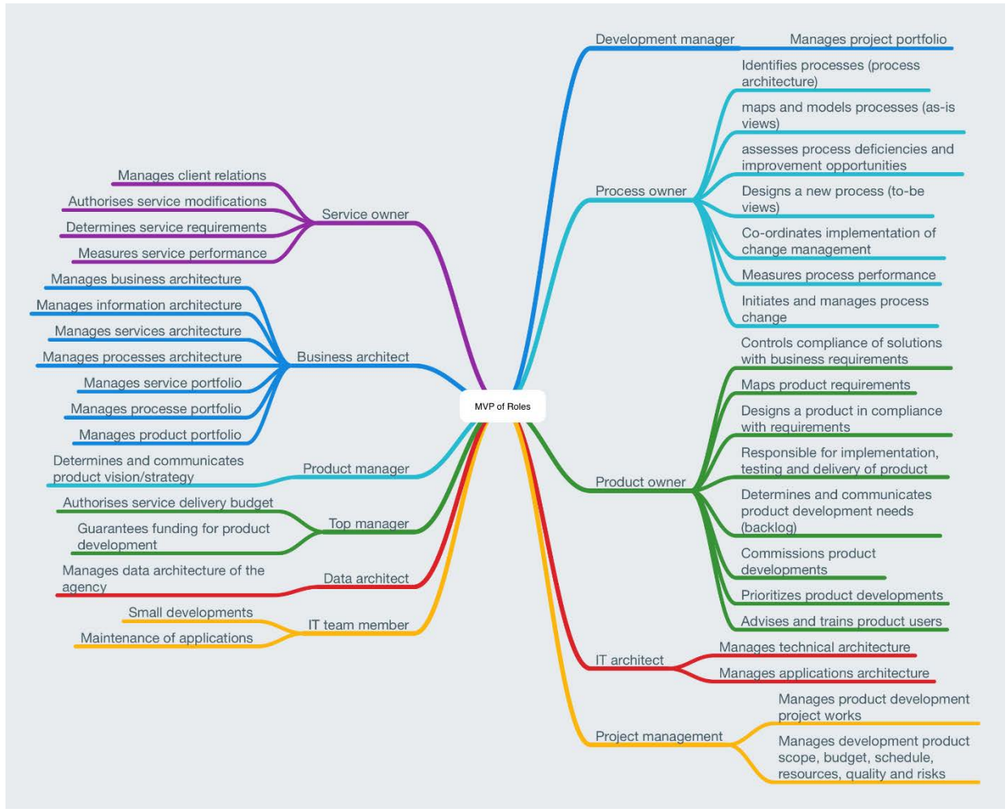
Source: Operating model of ICT developments

The breath of elements on the right-hand side and left-hand side varies. For example, managing security on business side is much wider than managing security on the ICT side.

Figure 14. Reference model at organisation level

Source: Operating model of ICT developments

Figure 15. Essential roles and responsibilities MVP



Source: Operating model of ICT developments

This reference model was used to assess the operating model of ICT developments in three ministries in Estonia, each of which has a sizable IT house to serve the entire ministry governance domain. It allowed to identify where the practices are in compliance with the reference model either fully, partially or not at all (see the Figure 15 for the categories assessed). This allowed to come up with improvement plan where the fit is not ideal.

One of the practical examples of remodelling business architecture from the public sector comes from Kosovo where the Ministry of Finance, Labour and Transfers undertook ICT Assessment and Feasibility Study to identify the weaknesses in implementation of ICT reforms required for accountable, efficient and long-term sustainability of the IT Service Management practices. The purpose of the initiative was to align a general IT strategy for the purpose of establishing and implementing the best IT practice framework related to all IT functions, operations and responsibilities in the Ministry and its related IT departments with the purpose of advancing and modernising the quality of IT services to its customers, staff and stakeholders[128], as shown in this good practice example:

128 GIZ Project Support to EU-Integration Reform Processes in Kosovo. ICT Assessment and Feasibility Study Report. Ministry of Finance, Labour and Transfers.

Consolidation of ICT in the Kosovo Ministry of Finance, Labour and Transfers (MFLT)

Kosovo MFLT is one of the most heavily ICT-relying governance domains in the administration, covering Tax Administration, Customs, Treasury, Budget Department, Property Tax Department, Labour and Social Welfare Departments, Labour Inspectorate, Employment Agency and other units. As in many other economies, Tax, Customs, Treasury and Budget rely heavily on high volume of data supported by various information systems. However, the problem is that the ICT governance is scattered, relying on occasional islands of excellence but lacking a strategic direction, enterprise architecture, standards, and being un-coordinated in planning the developments, maintenance or information exchanges between systems.

In 2022/23, an ICT assessment and feasibility study was carried out across the entire Ministry domain to identify the weaknesses and come up with solutions to address these. IT results in the creation of a dedicated MFLT ICT Agency from 2024. Some of the key recommendations are the following:

- Consolidate ICT services into MFLT ICT Shared Services Centre. The aim is to achieve ICT cost savings, process efficiency and business transformation. The following services will be shared among the different IT departments and units within the MFLT:
  - IT Service desk (service request, incident request, change management, service catalogue, IT asset inventory, availability management, knowledge management, configuration management), E-learning zone, ITIL service management practices, Digital archive and content management, Data Centres, Cyber security and network security, IT continuity and disaster recovery, Vulnerability remediation services, Software development services, Middleware support services, Technology advisory services, Project management, Strategies, roadmaps, policies and procedures, Infrastructure hosting services, Data repository and reports, security endpoint protection services, security vulnerability scanning services, IT risk management, information security, data protection, IT audit

The following five models of IT Shared Services Centre shall be considered to co-exist within the MFLT:

- The “IT Infrastructure Solution” that will manage a common IT infrastructure and are looking for consolidating asset, standardizing processes and optimizing delivery.
- The “Technology Expertise Centre“ will be offering advisory and expertise on specific technologies, develops and supports applications based on these technologies.
- The “Application Factory” develops and maintains standardized and mature applications to meet expectations of business process owners located in business unit or entities.
- The “Business Solution Centre” delivers both business process and IT solution that will be operated by business units or entities.
- The “Operational Excellence Centre” performs operational service and business tasks.

- Establish the Disaster Recovery and Business Continuity Centre which becomes a dedicated facility to house the information processing infrastructure, such as servers, core network infrastructure etc.
- Plan joint ICT strategy, roadmap and operational plan of the MFLT
- Provide for digital interoperability of IT services within the MFLT (seamless integration of all current and new IT systems and Exchange of data across all domains and networks throughout the MFLT
- Increase the mandate and competencies of the MFLT IT Technical Committee to enhance ICT strategic directions and alignments and improve communication and collaboration to move away from IT silos towards an integrated IT body for the MFLT
- Ensure additional and specialised ICT workforce, talent management, retention strategy, training

Recommendations

The recommendations apply to some administrations more than others. This is because the level of development varies from administration to administration.

1. Strengthen the governance of digital government transformation by appointing the Government CIO-s and ministry CIO-s to serve as the highest managerial level digital leaders respectively in the centre of government and a ministry governance domain where they still do not exist and resource the government digital transformation units with sufficient capacity to steer the developments throughout the government.

2. Create technical strategies of e-government which capture the aspects of Enterprise Architecture in order to establish a clear platform from which to create standards, tools and other common digital government enablers and create and share technology governance frameworks which benefit all the government agencies.

3. Systematically pursue the concept of Enterprise Architecture across the government and in individual governance domains. Make sure that there are people in administration who understand and can take forward the concepts introduced as de facto enterprise architects. These frameworks will help to ensure that scarce resources are used in an effective and efficient manner by instilling better co-ordination into the launch and development of ICT projects, identifying and overcoming gaps in the capabilities required to deliver the best value to the customers.

4. Educate business managers to take responsibility for identifying business needs that can be supported by ICT. Although there are no easy solutions for this, an option could be based on domestic and international peer-learning and specific training in digitalisation. Create the rules, methodology and templates for having to properly justify the creation of a new information system or substantially tweaking an existing one from the business perspective. Design and deliver designated digital skills trainings at the operational level of public administration.

5. As part of organisational interoperability, define common typologies and concepts in service management, such as service, product, and process, which would become the main management objects and for which portfolio management could be applied. Define business architecture management to build the basis for integrated service management.

6. Ensure legislatively and administratively that the government interoperability framework is the only way of connecting and sharing data between various registries in the public sector. Identify barriers to the roll-out of interoperability technical solutions and adopt a plan at the level of Government to eliminate these barriers in order to facilitate integrated service delivery and the application of ‘once only’ principle in practice. Establish key metrics, such as number of connected registries across the technical interoperability solution, number of enquiries over the government service bus, including the type of enquiry (machine-to-machine, human-to-machine) as the foundation for measuring success in interoperability.

7. Advance the catalogues of public services to turn them into analytical tools in the hands of the digital transformation units to steer the simplification, re-engineering, standardising and measuring the performance of administrative services with the view to greater user-centricity based on life-events. Give the catalogue a legal status where all the service owners need to make sure that information about the services is accurate and presented in a citizen-centric manner (in plain language) which is presented through the government portals to the general public.

8. Create a digital identity ecosystem by bringing in both the public and private sector counterparts to build interoperable user-friendly tools based on mobile device or existing tools (such as ID card) to identify and authenticate users in various information systems with sufficient level of confidence. Create a technical solution for single sign-on to grant access to all government digital services with the same method.

9. In order to ensure sustainability in ICT developments, there is a need for the definition of roles and responsibilities which helps to move away from ad hoc and person-centred developments to ensure business continuity but also to have greater clarity on the expectations for business and IT functions in pursuing technology-rich service provision. The European Committee for Standardization’s Standard on ICT Professionalism and Digital Competencies (CEN/TC 428) can serve as a guideline[129] along with the Methodology Documentation[130].

129 ICT Professionalism and Digital Competencies (CEN/TC 428). The European Committee for Standardization. Accessed on 28 April 2023. Available at: https://standards.cencenelec.eu/dyn/www/f?p=CEN:110:0::::FSP_PROJECT,FSP_ORG_ID:67073,1218399&cs=10959C403D64BC62BB94544948294A4E5

130 Available at: https://eufordigital.eu/wp-content/uploads/2019/10/EUROPEAN-ICT-PROF_ROLE-PROFILES-VERSION-2_PART-3_METHODOLOGY.pdf

10. Seek for possibilities to consolidate ICT management to ministry governance domain level or to cross-ministerial level in order to make the best use of IT resources (technical, organisational and human) to deliver high-quality services and implement the vision for enterprise architecture.

11. Accommodate the SIGMA forthcoming metrics of digital government to measure all the essential aspects of digital maturity covered by such metrics.

References

Badiee, S., Crowell, J., Noe, L., Pittman, A., Rudow, C. and Swanson, E. (2021). Open Data for Official Statistics: History, Principles, and Implementation. Statistical Journal of the IAOS, vol. 37, issue 1. Available at: https://opendatawatch.com/publications/open-data-for-official-statistics-history-principles-and-implentation/.

Bosch, J.M., Tangi, L. and Burian, P., European Landscape on the Use of Blockchain Technology by the Public Sector, EUR 31332 EN, Publications Office of the European Union, Luxembourg, 2022. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC131202.

Desfray, G. and Raymond, P. (2014), Modelling Enterprise Architecture with TOGAF. Morgan Kaufmann.

Dumas, M., La Rosa, M., Mendling, J., and Reijers, H. A. (2013). Fundamentals of Business Process Management. Available at: https://repository.dinus.ac.id/docs/ajar/Fundamentals_of_Business_Process_Management_1.pdf.

eGovernment Academy (2022). Cybersecurity Identification and Formulation Study on the Western Balkans. Project Report.

The European Commission (2023). Digital Decade Policy Programme 2030. Available at: https://digital-strategy.ec.europa.eu/en/library/digital-decade-policy-programme-2030.

The European Commission (2022). Digital Economy and Society Index 2022. Available at: https://digital-strategy.ec.europa.eu/en/library/digital-decade-policy-programme-2030.

The European Commission (2022). eGovernment Benchmark 2022. Available at: https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2022

The European Commission (2021), Selected AI cases in the public sector. JRC Data Catalogue. Available at: https://data.jrc.ec.europa.eu/dataset/7342ea15-fd4f-4184-9603-98bd87d8239a.

The European Commission (2019). Monitoring the Digital Economy and Electronic Communications Services in the Western Balkans and Turkey. Market Report. 2019 Follow-up Study Report. Available at: https://www.rcc.int/files/user/docs/3%20-%20DESI%202019.pdf.

The European Commission (2016), Access to Base Registries. Good Practices on Building Successful Interconnections of Base Registries. Available at: https://ec.europa.eu/isa2/sites/isa/files/publications/access-to-base-registries-good-practices-on-building-successful-interconnections-of-base-registries.pdf.

The European Commission (2010). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Digital Agenda for Europe. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010DC0245R(01)&from=EN.

The European Commission (2004), European Interoperability Framework for Pan-European eGovernment Services. Available at: https://joinup.ec.europa.eu/sites/default/files/custom-page/attachment/2021-11/EIF%20V1.0.pdf.

The European Committee for Standardisation (n.d.), ICT Professionalism and Digital Competencies (CEN/TC 428). Available at: https://standards.cencenelec.eu/dyn/www/f?p=CEN:110:0::::FSP_PROJECT,FSP_ORG_ID:67073,1218399&cs=10959C403D64BC62BB94544948294A4E5

Eurostat (2021). “How many citizens had basic digital skills in 2021?” Available at: https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20220330-1.

Integrated Portfolio Management of Public Services. Summary. Available at: https://joinup.ec.europa.eu/collection/catalogue-services/document/study-integrated-portfolio-management-public-services.

Ligi, T. and A. Kmecl (2021), “Implementation of laws on general administrative procedure in the Western Balkans”, *SIGMA Papers*, No. 62, OECD Publishing, Paris, https://doi.org/10.1787/e5162057-en.

McCarthy, J. “What is Artificial Intelligence?” Stanford University. 2007 November 12. Available at: https://www-formal.stanford.edu/jmc/whatisai.pdf

McKendrick, J. (February 26, 2016), ’Is cloud computing truly, truly disruptive?’. Forbes magazine. Available at: https://www.forbes.com/sites/joemckendrick/2016/02/26/is-cloud-computing-truly-truly-disruptive/?sh=3ed44ace4295

Ministry of Public Administration and Local Self Government of Serbia (2020). Feasibility study on the use of blockchain in public administration in the Republic of Serbia. Available at: https://mduls.gov.rs/wp-content/uploads/Blockchain-study-ENG.pdf.

OECD (2023). Draft Recommendation on the Governance of Digital Identity. Available at: https://www.oecd.org/gov/digital-government/draft-oecd-recommendation-on-the-governance-of-digital-identity-public-consultation.pdf.

OECD (2019). State of the art in the use of emerging technologies in the public sector. OECD Working Papers on Public Governance No. 31. Available at: https://dx.doi.org/10.1787/932780bc-en

Office for Information Technology and Electronic Government of Serbia (2020), List of Interoperability Standards. Avaiable at: https://www.ite.gov.rs/extfile/sr/2003/LISTA_STANDARDA_Tehnicke_Interoperabilnosti%20v%202.1.pdf

Pandey, A. (November 6, 2020). How governments can harness teh potential of blockchain. McKinsey Digital. Available at: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/tech-forward/how-governments-can-harness-the-potential-of-blockchain.

PricewaterhouseCoopers Advisors (2014). Integrated Portfolio Management of Public Services. Summary Report. Available at: https://joinup.ec.europa.eu/collection/catalogue-services/document/study-integrated-portfolio-management-public-services.

PricewaterhouseCoopers (n.d.). Smart governance and technology. Available at: https://www.pwc.in/assets/pdfs/publications/2013/smart-governance-and-technology.pdf.

Prichard, S. (October 4, 2022). How to design a data architecture for business success. ComputerWeekly.com. Available at: https://tinyurl.com/yr8xfx4t.

Annex 1. SIGMA Set of Indicators to Measure Digitalisation in Government

The first edition of the OECD SIGMA Principles of Public Administration was published in 2014 and revised in 2023 https://www.sigmaweb.org/publications/Principles-of-Public-Administration-2023.pdf.

New principle 22, as one of principles within Service delivery and digitalisation refers most specifically to digitalisation of public services: **Digitalisation enables data-driven decisions and effective, efficient and responsive policies, services and processes in the whole of government.**

The principle and corresponding indicator for monitoring measures the extent to which governments have managed to adopt the fundamentals as well as advanced enablers for impactful digital transformation of public sector, and, in particular, how widely such measures are applied in practice across these governments).

Principle of Public Administration	Related measurements
The public administration ensures leadership, co-ordination and capacity for the creation of effective, integrated and digital government strategies and services.	Existence and extent of delivery of strategy on digital government
	Strength of co-ordination for digital government development
Public registries are digital by design, and data governance is coherent and systematic, to ensure the trustworthiness and high quality of data and access to it, with active use and sharing of data within the public administration and beyond.	Availability and use of public registries digitally
	Data governance
Interoperability of public registries (legal, semantic, organisational, and technical) across the public administration improves services and facilitates cross-border integrations.	Infrastructure for Interoperability
	Interoperability framework maturity
	Extent of interoperability framework adoption
User-friendly digital identity, digital signature and trust services, digital payment and digital delivery solutions are easily available to everyone, legally enacted, technically functional, and widely used.	Legal framework for digital identity and trust services
	Acceptance and use electronic signature and identity in practice
Digital government infrastructure and information systems are scalable, flexible and future proof	Digital government architecture and infrastructure maturity
The public administration promotes digital possibilities and new technologies, such as artificial intelligence, including through a flexible regulatory framework, while mitigating risks adequately.	Uptake of emerging technologies in the public sector
Mitigation of cyber security and privacy risks ensures data protection, in particular personal data protection, and builds public trust by applying prevention frameworks and building sufficient capacities.	Legal framework for privacy and cybersecurity protection
	Capacity and readiness for risk management
The public administration devises and implements targeted policy to attract and maintain digital talent and leadership, and to enhance digital skills and mind-set among public officials.	Extent of digital talent management in public administration
	Adequacy of public sector staff digital skills for requirements of their jobs
The public administration actively collaborates with relevant stakeholders to enhance the re-use of digital solutions developed with public budget to boost a collaborative ecosystem for the provision and use of digital services economy-wide.	Extent of re-use of digital solutions

Annex II. Public administrations overview

Albania

1. Position in the United Nations E-Government Survey

2018	2022
EGDI Rank 74	EGDI Rank 63
EGDI Value 0.6519	EGDI Value 0.7413
OSI[131] value 0.7361	OSI value 0.8182
HCI[132] value 0.7877	HCI value 0.8022
TII[133] value 0.4318	TII value 0.6037

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: High	Maturity Index Group: Very High
GTMI[134] Value 0.748	GTMI Value 0.752
CGSI[135] value 0.606	CGSI value 0.707
PSDI[136] value 0.859	PSDI value 0.857
DCEI[137] value 0.857	DCEI value 0.735
GTEI[138] value 0.669	GTEI value 0.709

3. Position in the European Union E-government benchmarking

	2022
Administration overall eGovernment maturity	46%[139]
User Centricity[140] (score)	74
Transparency[141] (score)	31
Key Enablers[142] (score)	55
Cross-border services[143] (score)	23

131 Online Services Index
132 Human Capital Index
133 Telecommunications Infrastructure Index
134 GovTech Maturity Index
135 Core Government Systems Index
136 Public Service Delivery Index
137 Digital Citizen Engagement Index
138 Telecommunications Infrastructure Index
139 EU27 average is 68%
140 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
141 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
142 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
AL	Yes/Yes Digital Agenda of Albania 2022-2026	Yes/Yes // Yes/Yes National Agency for Information Society (NAIS)	389/315

In Albania, the digital transformation has been run since 2015 from the vicinity of the Prime Minister based on clear strategic framework consisting of PAR strategies and the Long-Term Policy Document on the Delivery of Citizen-Centric Services by Central Government Institutions in Albania (2016) and two consecutive Digital Agendas of Albania (2015-2020 and 2022-2026).

Albania has heavily invested into the organisation running service delivery and digitalisation reform, consisting of the Agency for Delivery of Integrated Services (ADISA) serving as a one-stop shop for administrative service delivery but also dealing with Albania service standardisation and re-engineering, and the National Agency for Information Society (NAIS) dealing with digitalisation. Albania was clear about its vision to digitalise 100% of its administrative services to be provided through the e-Albania portal. In 2020, it took a bold decision to close down ADISA offices to redirect all the users to digital channels.

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
AL	58/47	265 million	Yes[144]

Albania had made great efforts in making registries interoperable already by 2018 having had the highest number of interconnected registries in the WB region. It has continued making steady progress on that front since then. It also has taken seriously the legal provision of 'once only' principle requiring the administration to reuse already existing data possessed by a government institution. Thanks to the legal framework that obligates all authorities to seek NAIS approval when new IT systems are to be introduced, the NAIS has strong leverage to push authorities to integrate their new systems with the common interoperability solution. The centrally co-ordinated interoperability technical solution is the only legal way to exchange electronic data between government IT systems.

Number of annual transactions over interoperability technical solution should be seen in the context of 2,8 million registered users on the e-Albania portal.

143 Cross-border services indicates to what extent the citizens can use online services in another administrations.
144 The current interoperability system is compliant with EI 1.0 and the Upgrade of the interoperability platform is expected to be compliant with EI 2.0.

6. Data Quality and Availability in Digital Format

Albania has had all the base registries (population register, business register, vehicle register, land register) assessed in the SIGMA monitoring reports available in digital format and accessible through interoperability technical solution in place since at least 2018 with the exception of land register which has not been fully digitalised yet.

	2018	2022
Population register	Yes	Yes
Business register	Yes	Yes
Vehicles register	Yes	Yes
Land register	No	Yes
Access to population register over interoperability solution	Yes	Yes
Access to business register over interoperability solution	Yes	Yes
Access to vehicle register over interoperability solution	Yes	Yes
Access to land register over interoperability solution	Yes	Yes

This is the most consistent result in the Western Balkan region.

7. Document Exchange between Government Institutions

Albania has taken seriously the application of 'once-only' principle by creating an information system for document exchange, called the e-Signed Documents Circulation System (SQDNE), between government agencies for the documents which are not available in digital format. The system uses digitally signed document exchanges for speeding up process of obtaining evidence from other government agencies *ex officio* to relieve the citizens from the need to act as couriers between government agencies. The documents are uploaded to the system after being digitised and are accessible to another government agency. A second important functionality of the SQDNE system is monitoring the time to delivery of public services. Specific accounts have been created for the Agency for Dialogue and Co-Governance that has the mandate to monitor the time to delivery of public services, as well as to receive and address complaints from citizens/businesses.

8. Catalogue of Public Services

In the Albanian catalogue of public services there are more than 1,200 services linked to e-Albania portal. The services have been graded according to their level of maturity where levels three to five constitute high levels of digital maturity, the fifth one becoming proactive service. The catalogue is managed by NAIS and helps it to develop, administer and maintain electronic services provided through the e-Albania portal.

9. National Services Portal

e-Albania functions as the main entrance point for obtaining information about and using digital services. Since 1st January 2020, all the administrative services are only available through e-Albania. The institutions' service windows and the ADISA's one-stop shops converted into assistance desks for citizens and businesses to open an account on e-Abania and supporting them with the online application. This is one of the reasons why Albania has by far the highest rate of population registered as users on the government portal. Since there are no other digital entry points to services, it essentially means Albania also uses single sign-on solution.

	E-government Portal	Number of Services	Number of registered users
AL	e-albania.al	1,227	2,800.000

10. E-Payment

e-Payment option existed already in 2018. Electronic payment can be completed in the e-Albania portal, through the government payment platform, connected to banking institutions. For anyone who owns a credit or debit card of any bank inside or outside Albania, it is possible to make online payments.

11. Digital Signature and Timestamping

Digital signature exists since 2015 but its use in signing digital documents has been particularly boosted over the last three years with the adoption of the 'digital by default' approach to service delivery. In 2021, more than 17,000 digital signature certificates were released by NAIS. The RSS signatures are integrated into more than 20 state information systems.

E-seal has been used in the public service delivery since 2017. There are 55 fully automated digital services in e-Albania portal that automatically generate a document without human intervention. These documents are electronically sealed and placed in the 'My space' section of an individual's account. The authenticity of the printed e-sealed document can be verified by scanning the QR code included in the seal. It is estimated that a total of 23 million e-sealed documents have been generated through e-Albania since 2017.

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
AL	https://opendata.gov.al/	91	Beginner/ 34

Albania has the lowest number of datasets available on its open data portal compared to other WB administrations for which the data is available. On the EU Open Data Maturity Report 2022, it does as well as Bosnia and Herzegovina and Montenegro, but less well than Serbia (Kosovo and North Macedonia are not part of that survey).

13. Artificial Intelligence and Blockchain

Currently there are no examples of deployment of AI technologies into the delivery of public services in Albania.

	Does your administration have AI strategy?	Use cases of big data or AI in government
AL	Digital Agenda 2022-26 intends to integrate modern technologies, such as blockchain and AI, into the improvement of quality of service delivery	One project in the State Agency of the Cadaster being developed to limit of the possibility to manipulate with registered properties.

14. Cybersecurity

Albania ranks at the position of 51 in the eGA National Cyber Security Index with the score of 62.34.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
AL	The Digital Agenda of Albania (2020) has cybersecurity as a chapter with four objectives: protection of information infrastructure, education and awareness, child safety in cyberspace, and improving domestic and international cooperation.	Cybersecurity Council not functional National Authority for Electronic Certification and Cyber Security	National Authority on Certification and Cyber Security (AKCESK)

Bosnia and Herzegovina

1. Position in the United Nations E-Government Survey

2018	2022
EGDI Rank 105	EGDI Rank 96
EGDI Value 0.5303	EGDI Value 0.6256
OSI[145] value 0.4306	OSI value 0.4898
HCI[146] value 0.7217	HCI value 0.7489
TII[147] value 0.4385	TII value 0.6382

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: Medium (some focus on GovTech)	Maturity Index Group: Medium
GTMI[148] Value 0.377	GTMI Value 0.271
CGSI[149] value 0.421	CGSI value 0.464
PSDI[150] value 0.534	PSDI value 0.285
DCEI[151] value 0.235	DCEI value 0.160
GTEI[152] value 0.319	GTEI value 0.176

3. Position in the European Union E-government benchmarking[153]

	2022
Administration overall eGovernment maturity	N/A
User Centricity[154]	
Transparency[155]	
Key Enablers[156]	
Cross-border services[157]	

145 Online Services Index
146 Human Capital Index
147 Telecommunications Infrastructure Index
148 GovTech Maturity Index
149 Core Government Systems Index
150 Public Service Delivery Index
151 Digital Citizen Engagement Index
152 Telecommunications Infrastructure Index
153 Bosnia and Herzegovina is not yet part of the EU E-Government Benchmarking
154 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
155 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
156 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
157 Cross-border services indicates to what extent the citizens can use online services in another administration.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
BiH	Yes/Yes Public Administration Reform Strategy 2017-2022 and its Action Plan Digital Service Delivery Strategy (RS)	Yes/Yes // No/No **Bosnia and Herzegovina level:** Ministry of Transport and Communication General secretariat of CoM Agency for Identification Documents, Registries and Data Exchange (IDDEEA) **Republika Srpska level:** Ministry of Scientific and Technological Development, Higher Education and Information Society, Agency for Information Society. **Federation of Bosnia and Herzegovina level:** General Secretariat of the Federation of Bosnia and Herzegovina Government, Federal Ministry of Transport and Communications, Federal Ministry of Justice **Brcko District level:** Department for Informatics BD BiH, Department for Public register BD BiH, Judicial commission BD BiH, Office of the Public Administration Reform Coordinator of the Government of the BD BiH	Bosnia and Herzegovina level: 25 Republika Srpska level: 5 Federation of Bosnia and Herzegovina: 5

Bosnia and Herzegovina predominantly utilises the model whereby a line ministry is responsible for digitalisation (at the State level and in Republika Srpska entity) while in Federation of Bosnia and Herzegovina entity, it is the General Secretariat of the Federation of Bosnia and Herzegovina Government, Federal Ministry of Transport and Communications and Federal Ministry of Justice. As the strategic framework consists of PAR Strategy only, except in Repubilca Srpska where there is also a designated digital service delivery strategy, it does not provide a solid institutional or strategic framework for making steady progress in the area of digitalisation (this is also due to a complicated organisational structure which requires a lot of co-ordination between the levels). SIGMA 2022 assessment[158] revealed the need for consolidation and strengthening of central ICT units at each level and the assignment of digitalisation to a position which could serve as the Chief Information Officer.

158 Monitoring Report. The Principles of Public Administration. Bosnia and Herzegovina. May 2022. Available at: https://www.sigmaweb.org/publications/Monitoring-Report-Bosnia-and-Herzegovina-May-2022.pdf

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
BiH	29/20	N/A	Yes

Interoperability technical infrastructure in Bosnia and Herzegovina requires a significant financial and technical support to become usable and sustainable and only then can data exchanges be enforced to take place over the Government Service Bus. Although the 'once only' principle is legislated by the Law on General Administrative Procedures, its applicability in practice varies. Data exchanges by agencies are hindered by legal provisions related to the protection of personal data and paper-based logic of regulations[159].

There is no register of registries in BiH.

6. Data Quality and Availability in Digital Format[160]

	2018	2022
Population register	Yes*	Yes*
Business register	Yes	Yes
Vehicles register	Yes	Yes
Land register	Yes	Yes
Access to population register over interoperability solution	No	No
Access to business register over interoperability solution	Yes	Yes
Access to vehicle register over interoperability solution	No	No
Access to land register over interoperability solution	Yes	Yes

There are several fragmented registries which taken together can be considered as an equivalent of population register. They all are operated by the IDDEEA and the data is fully digital and exhaustive. However, the authoritative data is in some cases stored at the municipal level.

7. Document Exchange between Government Institutions

In Bosnia and Herzegovina, ministries and government agencies choose their own document management system. There are no attempts to co-ordinate this work by setting document and their exchange standards or to make the document management systems interoperable. However, by law an electronic document has the same legal validity as a paper document when certain conditions are met.

8. Catalogue of Public Services

There was an attempt of establishing the service catalogue for G2G services that is being offered by the Council of Ministers of Bosnia and Herzegovina General Secretariat. However, this initiative has stalled over the last couple of years. More details are on: https://www.vijeceministara.gov.ba/elektronska_vlada/katalog_servisa/default.aspx?id=34239&langTag=hr-HR

159 Ibid.

160 This information on BiH is not available in the SIGMA Data Portal https://par-portal.sigmaweb.org.

9. National Services Portal

	E-government Portal	Number of Services	Number of registered users
BiH	https://www.vijecemini-stara.gov.ba	227	98,180[161]

This is the portal at the State level of Bosnia and Herzegovina. A portal with 227 services of the Council of Ministers was developed, describing, categorising, and making available the service descriptions through that portal. However, the information was never published due to lack of legislative and organisational preconditions.

Some government bodies, such as the Indirect Taxation Authority, provide e-services through their own websites.

10. E-Payment

In Bosnia and Herzegovina, in 2018 the Public Administration Reform Coordinator's Office (PARCO) at the State level developed a Proof of Concept of e-payment, eID and single sign-on solutions for all the administrative levels, but this has not moved further since then. However, the Law on Administrative Fees of Bosnia and Herzegovina does not envisage the possibility of paying administrative fees electronically.

11. Digital Signature and Timestamping

According to the SIGMA 2021 Monitoring Report, The IDDEEA is envisaged to become the certification authority for individuals. When in 2003 the ID card with a chip was introduced across the territory of Bosnia and Herzegovina, it was intended also to carry the certificates for electronic signature. However, the infrastructure has not been developed to make it work. Instead, due to the need for electronic signature for businesses being greater than for citizens, tax authorities have each (except in Brcko District, where corporate income tax declarations are filed on paper) developed their own systems, not relying on the ID card but devising their own technical solutions. In Republika Srpska enity, since 2021 this means an obligation for legal entities to submit all tax declarations electronically through the web portal, using an electronic signature based on certificates installed on the computer, available free of charge. The tax authorities have thus become certification authorities. Republika Srpska also did not put the certificates for electronic signature on the ID card but developed its own solution.

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
BiH	https://cbbh.ba/Content/Read/1133	N/A	Beginner/18

The situation of open data in Bosnia and Herzegovina was assessed for the EU Open Data Maturity Report 2022. Its strongest area is Policy while Impact and Data Quality need the biggest improvement. Portal itself also requires significant improvement.

161 2021 data: https://bhas.gov.ba/data/Publikacije/Saopstenja/2022/SBR_01_2021_Y1_1_BS.pdf.

13. Artificial Intelligence and Blockchain

Bosnia and Herzegovina has not addressed AI in any of its policy documents.

	Does your administration have AI strategy?	Use cases of big data or AI in government
BiH	No references to AI in policy documents	Chatbot Municipal Intelligent Assistant in cities of Bjeljina and Laktaši[162]

There was a joint project "Improvement of municipal services in Serbia and Bosnia and Herzegovina by introducing the chatbot application" between Serbia and Bosnia and Herzegovina where in four cities, two from each administration, was set up a chatbot on the municipal websites to assist with responding to citizens' requests.

14. Cybersecurity

Bosnia and Herzegovina ranks at the position of 112 in the eGA National Cyber Security Index with the score of 28.57. This is the lowest score in the WB.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
BiH	No state level strategy; Policy for Cybersecurity (FBIH); MoD has cybersecurity strategy and action plan (2017)	Formally assigned to Ministry of Security and the Ministry of Transport and Communication	At state level: Ministry of Security (since 2017) At RS level: MST-DHEIS

162 Joint project with Serbian municipalities of Sombor and Šabac supported by the German Federal Ministry of Economic Cooperation and Development.

Kosovo

1. Position in the United Nations E-Government Survey[163]

2018	2022
EGDI Rank N/A	EGDI Rank N/A
EGDI Value	EGDI Value
OSI[164] value	OSI value
HCI[165] value	HCI value
TII[166] value	TII value

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: Medium (some focus on GovTech)	Maturity Index Group: High
GTMI[167] Value 0.455	GTMI Value 0.633
CGSI[168] value 0.430	CGSI value 0.647
PSDI[169] value 0.533	PSDI value 0.852
DCEI[170] value 0.528	DCEI value 0.577
GTEI[171] value 0.327	GTEI value 0.456

3. Position in the European Union E-government benchmarking[172]

	2022
Administration overall eGovernment maturity	N/A
User Centricity[173]	
Transparency[174]	
Key Enablers[175]	
Cross-border services[176]	

163 Kosovo is not yet part of the UN E-Government Survey
164 Online Services Index
165 Human Capital Index
166 Telecommunications Infrastructure Index
167 GovTech Maturity Index
168 Core Government Systems Index
169 Public Service Delivery Index
170 Digital Citizen Engagement Index
171 Telecommunications Infrastructure Index
172 Kosovo is not yet part of the EU E-Government Benchmarking
173 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
174 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
175 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
176 Cross-border services indicates to what extent the citizens can use online services in another administration.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
XK	Yes/No E-Government Strategy 2023-26	No/No // Yes/No Formally the Ministry of Internal Affairs and Agency for Information Society, supported by the Government CTO and his digital transformation unit	3 / 0 Government CIO's Digital transformation Unit 50 / N/A Agency for Information Society

In Kosovo, the digital transformation is managed by the Office of the Prime Minister and the Ministry of Internal Affairs. Recently, in 2021, Kosovo established position of the Government CTO as adviser to the Prime Minister with a small designated Digital Transformation Team attached to him. Kosovo case is quite complicated because the formal responsibility for the digitalisation of public administration lies with the MoIA, itself a product of amalgamation of the Ministry of Public Administration with the MoIA, and the technical capacity lies in the Agency for Information Society under the MoIA. In addition, Kosovo established in 2023 two high-level co-ordination bodies: the Commission of the Government for digital transformation led by the Prime Minister, and underneath it the Technical Committee of Government for digital transformation led by the Government CTO. Not every ministry participates in the work of these bodies, but those which have capacity and competence in setting the strategic direction for digital government development, such as the MFLT, Ministry of Economy, or Agency for Information Society which serves the entire government. Kosovo adopted in 2023 the E-Government Strategy to set the vision and direction for reforms in this area.

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
XK	32[177]/7	30,498,800	No

Kosovo interoperability platform, the Government Gateway, has been operational in technical terms since 2017. Although it started from a rather low position, Kosovo has made good progress over the last years by adding 25 new registries to exchange data over the interoperability technical platform. Number of annual transactions per registered user is 753,000, about twice lower than in Albania (40 vs 93).

There is no register of registries in Kosovo.

6. Data Quality and Availability in Digital Format

	2018	2022
Population register	Yes	Yes
Business register	Yes	Yes
Vehicles register	No	Yes
Land register	No	Yes
Access to population register over interoperability solution	Yes	Yes
Access to business register over interoperability solution	Yes	Yes

177 As of 28 April 2023.

Access to vehicle register over interoperability solution	No	Yes
Access to land register over interoperability solution	No	Yes

In Kosovo, in 2018, population[178] and business registries were fully digital and exhaustive whilst the vehicle register and land register were not. By 2022, all the registries are fully digital and exhaustive, and all are accessible over the Government Gateway. It is the best result in the Western Balkans on par only with Albania.

7. Document Exchange between Government Institutions

In Kosovo, all the ministries and government agencies are free to choose their own document management system. The Tax Administration has used Electronic Data Interchange platform to receive documents, such as annual income tax declaration and annual financial report of the companies in electronic format. However, it is not in universal use so that the Business Registration Agency for example still requires hard copies of signed documents from the entrepreneurs. Document management is co-ordinated by the Archive Office.

8. Catalogue of Public Services

In Kosovo, in early 2023, the catalogue was in the process of being developed and contains 658 services[179]. There is no information available about the maturity level of digital services. Kosovo has also a register of permits and licenses because its Deregulation Programme envisaged the need to eliminate the unnecessary permits and licenses specifically. The former is managed by the MoIA, the latter by the Office of the Prime Minister.

9. National Services Portal

	E-government Portal	Number of Services	Number of registered users
XK	ekosova.rks-gov.net	150	753,000[180]

Kosovo has set a target to digitalise 350 public services by the end of 2025. It took a giant leap towards increasing the number of users of e-Kosova portal by making registering for COVID-19 vaccination possible only through the government portal.

10. E-Payment

In Kosovo, there is no e-payment system integrated into the e-Kosova portal yet. The solution developed by the Tax Administration of agreeing with individual banks to connect to them directly is not feasible for the rest of the administration due to the high costs involved.

178 Civil Register serves in Kosovo as population register for that matter.
179 As of 24 March 2023.
180 As of 26 January 2023.

11. Digital Signature and Timestamping

There is currently no working solution for digital signature. Although the legislation to harmonise the digital signature with the EU eIDAS regulation has been put in place, there is no technical solution for deploying the digital signature. SIGMA 2021 Monitoring Report concluded that although it would be easiest to use the existing ID card as the vehicle for digital signatures, Ministry of Economy believes that this solution would be sub optimal as, in an era of ubiquitous smartphones and Internet connections, users would additionally need to purchase an NFC card reader which is unnecessarily expensive.

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
XK	https://opendata.rks-gov.net	210[181]	N/A

Kosovo has a decent number of datasets available in the designated open government portal. Since Kosovo was not part of the EU Open Data Maturity study of 2022, there is little information about the strengths and weaknesses of its open data management system. Kosovo is also not part of the Open Government Partnership, an initiative where the rest of the WB administrations have addressed open data through their action plans.

13. Artificial Intelligence and Blockchain

Kosovo has not addressed AI in any of its policy documents, nor are there reported cases of AI use in public administration.

	Does your administration have AI strategy?	Use cases of big data or AI in government
XK	No references to AI in policy documents	No cases

14. Cybersecurity

Kosovo is not yet part of the eGA National Cyber Security Index. Only recently has there been serious attempt to put the cyber security policy in place along with the responsible agency under the Ministry of Internal Affairs.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
XK	Cyber Security Strategy under preparation	Cybersecurity Agency (2023)	Regulatory Authority for Electronic and Postal Communications

181 As of 31 December 2022.

Montenegro

1. Position in the United Nations E-Government Survey

2018	2022
EGDI Rank 58	EGDI Rank 71
EGDI Value 0.6966	EGDI Value 0.7260
OSI[182] value 0.6667	OSI value 0.5528
HCI[183] value 0.8172	HCI value 0.8383
TII[184] value 0.6059	TII value 0.7868

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: High	Maturity Index Group: High
GTMI[185] Value 0.539	GTMI Value 0.564
CGSI[186] value 0.417	CGSI value 0.652
PSDI[187] value 0.631	PSDI value 0.705
DCEI[188] value 0.616	DCEI value 0.418
GTEI[189] value 0.491	GTEI value 0.481

3. Position in the European Union E-government benchmarking

	2022
Administration overall eGovernment maturity	38%[190]
User Centricity[191]	69
Transparency[192]	31
Key Enablers[193]	26
Cross-border services[194]	26

182 Online Services Index
183 Human Capital Index
184 Telecommunications Infrastructure Index
185 GovTech Maturity Index
186 Core Government Systems Index
187 Public Service Delivery Index
188 Digital Citizen Engagement Index
189 Telecommunications Infrastructure Index
190 EU27 average is 68%
191 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
192 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
193 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
194 Cross-border services indicates to what extent the citizens can use online services in another administration.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
ME	No/Yes Digital Transformation Strategy 2022-2026 Strategy for the Information Society Development (2016-2020)	Yes/Yes // No/No 2016-2020 Ministry of Public Administration (MPA) 2020-2022 – Ministry of Public Administration, Digital Society and Media Since May 2022: MPA	~ 110[195] ~ 90 ~ 90

In Montenegro, the digital transformation has been managed by the Ministry of Public Administration which has since 2016 borne various names. The strategic framework for digital government has been established in the PAR strategy. There has been no designated position in government which could be referred to as the Chief Information Officer. There has been no specialised agency to execute government policy in the digitalisation area.

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
ME	19/0[196]	91,026[197]	No

Montenegro adopted a new Interoperability Framework in 2019 which is regulated by the Law on Electronic Government (2020) Article 19. The Law on Administrative Procedures, enacted on 1 July 2017, introduces the “once-only” principle according to which public administration bodies must share and re-use the information once collected instead of requesting it again from an external party. However, there is some evidence that the principle is not consistently applied in practice[198]. Montenegro has one of the lowest numbers of interconnected registries in the WB region, which also hinders the design and provision of simplified and user-friendly administrative services. Even the base registries are not connected over interoperability technical solution. There is no central mechanism to enforce the implementation of ‘once only’ mechanism in practice although the Council for Electronic Administration was established in 2019 to co-ordinate and monitor the development of digital governance.

195 Entire ministry staff count.
196 SIGMA assessment of 2019 counted six registries connected over the Government Service Bus.
197 Note that the figure was low due to cyber-attacks in ME; in 2023, up to 1 September, already 2,571,488 transactions were made.
198 SIGMA Paper 62, p. 18. Ligi, T. and A. Kmecl (2021), “Implementation of laws on general administrative procedure in the Western Balkans”, SIGMA Papers, No. 62, OECD Publishing, Paris, https://doi.org/10.1787/e5162057-en.

6. Data Quality and Availability in Digital Format

Montenegro has most of the base registries (population register, business register, vehicle register, but not land register in 2022) assessed in the SIGMA monitoring reports available in digital format. Land register is not fully digitalised. However, when it comes to accessibility of base registries through interoperability technical solution, only population and business registries are accessible this manner. Pursuant to the Law on Central Registry (2007), the "registry of registries" has been established.

	2018	2022
Population register	Yes	Yes
Business register	Yes	Yes
Vehicles register	Yes	Yes
Land register	No	No
Access to population register over interoperability solution	No	Yes
Access to business register over interoperability solution	No	Yes
Access to vehicle register over interoperability solution	No	No
Access to land register over interoperability solution	No	No

7. Document Exchange between Government Institutions

Montenegro has had since 2011 eDocument management System (eDMS) which is used to manage documents in by 20 government institutions. Only in 2018 was it enabled the functionality to exchange documents between ministries and the Secretariat for Legislation in the domain of submitting regulations for publication in the Official Gazette. Digital signature is used to sign the documents by the government.

8. Catalogue of Public Services

In Montenegro, the Law on Electronic Government obliges the public bodies to publish a catalogue of e-services on their websites and to submit it to the Ministry of Public Administration to publish the consolidated catalogue on the Government portal[199]. The MPA started to establish the catalogue in 2021 and as of 31 May 2021, there were 96 e-services listed. In 2022, in co-operation with the UNDP, a project was launched to redesign the attributes of catalogued services and in the pilot phase, services of five institutions were analysed according to some 50 attributes.

199 http://www.gov.me/e-servisi.

9. National Services Portal

eUprava[200] functions as the main entrance point for digital services. At the same time, portal for information on the services (catalogue of e-services) is available on a different website, www.gov.me. There are 383 services on the portal, of these 177 are informative services, 130 one-way services and 73 are two-way services. Several institutions run their own separate websites for their services, such as the Ministry of Education, Science and Innovation, The Revenue and Customs Administration, The Ministry of Internal Affairs and others. There are over 106,326 registered users to the eUprava website.

	E-government Portal	Number of Services	Number of registered users
ME	www.euprava.me	403	72,531

10. E-Payment

Montenegro integrated the Information System for the Collection of Administrative Fees into the eGovernment portal to allow for payments online. In the pilot phase, four services of the Ministry of Justice were made available for the citizens to pay for online. Payments can also be executed electronically for the services which are not available in electronic format.

11. Digital Signature and Timestamping

The Law on Electronic Identification and Electronic Signature is in place since 2017. Only from 1 June 2020 did the Ministry of Interior start issuing digital certificates with national ID cards to citizens not charging extra for the activation and use of the digital signature function[201]. As of December 2020, also the Post Office of Montenegro (both to legal entities and citizens, costs 110 EUR; 30,000 certificates had been issued), CoreIT (to legal entities only, costs 80 EUR; 98 digital certificates had been issued) and the Ministry of Public Administration provide digital certificates (to state administration authorities, free of charge; 712 digital certificates had been issued). As of 2023, also the Montenegrin Telecom, Zeko.me and Central Bank of Montenegro issue certificates for advanced electronic seal or signature.

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
ME	https://data.gov.me/	166	Beginner/49

Montenegro has a decent number of datasets available in open data format and according to the Open Data in Europe 2022 report, its maturity level of open data governance is the second highest in the region, although still less that 50% of the possible score. Its relative strengths are related to data quality, deployment quality and open data implementation[202].

200 www.Euprava.me
201 SIGMA Monitoring Report on Montenegro. 2021. Available at: https://www.sigmaweb.org/publications/Monitoring-Report-2021-Montenegro.pdf
202 Open Data in Europe 2022. Available at: https://data.europa.eu/en/publications/open-data-maturity/2022?pk_campaign=launch&pk_source=li#country-overview

13. Artificial Intelligence and Blockchain

Currently there are no examples of deployment of AI technologies into the delivery of public services from Montenegro

	Does your administration have AI strategy?	Use cases of big data or AI in government
ME	No references to AI in policy documents	No reported cases

14. Cybersecurity

Montenegro ranks at the position of 95 in the eGA National Cyber Security Index with the score of 35.06. This is one of the lowest scores from the Western Balkans.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
ME	Cybersecurity Strategy 2022-2026 (2021)	Information Security Council	Since 2019 National Security Authority, previously MPA

North Macedonia

1. Position in the United Nations E-Government Survey

2018	2022
EGDI Rank 79	EGDI Rank 80
EGDI Value 0.6312	EGDI Value 0.7000
OSI[203] value 0.7153	OSI value 0.7020
HCI[204] value 0.6924	HCI value 0.7562
TII[205] value 0.4859	TII value 0.6417

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: High	Maturity Index Group: High
GTMI[206] Value 0.666	GTMI Value 0.570
CGSI[207] value 0.493	CGSI value 0.583
PSDI[208] value 0.688	PSDI value 0.795
DCEI[209] value 0.687	DCEI value 0.535
GTEI[210] value 0.794	GTEI value 0.367

3. Position in the European Union E-government benchmarking

	2022
Administration overall eGovernment maturity	35%[211]
User Centricity[212] (score)	66
Transparency[213] (score)	26
Key Enablers[214] (score)	29
Cross-border services[215] (score)	19

203 Online Services Index
204 Human Capital Index
205 Telecommunications Infrastructure Index
206 GovTech Maturity Index
207 Core Government Systems Index
208 Public Service Delivery Index
209 Digital Citizen Engagement Index
210 Telecommunications Infrastructure Index
211 EU27 average is 68%
212 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
213 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
214 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
215 Cross-border services indicates to what extent the citizens can use online services in another administration.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
MK	Yes/Yes Public Administration Reform Strategy 2018-2022. National ICT Strategy 2021-2025	Yes/Yes // No/No The Ministry of Information Society and Administration (MISA) is responsible for all issues pertaining to IT, including the policy and strategy for eGovernment and the modernisation of the public administration. Some would say that the Minister of MISA is considered as CIO but there is no technical level CIO	5-10 / 20-25 Number of people dealing with digitalisation and government ICT policy, not including people who work as an IT support for the ministry's needs

North Macedonia, according to the studies referred to above, has somewhat regressed in relative and absolute terms in the area of digital government. It had in place the PAR Strategy 2018-2022 and its Action Plan which set adequate goals, actions and indicators to improve the level of digitalisation, including centralised approach to e-government. Its focus is on improving e-services. Information and Communication Technology Council was tasked to prepare and monitor the implementation of the National ICT strategy 2021-2025. The Ministry of Information Society and Administration is the responsible ministry behind the PAR Strategy. However, some reports[216] have pointed out that the missile acts the authority over the ministries and bodies to force them to implement the new policies.

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
MK	N/A[217]/N/A[218]	1,484,018	Yes

North Macedonia does not count the number of connected registries, but instead connected institutions and webservices. The number of institutions is usually significantly higher than the number of connected registries.

Number of annual transactions over interoperability technical solution should be seen in the context of 87,161 users on the e-Government portal. Compared to Kosovo, the number of transactions per users is about two times lower (17 vs 40) and compared to Albania about 5,5 times lower (17 vs 93).

216 Center for Change Management (2019), Roadmap for Organizational, Legal and Technical Reforms to Improve Public Services, p. 14, https://cup.org.mk/publication/roadmap-for-organizational-legal-and-technical-reforms-to-improve-public-services.
217 In 2022, there were 52 connected institutions and 705 webservices available.
218 In 2018, there were 27 connected institutions and 103 webservices available.

6. Data Quality and Availability in Digital Format

	2018	2022
Population register	No	Yes
Business register	Yes	Yes
Vehicles register	No	No
Land register	Yes	Yes
Access to population register over interoperability solution	No	Yes
Access to business register over interoperability solution	Yes	Yes
Access to vehicle register over interoperability solution	No	No
Access to land register over interoperability solution	Yes	Yes

North Macedonia has improved its population register over the four-year period by making it fully digitised and exhaustive and accessible over the interoperability technical solution. However, its vehicle register is still not fully digitised and exhaustive and not accessible over the interoperability solution.

In 2019, North Macedonia established the central register of population.

7. Document Exchange between Government Institutions

In 2019 the Law on Electronic Management and Electronic Services and the Law on Electronic Documents, Electronic Identification and Trust Services where adopted. These laws make possible the mutual exchange of documents between public bodies *ex officio* and give legal value to electronic documents.

8. Catalogue of Public Services

The Catalogue of Public Services has 1,497 entries. As defined in the Law for Electronic Management and Electronic Services, "Catalogue of services for the purposes of this law is a single register of services, which clearly and unequivocally states: the competent authority that provides each individual service, the law from which the service derives and the responsibility of the authority, the conditions that must be met for use of each individual service, as well as the evidence required for using the specific service, based on the law". In fact, the Catalogue of Public Services is an electronic database where data for all public services is entered, kept and managed in a structured format. Besides data mentioned in the definition such as basic data, competent authorities and legal grounds; deadlines, data about the payments, legal remedies, types and categories, life events, contact data, points for application, FAQ, data about versioning, short and long descriptions, etc. are being collected and kept. Considered as a tool, the catalogue is available to authorised public authorities' personnel only.

789 out of the 1,336 services data entered to the Catalogue of Public Services are published on the Nationalc e-services Portal's public section. Prior to publication, entered data is verified by the authorized officials (civil servants) from the competent authorities and finally approved by the MISA. Translations of the entered data in two languages are stored in the Catalogue.

9. National Services Portal

In North Macedonia, the 835 e-services provided through the main e-government portal are from 39 government agencies. There are examples of pre-filled webforms when applying for a service.

	E-government Portal	Number of Services	Number of registered users
MK	https://uslugi.gov.mk/	835[219]	87,161

10. E-Payment

E-payment was implemented for the first time in 2018, and is being upgraded and improved over time, following the technologies that are available. At the beginning through the introduction of card payment, then electronic banking, so that today the North Macedonia also has m-banking. Payment for public services such as electricity bills, water bills, property taxes, customs and other related charges was leading the way of e-payment.

11. Digital Signature and Timestamping

There are a few institutions where "digital by default" is applied. Namely, the Central Registry and the Agency for Real Estate Cadastre are working with digital signatures/digital stamps used for signing the documents by civil servants. Also, documents received as a result of e-services provided by a citizen or business on the nationalcentral? e-services portal are signed with electronic signature of an authorized civil servant and/or sealed with an electronic seal and timestamp from the competent institution.

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
MK	https://data.gov.mk/en/ https://ovp.gov.mk/	580	N/A

North Macedonia has hefty 580 datasets available over the e-government portal. North Macedonia is part of the Open Government Partnership and has addressed open data through their action plans. Since North Macedonia was not part of the EU Open Data Maturity study of 2022, there is little information about the strengths and weaknesses of its open data management system.

219 As of 20 December 2022.

13. Artificial Intelligence and Blockchain

North Macedonia has not addressed AI in any of its policy documents, nor are there reported cases of AI use in public administration.

	Does your administration have AI strategy?	Use cases of big data or AI in government
MK	No references to AI in policy documents	No reported cases

14. Cybersecurity

North Macedonia ranks at the position of 58 in the eGA National Cyber Security Index with the score of 58.44.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
MK	National Cybersecurity Strategy and Action Plan 2018–2022 has five objectives: cyber resilience; capacities and culture; combating cybercrime; cyber defence; and cooperation and information exchange; lacks governance and legislative aspects, performance measures	National Cyber Security Council and Operational Implementation Body not functional	Agency for Electronic Communications

Serbia

1. Position in the United Nations E-Government Survey

2018	2022
EGDI Rank 49	EGDI Rank 40
EGDI Value 0.7155	EGDI Value 0.8237
OSI[220] value 0.7361	OSI value 0.8514
HCI[221] value 0.7896	HCI value 0.8332
TII[222] value 0.6208	TII value 0.7865

2. Position in the World Bank GovTech Maturity Index

2020	2022
Maturity Index Group: High	Maturity Index Group: Very High
GTMI[223] Value 0.722	GTMI Value 0.895
CGSI[224] value 0.597	CGSI value 0.802
PSDI[225] value 0.751	PSDI value 0.890
DCEI[226] value 0.851	DCEI value 0.979
GTEI[227] value 0.688	GTEI value 0.910

3. Position in the European Union E-government benchmarking

	2022
Administration overall eGovernment maturity	49%[228]
User Centricity[229]	77
Transparency[230]	45
Key Enablers[231]	54
Cross-border services[232]	18

220 Online Services Index
221 Human Capital Index
222 Telecommunications Infrastructure Index
223 GovTech Maturity Index
224 Core Government Systems Index
225 Public Service Delivery Index
226 Digital Citizen Engagement Index
227 GovTech Enablers Index
228 EU27 average is 68%
229 User Centricity indicates to what extent (information about) a service is provided online, how the online journey is supported and if public websites are mobile friendly.
230 Transparency indicates to what extent governments are transparent regarding transparency of services delivery, service design and personal data.
231 Key enablers indicates the extent to which 4 technical pre-conditions are available online: eID, electronic documents, authentic sources and digital post.
232 Cross-border services indicates to what extent the citizens can use online services in another administration.

4. Governance of Digital Transformation

	Does the government have digitalisation strategy? (2022/2018)	Does the government have de facto responsible institution for digitalisation policy and CIO? (2022/2018)	How many people work in the central executive organisation for digitalisation? (2022/2018)
RS	Yes/Yes E-Government Development Programme 2020-22 E-government Development Programme proposal 2023-2025[233] E-Government Development Strategy 2015-2018[234]	Yes/No // Yes/No Office for Information Technologies and Electronic Government	108 (2021) / N/A

In Serbia, the digital transformation is managed by the Office for Information Technologies and Electronic Government while the administrative simplification is managed by the Public Policy Secretariat. Besides the more general Public Administration Strategy 2021-2030 managed by the Ministry of Public Administration and Local Self-Government, there is a proposed E-Government Development Programme 2023-2025 proposal. Also, there is a separate Artificial Intelligence Development Strategy 2020-2025.

Overall, the institutional framework, while clear in legislation, sometimes poses a challenge in providing leadership, co-ordination and joining up of different initiatives. There has been a lack of a leading central institution to manage the policy of digital transformation, provide authority over other agencies and centrally monitor and take stock of progress and identify the areas for further improvement.

5. Interoperability of Registries and Application of Once-Only Principle

	Number of connected registries (2022/2018)	Number of annual transactions (2022)	Compatible with EI platform standards
RS	55/20	2,239,710	Yes

Serbia is one of the two regional leaders in terms of number of registries which are connected over the interoperability technical solution and its progress in regard to bringing more registries to the interoperability platform has been the fastest over the period 2018-2022. Serbia updated its technical interoperability in 2020 to align it with the new legislative framework and technological developments and the latest EU recommendations[235].

Serbia has by legislation mandated[236] metaregister which is supposed to serve as the register of registries, but in practice it has not been established yet (the aim is to launch it in 2024). The aim is to help prevent exchange of incomplete or obsolete data, and to eliminate unnecessary duplicate data fields in various registries.

233 https://www.ite.gov.rs/extfile/sr/2090/StrategijarazvojaeUpravesaAP2015-2018-1.pdf
234 https://www.ite.gov.rs/extfile/sr/2090/StrategijarazvojaeUpravesaAP2015-2018-1.pdf
235 List of Standards of Interoperability. Version 2.1. Available at: https://www.ite.gov.rs/extfile/sr/2003/LISTA_STANDARDA_Tehnicke_Interoperabilnosti%20v%202.1.pdf.
236 The Law on e-Government of 2018.

6. Data Quality and Availability in Digital Format

Serbia has all the base registries (population register, business register, vehicle register, and land register) available in digital format according to the SIGMA monitoring reports. It is an improvement from 2018 when the population register was not digitised and exhaustive. When it comes to accessibility of base registries through interoperability technical solution, vehicles register is not accessible yet over the interoperability infrastructure. Serbia established in 2020 central population register (CPR) which combines data on the population from other government registries and records. It covers 13 official government records ("source records") maintained by different public authorities. Administrative bodies are required to transfer data to the CPR "without delay" after entering it in the source records. As of 13 July 2022, 11 bodies are authorised to obtain data from the CPR. In 2021, the MPALSG invited the citizens to request access to, review the data accuracy on them or supply missing personal data.

	2018	2022
Population register	Yes	Yes
Business register	Yes	Yes
Vehicles register	Yes	Yes
Land register	No	No
Access to population register over interoperability solution	No	Yes
Access to business register over interoperability solution	No	Yes
Access to vehicle register over interoperability solution	No	No
Access to land register over interoperability solution	No	No

7. Document Exchange between Government Institutions

In Serbia, software solution e-Registry Office (*ePisarnica)* has been envisaged as the central information system for document management in the public administration, available to all state bodies and local self-government units, but due to lack of funding it has not yet been made operational. Meanwhile, office operations are still largely carried out in the traditional way. Many authorities use case management systems, but many of these systems are rudimentary and limited to an electronic ledger without digitising and storing documents. Moreover, the solutions used are different, which makes solving the interoperability problem even more difficult[237].

8. Catalogue of Public Services

In Serbia, the Digital Register of Administrative Procedures was launched in June 2021 through the ePaper Programme. The register has a public interface to the web portal, containing detailed information on over 2,300 procedures for business entities and, as of 2023, 212 procedures for citizens.[238]

237 Ex-post Evaluation of the E-government Development Programme 2020-2022.
238 Register of administrative services for the economy. Available at: https://rap.euprava.gov.rs/privreda/home

9. National Services Portal

eUprava.gov.rs[239] functions as the main entrance point for digital services. All the services on the portal are of sophistication level three or four (26% of all the services are characterised as fully transactional services). Besides the eGovernment portal there is a plethora of other portals: Local Tax Administration Portal, ePayment of court fees (Ministry of Justice), eForeigner residence, eRegistration Portal (Register of Companies), Central Register of Facilities.

	E-government Portal	Number of Services	Number of registered users
SR	www.euprava.gov.rs	340	1,588,101

10. E-Payment

In Serbia, the electronic payment system ePayment+, in effect since 2017, was designed to provide the possibility of integrating the administrative fee payment procedure with independent applications of institutions that independently offer electronic services. Not the service can be completely digitalised. If the institution has no aims to independently develop electronic services that would be integrated with the ePayment+ system, then it can create an electronic service on the eGovernment Portal. Electronic services created this way also use the ePayment+ system. In 2021, the government launched the ePayment Portal. It currently enables fee payments for 300 services of the Ministry of the Interior and one service of the Tax Administration. Apart from this, citizens can also pay administrative fees with payment cards and iPay option through various portals.

11. Digital Signature and Timestamping

In Serbia, there are 6 qualified trust service providers registered for the issuing of qualified electronic signature certificates and one registered for the cloud signature.[240] The law regulating digital signature[241] is in line with eIDAS and the requirements are the same for all trust service providers. The signature creating devices vary, from the chipped ID card provided free of charge, to smart cards, USB tokens, to the mobile app for signing in the cloud.

Digital signature has the equivalent legal effect of a handwritten signature by law. The exception is if a special law provides that certain legal affairs cannot be made in electronic form. The exception is if "contracts and other legal affairs are specifically envisaged by the special law to be drafted in the form of authentication of signatures, publicly certified (notarized) documents, or in the form of a public notary record". These should be concluded "in accordance with the regulations governing the authentication of signatures, validation and drafting of documents on legal affairs."

239 Euprava.gov.rs
240 https://epotpis.mtt.gov.rs/eng/trusted-qualified-providers-register/
241 https://epotpis.mtt.gov.rs/download/law-on-electronic-document-electronic-identification-and-trust-services-in-electronic-business-official-gazette-rs-94-17/?wpdmdl=544&refresh=641d723178e051679651377

12. Open Data Governance

	Link to open data portal	Number of datasets	Maturity level and score (%)
RS	https://data.gov.rs/sr/datasets/adresni-registar-shifarnik/	2150	Follower/66

Serbia has the highest number of datasets available on the open data portal and is also the most advanced administration in the WB in terms of maturity level, assessed in the EU Open Data Maturity Report of 2022. Serbia falls into the category of 'Followers', third maturity level overall, getting close to the 'Fast trackers' category.

13. Artificial Intelligence and Blockchain

Serbia has in place the National AI Development Strategy 2020-2025[242]. It also has a number of cases of AI implemented over the last few years. In regional comparison, Serbia is the most active in pursuing these new technologies.

	Does your administration have AI strategy?	Use cases of big data or AI in government
RS	The National AI Development Strategy 2020-2025[243]	National Platform for AI (2021) Immunization Management System Viber chatbot Covid-19 Infor Serbia Chatbot IVA (Contact Centre of National Inspections) Chatbot Municipal Intelligent Assistant in Sombor and Šabac Chatbots in egovernment portal, websites of the Republic Geodetic Authority (cadastre services) and the Ministry of Education (scholarship, school enrollment) OKO SOKOLOVO parking control system in the City of Belgrade

In May 2020, the Serbian MPALSG published the "Study on the Feasibility of Using Blockchain Technology in Public Administration of the Republic of Serbia", prepared by a team of Korean experts, lecturers at Serbian-Korean Information Access Center, as part of the joint project between the MPALSG and the National Information Society Agency of the Government of the Republic of Korea.[244] The study proposed introduction of blockchain technology into the integrated administrative system, land administration, agricultural product management and export customs clearance system.

242 AI Development Strategy in the Republic of Serbia for the period 2020-2025, Official Gazette RS no. 96/2019 https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/viewdoc?uuid=43d94c01-6bc3-4f5f-a4ba-9c22d3f3b88a&regactid=429661&doctype=reg

243 AI Development Strategy in the Republic of Serbia for the period 2020-2025, Official Gazette RS no. 96/2019 https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/viewdoc?uuid=43d94c01-6bc3-4f5f-a4ba-9c22d3f3b88a&regactid=429661&doctype=reg

244 https://mduls.gov.rs/wp-content/uploads/Blockchain-study-ENG.pdf.

14. Cybersecurity

Serbia ranks at the position of 21 in the eGA National Cyber Security Index with the score of 80.52. This is the highest score in the Western Balkans.

	Cybersecurity strategy	Institution responsible for cybersecurity supervision	Institution operating as CERT
SR	Strategy for the Development of Information Society and Information Security (2021) addresses, inter alia, the information security of citizens, economy, and 'ICT systems of special importance'. Cybersecurity is also interwoven into other strategies	Ministry of Trade, Tourism and Telecommu nications/ Regulatory Agency for Electronic Communica tions and Postal Service	Regulatory Agency for Electronic Communications and Postal Services

Serbia does not have a designated cybersecurity strategy, but it has addressed cybersecurity in various strategic documents.

Western Balkan Regional Study on Digitalisation in Government

ReSPA
Regional School of Public Administration
BUILDING TOGETHER GOVERNANCE FOR THE FUTURE

Regional School of Public Administration
Podgorica, Bulevar knjaza Danila Petrovića – Business Tower Montenegro (III floor), Montenegro
respa-info@respaweb.eu
www.respaweb.eu

Co-funded by the European Union