European Commission

State-of-play report on digital public administration and interoperability 2021

Directorate General for Informatics

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Executive Summary

The state-of-play report on digital public administration and interoperability will provide the readers with an overview of the main developments and initiatives put forward by the European countries to digitalise and make their public administrations more interoperable, from 2020 through 2021. Indeed, the report sheds light on the national initiatives, both binding and non-binding, that have been put in place, or modified, by the 35 European countries under the scope of this study. The readers will also be provided with an overview of the current state-of-play of interoperability across Europe thanks to a high-level overview of the level of implementation of the European Interoperability Framework (EIF) in the same 35 European countries in 2020. The dedicated chapter will also provide comparisons with the countries' performance in 2019, so as to find correlations and commonalities but also potential areas of improvements to help the European countries in better and further implementing the EIF.

The report demonstrates that while most European countries had already started to digitalise their public sectors, the outbreak of the COVID-19 pandemic has only accelerated the pace of this digital transformation, rendering digital technologies and digital services an imperative for all. In this context, the European Commission has demonstrated a strong commitment in fostering the uptake by its Member States of digital solutions and on how to render them sustainable in the long term. Hence, the report aims at providing an overview of the state-of-play of digital public administration and interoperability in the EU by examining the vast array of political and legislative initiatives put forward by the European Commission in this field in the period 2021-2021 but also by giving an account of the many EU funding programmes aimed at fuelling the digital transformation of the public sector across Europe. Lastly, this year's edition of the report also aims at providing readers with insights on the most recent global initiatives developed since 2019 by various international organisations to support governments and public administrations around the globe on their road towards digital transformation.

Introduction

Introduction

Following the mandate from the European Commission's Directorate-General for Informatics (DG DIGIT), and in the context of the monitoring and reporting activities of the National Interoperability Framework Observatory (NIFO) project, Wavestone was requested to conduct the second edition of the study on the state-of-play on digital public administration and interoperability across Europe. While describing the landscape of activities aimed at promoting digital public administration and interoperability, the report also highlights the role of the COVID-19 crisis as a positive catalyst for the acceleration of the digital transformation of European countries.

The study covers the recent developments on digital public administration and interoperability in the 27 EU Member States as well as in the countries of the European Free Trade Association (Iceland, Liechtenstein, Norway, Switzerland), Ukraine, Montenegro, Turkey, and the Republic of North Macedonia. Further to providing the main initiatives introduced by the European Commission to foster digital transformation across the EU, this year's edition introduces some of the initiatives in the fields of digital public administration and interoperability sponsored by the major international organisations such as the United Nations (UN), the Organisation for Economic Cooperation and Development (OECD), and the World Bank, among others.

The state-of-play report on digital public administration and interoperability is structured around the following chapters:

- **Chapter 1 – Latest developments in digital public administration in Europe**. Through the lens of the principles outlined in the Berlin Declaration on Digital Society and Value-Based Digital Government, this chapter presents the results of the analysis of over 500 political and legislative initiatives around digital public administration recently created or upgraded in Europe.

- **Chapter 2 – Latest developments in interoperability in Europe**. This chapter focuses on the implementation of the European Interoperability Framework (EIF) across Europe, providing a high-level overview of the performance of the European countries in 2020, compared to their previous year's performance. Further to that it draws commonalities and conclusions on the key areas for improvement.

- **Chapter 3 – The role of the European Commission in promoting digital public administration and interoperability in the recovery phase**. This chapter details the European Commission's commitment in terms of political, legislative, and funding initiatives aimed at fostering the digital transformation across the EU.

- **Chapter 4 – Latest developments in digital public administration and interoperability in the world**. This chapter summarises the most recent initiatives developed by international organisations to support countries in their digital transition.

Through the breadth of this year's edition, the reader is presented with a multilevel narration of an irreversible trend towards a more digital and interoperable society, both in Europe and in the world.

01

Latest developments in digital public administration in Europe

Latest developments in digital public administration in Europe

The process of digitalisation of public administrations aims at improving the efficiency of the public sector by exploiting the potential of ICT technologies to promote innovation, sustainability and transparency, and thus bringing benefits to both citizens and businesses throughout Europe. Indeed, due to the endless digitalisation of society and its evolving needs, public administrations have no choice but to follow suit, taking onboard the most recent developments brought by innovative technologies and eventually breaking up the silos in which they have long worked. In this regard, their ability to address interoperability challenges appears critical to ensure the cross-border and cross-sector interconnections, which are increasingly important for the delivery of digital public services. In the context of this report, interoperability is defined as the ability of organisations to interact towards mutually beneficial goals, involving the sharing of information and knowledge between these organisations, through the business processes they support, by means of the exchange of data between their ICT systems[1]. For all these reasons, countries keep designing and implementing several initiatives, including strategies, action plans, non-binding policies, roadmaps, frameworks, binding legislative proposals or amendments, which sometimes induce new digital infrastructures.

The purpose of this first chapter is to draw a clear picture of the main trends identified from the political communications, legislations and infrastructures designed and implemented by European countries between 2020 and 2021. To do so, we rely on data gathered through the most recent editions of the Digital Public Administration factsheets, i.e. 2020 and 2021[2]. Our analysis is the result of an in-depth analysis and clustering of more than 500 data computations from 35 European countries[3].

A new clustering taking stock of the Berlin Declaration principles

The Berlin Declaration on Digital Society and Value-based Digital Government, signed in 2020 by representatives of all Member States in Europe, acknowledges the importance of the digitalisation of the public sector, as well as digital public services, while considering the public sector as a driving force for the development of new and innovative solutions, including the use of emerging technologies. For our analysis, the initiatives retrieved from the Digital Public Administration factsheets 2020 and 2021 are clustered in five categories, aligned with key principles of the Berlin Declaration:

Digital transformation of public administrations: It refers to all the digital strategies, action plans, legislations, and initiatives more broadly, that aim to modernise and digitalise public administrations.

Trust and security in the digital government sphere: It refers to all the initiatives put in place by the Member States to ensure that citizens and businesses can rely on trustworthy and verifiable digital government applications and services, conforming to European standards (e.g., eID).

Digital inclusion and digital government services: It refers to the initiatives put in place by governments and public authorities, at all levels, that provide digital services which respond and meet citizens' digital preferences and needs.

Digital sovereignty and interoperability: It refers to initiatives that aim to create the right conditions in Europe to develop and deploy secure and interoperable digital capacities.

Innovative technologies in the public sector: It refers to the Emerging Disruptive Technologies (EDT) initiatives and opportunities that Member States are promoting and investing on, including the Internet of Things, Artificial Intelligence systems, distributed ledger technologies and quantum computing, among others.

1 European Commission, 2017. New European Interoperability Framework: Promoting seamless services and data flows for European public administrations.

2 The Digital Public Administration factsheets are issued every year by the National Interoperability Framework Observatory (NIFO), which is part of Interoperable Europe. The factsheets document and monitor every aspect related to digital public administration and interoperability in the analysed countries and provide information on the actors and institutions in charge of these fields.

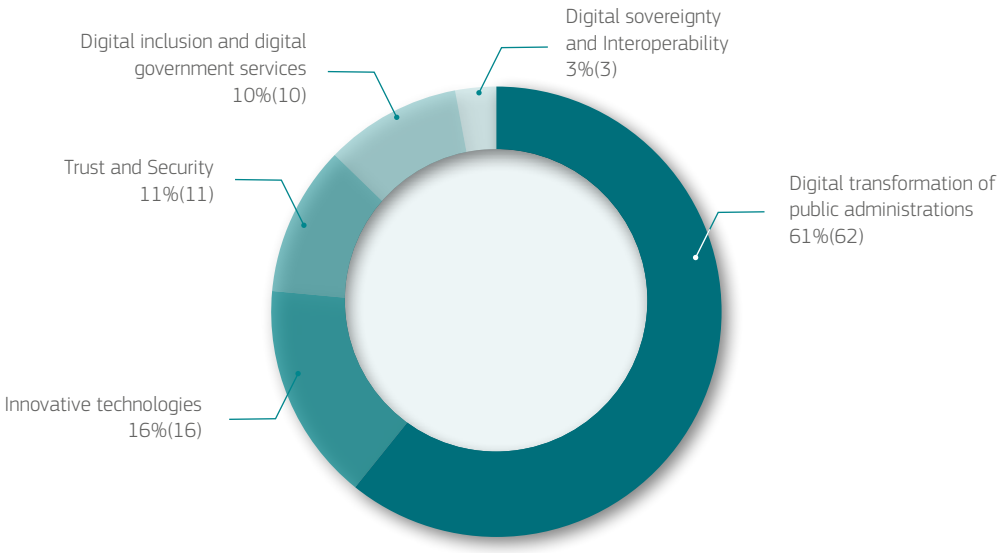
3 The countries studied are the 27 EU Member States, the members of the European Free Trade Association (Iceland, Liechtenstein, Norway and Switzerland) as well as Ukraine, Montenegro, Turkey and the Republic of North Macedonia.

1.1 Most recent political communications supporting digital public administration throughout Europe

To align themselves with the technological progress and to enhance the digitalisation of their public administration, European countries are continuously releasing new political communications. Political communications are defined, for the purpose of this report, as non-binding strategies, action plans and frameworks drafted by the countries' governmental bodies in order to set up future objectives and priorities in the field of digital public administration and interoperability. From 2020 to 2021, 102 new political communications were drafted to support the digitalisation of public administration across Europe. To have a better overview of the most relevant topics identified in these political communications, they have been grouped into the five clusters mentioned above.

Figure 1 shows the key digital policy areas on which the analysed countries have focused their political communications in 2020 and 2021. These policy areas are then further described below by order of recurrence.

Figure 1 Political Communications' digital themes



Source: analysis of the main political communications gathered from the 'Highlights' section of the 2020 and 2021 Digital Public Administration factsheets, performed by Wavestone.

Supporting the digital transformation of public administration

Most political communications address a variety of topics falling within the scope of the digital transformation of public administration through the **elaboration of various multiannual digital strategies and action plans**, with the common goal of enhancing the efficiency of their national public administration and in turn to ensure better public services delivery. According to our analysis, 62 such political communications were drafted between 2020 and 2021 in 35 countries in Europe[4]. For example, Bulgaria paved the way for its digital transformation over the next decade with a new national strategic document, the Digital Transformation of Bulgaria for the period 2020-2030. Another example comes from the Digital Transformation Strategy of Montenegro (2022-2026), drafted in 2020. This strategy focuses on the comprehensive digitalisation of the country in the provision of public administration services and addresses the issues of the development of interoperability, the identification of all relevant stakeholders in ICT and business sectors and their cooperation in the delivery of eServices. In addition, several European countries have been working on the elaboration of **open data strategies and action plans** to enhance the access to data and the re-use of public information. For instance, Germany's Data Strategy includes more than 240 measures to support the use of data and data sharing as well as to ensure data protection and sovereignty in the age of global data transfers and networking.

4 These countries are the 27 EU Member States, the members of the European Free Trade Association (Iceland, Liechtenstein, Norway and Switzerland) as well as Ukraine, Montenegro, Turkey and the Republic of North Macedonia.

Pushing forward the integration of innovative technologies in the public sector

Another focus in the development of political communications in the period 2020-2021 was the deployment of **innovative technologies** in public administration. Our data analysis revealed that 16 political communications addressed this topic, and more particularly, the promotion of **artificial intelligence** (AI). For instance, Cyprus updated its National Strategy on Artificial Intelligence in May 2021. This new strategy is based on four main objectives: maximise investment through partnerships; create national databases; nurture talents and lifelong learning; and finally, develop an ethical and trustworthy Artificial Intelligence.

Enforcing trust and security measures for a more secure Europe

Cybersecurity risks and threats are increasing as the number of connected people grows, a trend reinforced by the COVID-19 crisis, the quarantine and remote working. In response to this phenomenon, various countries have decided to strengthen their policies linked to **security** and drafted new strategies to reinforce citizens' **trust** in public administration. According to our data analysis of 35 countries in Europe, 11 new political communications focused on this topic. Most of these political communications addressed the launch of new national **cybersecurity** strategies and the development of **eID**. The Czech Republic, for example, drafted a new multiannual cybersecurity strategy, called National Cybersecurity Strategy of the Czech Republic for the period from 2021-2025, which aims at maintaining a safe digital environment for all citizens and organisations, to secure public administration's infrastructures and information services, as well as to support the use of unified information channels that allow secure data exchange.

Encouraging digital inclusion and widening the access to digital government services

Public administrations continue to develop new digital public services and new features for existing services, with the aim of strengthening the digital inclusion of their citizens. To achieve this objective, public administrations are not only digitalising many administrative processes and public services, but also simplifying the functioning and the access to them, in an effort to meet citizens' digital preferences and needs. Due to the COVID-19 pandemic, digital inclusion became particularly fundamental, especially with regards to citizens' digital skills. Between 2020 and 2021, 10 new political communications on the **digitalisation process of public services and digital inclusion** have been introduced in the analysed European countries. One example of this type of political communication was elaborated by Ukraine in March 2021 through its Concept of Digital Competencies Development in Ukraine until the year 2025, aiming to align the development of digital competencies in the country with European standards, modernise its public administration processes, reduce the digital division and harmonise the national digital market with the European Union, as well as accelerate the introduction of eDemocracy and eGovernment tools in the country.

Developing digital sovereignty and interoperability in Europe

Due to the COVID-19 pandemic, the need for better interoperability of government systems and data sharing was reinforced. New political communications addressing topics related to **interoperability and digital sovereignty** were drafted in Malta, Luxembourg and Czech Republic. The common goal of these political communications is to help European countries accomplish interoperability in all technical, semantic, organisational, and legal dimensions, both at national and international level for various policy areas. Some of these strategies incorporate important policy projects, such as the alignment of the national framework with the new European Interoperability Framework, and projects that target the sectoral level for the implementation of interoperable digital services, as for example the establishment of a new Sectorial Committee for Interoperability of the central government in Luxembourg. It is also worth mentioning that between 2020 and 2021, some countries, such as Croatia, Hungary, Greece, and Slovakia, included interoperability considerations within some of their broader digital national strategies or action plans on various areas (e.g. data interoperability of information systems, interoperability of open data, base registries or government cloud). For instance, the Hungarian National Digitalisation Strategy (2021-2030) emphasises the need to establish a data-based administration in the country, with interoperable data connections between administrative services and encourages the development and use of open source software as a mean to promote interoperability.

Figure 2 below presents an analysis of the clusters gathering political communications aimed at steering digital public administration in Europe between 2020 and 2021.

Figure 2 Analysis of the most recent political communications aimed at supporting digital public administration and interoperability

Digital transformation of public administrations	Innovative technologies in the public sector	Trust and security in the digital government sphere	Digital inclusion and digital government services	Digital sovereignty and interoperability
EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE
Germany drafted a new **Data Strategy** including more than 240 measures to support the country's use of data and data sharing as well as to ensure data protection and sovereignty in the age of global data transfers and networking.	**Cyprus** updated its **National Strategy on Artificial Intelligence** in May 2021, which is based on four main objectives: maximise investment through partnerships; create national databases; nurture talents and lifelong learning; and finally, develop an ethical and trustworthy Artificial Intelligence.	**Czech Republic** drafted its **new National Cybersecurity Strategy** for 2021-2025 , which aims at maintaining a safe digital environment for all citizens and organisations, to secure public administration's infrastructures and information services, as well as to support the use of unified information channels that allow secure data exchange.	**Ukraine** drafted in 2021 its **Concept of Digital Competencies Development in Ukraine until the year 2025**, aiming to modernize public administration processes and reduce the digital division, as well as accelerate its introduction of eDemocracy and eGovernment in the country.	**Luxembourg** announced the establishment of a **new Sectorial Committee for Interoperability** within its central government.

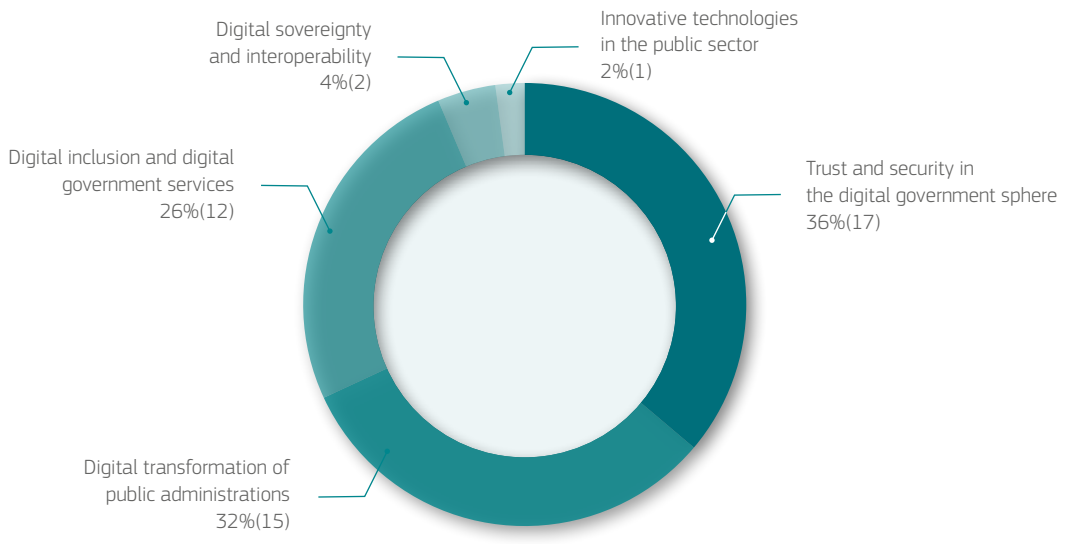
Source: analysis of the main political communications gathered from the 'Highlights' section of the 2020 and 2021 Digital Public Administration factsheets, performed by Wavestone.

1.2 Most recent legislative initiatives supporting digital public administration throughout Europe

The second section of this chapter is focused on new legislations adopted in 2020 and 2021 by countries in Europe to regulate various aspects related to the digitalisation of public administration and interoperability. Our analysis identified 47 new legislative frameworks and proposals which were then grouped into five clusters to get a better visualisation of the predominant digital themes of those legislations.

Figure 3 shows the legislations' main digital policy areas on which the analysed countries have focused their attention between 2020 and 2021.

Figure 3 Legislations' digital themes



Source: analysis of the main legislations gathered from the 'Highlights' section of the 2020 and 2021 Digital Public Administration factsheets, performed by Wavestone.

Improving security and trust through new and stricter legislations

Numerous countries in Europe have introduced new legislations related to cybersecurity and trust to cope with the challenges brought by the digitalisation of society, including one of public administrations. Among the legislations drafted by the 35 countries analysed in our report, 17 new legislations address trust and security related themes. Most of these initiatives focus on three main topics: **cybersecurity, data protection and eID**. Indeed, numerous cybersecurity-related regulations and amendments were adopted to strengthen the security of the various information and telecommunications systems of public administrations, as well as to coordinate methods across the public sector. Looking at data protection, North Macedonia and Liechtenstein both adopted in 2020 new laws on personal data protection to align their legislations with the General Data Protection Regulation (EU) 2016/679. For example, Liechtenstein amended in 2020 its Data Protection Ordinance, implementing the European Regulation mentioned above, by revising the list of third countries and international organisations considered to have an adequate level of data protection. In Luxembourg, Slovenia and Sweden, new laws were adopted to implement and adapt the Regulation (EU) N° 910/2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market (eIDAS Regulation) to their national context, to ensure the deployment and interoperability of electronic trust services such as eID, eSignature and eDelivery.

Encouraging the digitalisation of public services through legislations

Between 2020 and 2021, many European countries worked on developing new institutional frameworks to support the **digitalisation of public administrations and services and the adoption** of new **eGovernance** measures. 15 legislatives acts in this field have been implemented by 14 countries in Europe during the abovementioned period. In Finland, the Act on Information Management in Public Administration (906/2019) entered into force in January 2020, redefining the entire lifecycle of information of Finnish public administration. This act was part of a wider reform replacing the Act on Information Management Governance in Public Administration (634/2011) and over 30 other legislative acts. In addition, Poland and Switzerland adopted new rules on **electronic public procurement**. For instance, a new Public Procurement Law came into force in Poland in January 2021 following the EU Directives on public procurement (2014/24/EU and 2014/25/EU). This new Polish law envisages that all public procurement procedures, regardless of their value, will be electronic.

Towards more digital inclusion and digital public services

To promote digital inclusion and provide public services that meet the needs of citizens, nine countries[5] in Europe have adopted a total of 12 legislative initiatives in 2020 and 2021. Driven by the COVID-19 pandemic crisis, several countries drafted new proposals related to **eHealth**[6]. In Ukraine, the government approved in December 2020 the Order No 1671 on the Concept of eHealth development, which aims at establishing the necessary political, legal, organisational, technological and ideological conditions and principles for the development of a digital ecosystem that will allow patients to access and manage their medical data, while improving the safety, quality and availability of medical services in the country.

Legislations enhancing digital sovereignty and cross-border interoperability

Throughout 2020 and 2021, two legislative measures covering aspects related to **interoperability, cross-border services and digital sovereignty** were established. The first one is in Italy, which adopted the Circular No 1 of 9 September 2020, defining the new interoperability guidelines for public administrations in line with the European Interoperability Framework (EIF) model. The guidelines set out the technical interoperability that all Italian public administrations must meet in order to ensure the interoperability of their systems with third parties and to support the implementation of the national IT system for public administration. The second country to adopt a legislative measure related to interoperability is Montenegro. Indeed, the Law on Electronic Administration was adopted in January 2020 and aims to further regulate the field of eGovernment in Montenegro in an effort to meet current and future needs, while conforming to international requirements.

Innovative technologies

Finally, our analysis identified one single new legislative initiative aimed at **adapting and regulating the use of emerging technologies** in public administrations. Brought into force in 2020 in Switzerland, the Federal Act on the Adaptation of Federal Law to Developments in Distributed Ledger Technology (2019-2205) focuses on the adaptation of federal law regarding the introduction of distributed ledger technologies (DLT) allowing shared data management.

Figure 4 below presents an analysis of the countries having put in place legislations aiming to support digital public administration and interoperability in Europe between 2020 and 2021.

5 Austria, Croatia, Czech Republic, Malta, Norway, Poland, Sweden, Turkey and Ukraine.

6 Croatia, Sweden and Ukraine.

Figure 4 Analysis of the most recent legislations aimed at supporting digital public administration and interoperability

Trust and security in the digital government sphere	Digital transformation of public administrations	Digital inclusion and digital government services	Digital sovereignty and interoperability	Innovative technologies
EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE	EXAMPLE
Slovenia drafted a new law in 2020 in the area of **electronic identification and trust services**, which will align the national legislation with the European Regulation (EU) No 910/2014 on electronic identification and trust services for electronic transactions in the internal market (eIDAS Regulation), which is planned to be adopted in 2021.	In **Finland**, the **Act on Information Management in Public Administration (906/2019)** entered into force in January 2020, redefining the entire lifecycle of information of Finnish public administration. This act was part of a wider reform replacing the Act on Information Management Governance in Public Administration (634/2011) and over 30 other legislative acts.	**Poland** adopted the **Act on electronic delivery** in December 2020, enables public entities to provide widest possible electronic services within the administration and to introduce solutions ensuring citizens and entrepreneurs the exchange of correspondence registered by means of the trust services.	**Italy** adopted the **Circular No 1 of 9 September 2020,** defining new interoperability guidelines for public administrations in line with the European Interoperability Framework (EIF) model and focused on technical interoperability to support the implementation of the national IT system for public administration and to ensure the interoperability of their systems with third parties .	**Switzerland** brought into force in 2020 the **Federal Act on the Adaptation of Federal Law to Developments in Distributed Ledger Technology** (2019-2205), that focuses on the adaptation of federal law regarding the introduction of distributed ledger technologies (DLT) allowing shared data management.

Source: analysis of the main political communications gathered from the "Highlights" sections of the 2018, 2019 and 2020 Digital Public Administration factsheets, performed by Wavestone.

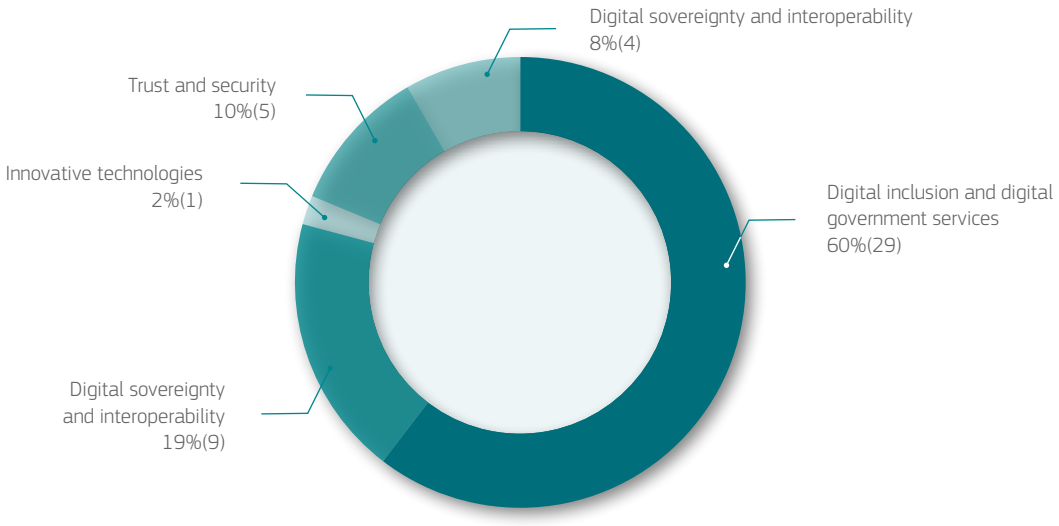
1.3 Most recent digital infrastructures put in place to support digital public administration throughout Europe

Digital infrastructure refers to eGovernment systems and technologies that deliver digital public services and support the digitalisation of public administrations.

This chapter provides an overview of the five trends on public digital infrastructures identified across the EU, a list of countries that have initiatives in each of them and examples of each trend: in total, European countries have put forward 47 initiatives related to the development or deployment of digital infrastructures between 2020 and 2021. These policy areas are described below, from most recurrent themes to least recurrent across Europe.

The trend across countries is represented in Figure 5.

Figure 5 Infrastructures' digital themes



Source: analysis of the main infrastructures gathered from the "Highlights" sections of the 2020 and 2021 Digital Public Administration factsheets, performed by Wavestone.

Digital inclusion and digital government services

To ensure citizens use of digital government services, governments need to support citizens digital inclusion: that is to say citizens' **ability and accessibility** to use digital services. With this goal in mind, 20 different countries[7] created or upgraded 29 public services in the period from 2020 to 2021.

Greece, for example, was quick to react to the pandemic, launching a project to improve the digital literacy of all citizens with the creation of the National Digital Academy. The aim of the Academy is to link the policies of the Hellenic Ministry of Digital Governance with the development of citizens' digital skills, regardless of their educational level, age or gender, by offering different educational courses on an electronic platform. In the Digital Academy, citizens can choose the courses that suit their needs, interests and level of knowledge and skills, free of charge and without complicated registration procedures. The portal also offers a self-evaluation tool that follows the European evaluation standard DigiComp v2.1, to enable the citizens to assess their own level of digital ability. Then, and according to the result of the self-assessment, citizens are provided with an individualised course proposal. The courses are created and deliver by certified providers.

Digital transformation of public administrations

European public administrations are focusing on the **digital transformation of their tools and processes** to improve their public services. Specifically, nine European countries, such as Austria, Croatia or Finland,[8] digitalised public processes through nine different infrastructures initiatives. These new infrastructures deliver solutions such as eProcurement, eDelivery, a Central Registry of Patient Data to enhance COVID-19 screening, or public cloud systems; all of them with the final goal of making public services more efficient.

Austria offers a good example: the Austrian Cloud (Ö-Cloud) initiative, launched on 10 June 2020, aims to increase Austria's resilience and data sovereignty. The Ö-Cloud Austria has the following goals: connecting Austrian cloud providers to a synergetic 'network system', strengthening data sovereignty, and improving transparency and integrity through comprehensible processing of data.

Trust and security in the digital government sphere

European countries are working to ensure that citizens and businesses can use **trustworthy and safe applications and services**. On this cluster, the analysis found five initiatives in the field of trust and security, in five different European countries[9]. Moreover, three of these initiatives aim to ensure compliance with the eIDAS regulation.

For instance, the new Digital Postbox service of Ireland, which acts as an alternative to the delivery of physical post from various public service bodies, provides a safe and secure way for public bodies to send all government communications in a single location to their citizens, while reducing costs and paper waste.

Digital sovereignty and interoperability

Digital sovereignty and interoperability are key elements for Europe to develop its own digital capacities. These includes the deployment of **secure cloud infrastructure and interoperable services** within European legal provisions and societal values. In this line, four countries[10] put in place initiatives that improve the interoperability of their public administrations' infrastructure, and thus the exchange of information and the delivery of cross-border digital services.

Notably, Finland and Estonia continued to develop the next version of the X-Road data exchange, which is the first joint data exchange platform between EU countries. It allows databases in both countries to interface, help and support in the development of cross-border services, and make eServices accessible to both Estonian and Finnish citizens. Specifically, the Estonian and the Finnish Tax Boards have laid plans to use the project to share data regarding income declarations, VAT information, and international audits.

Innovative technologies in the public sector

Innovative technologies have great potential to improve public administrations' **capacity of providing user-centric services**. In this regard, Cyprus is the first country trying to seize their benefits: the Deputy Ministry for Research, Innovation and Digital Policy adopted the "as-a Service aaS" model (Infrastructure as a Service, Platform as a Service, Software as a Service) across the government. This model ensures that the public sector can replace their IT systems in a speedier manner and upgrade to new technologies in a less cumbersome manner.

Figure 6 below presents an analysis of the countries having put in place infrastructures aiming to support digital public administration and interoperability in Europe between 2020 and 2021.

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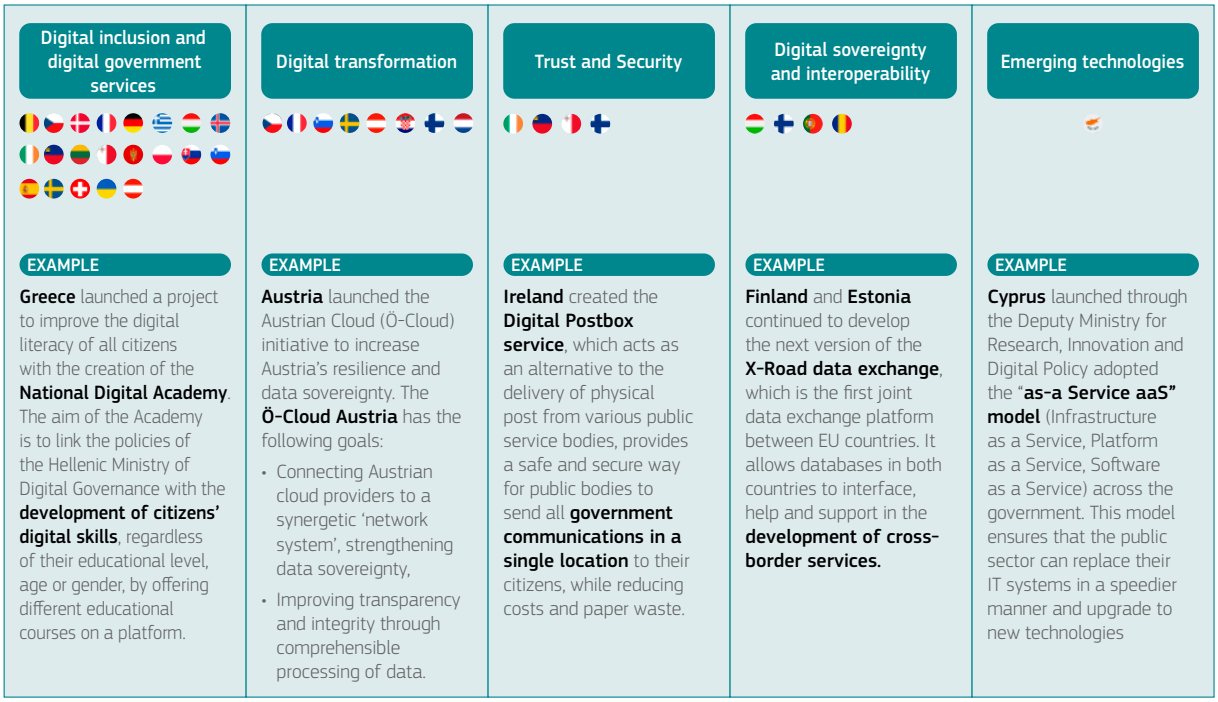
7 Belgium, Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Ireland, Liechtenstein, Lithuania, Malta, Montenegro, Poland, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine.

8 Austria, Croatia, Czech Republic, Finland, France, Hungary, Netherlands, Slovenia, Sweden.

9 Finland, Ireland, Latvia, Liechtenstein, Malta.

10 Finland, Hungary, Portugal, Romania.

Figure 6 Analysis of the most recent digital infrastructures put in place to support public administration and interoperability



Source: analysis of the main infrastructures gathered from the "Highlights" sections of the 2020 and 2021 Digital Public Administration factsheets, performed by Wavestone.

1.4 Main actors of digital public administration and interoperability oversight

Throughout 2020 and 2021, the digitalisation of European governments and public administrations was accelerated by the pandemic, with the sudden need to 'go online'. In light of this, several governments underwent structural changes in their **digital governance**.

Concretely, 27 European countries registered a change in their governance between 2020 and 2021. Within these initiatives, there are three types of governance changes: the transformation of a body, the creation of a new ministerial body/agency dedicated to digital matters, and the transfer of responsibilities from one body to another body.

Interestingly, due to an increase of cyberattacks and cyberthreats reported during the COVID-19 crisis, **cybersecurity** has been a top priority for many European countries in these governance changes. Various countries have created cybersecurity departments or centres, like Estonia, which established a new National Cybersecurity Department. Along the same lines, Sweden also established a new National Cybersecurity Centre in 2020, whose goal is to strengthen and increase Sweden's capacity to prevent, detect and manage cyberattacks and other cyber incidents that risk damaging the country's security.

These are some examples of the three types of governance changes:

- Transformation of a governmental body: Poland merged its Ministry of Digital Affairs with the Chancellery of the Prime Minister of Poland in November 2020, which since then has been continuing its mission and pending activities with regards to Poland's digital development. The digital tasks of the Chancellery of the Prime Minister are concentrated around three main pillars: providing internet access for all, developing web content and services, and promoting digital competences.

- Creation of new ministerial bodies or agencies dedicated to digital matters: the Slovenian government established a Strategic Council for Digitalisation in April 2021, serving as an advisory body to the Prime Minister. The Strategic Council for Digitalisation is complementary with the Council for Informatics Development in Public Administration and together they aim to create strong strategic frameworks for the digitalisation of the country. Norway also established its Norwegian Digitalisation Agency in 2020, becoming the Norwegian government's tool for faster and more coordinated digitalisation of the public sector.

- Change of governance: Croatia's Central State Office for the Development of the Digital Society gained responsibilities as it took over some tasks of the former Ministry of Administration. Those include the development of the State Administration Information System, and the establishment of an IT infrastructure within the State's administrative bodies, among others.

Interview with Georges Lobo

Georges Lobo

Programme manager (Interoperability Unit – DG DIGIT), European Commission

Based on your experience, how would you define the concept of digital government?

Digital government has evolved significantly over time. In the beginning, the idea was to digitalise the activities of public administrations so as to gain efficiency. Today, digital government means that digital intervenes everywhere, not only in the delivery of public services to citizens but also internally in public administration processes (in document processing for example), which is further reinforced by the use of emerging technologies like AI. Indeed, these emerging technologies are able to further enhance "public values" such as equity, democracy and transparency. This trend towards more digitalisation is further reinforced by the COVID-19 health crisis and the realisation that there is no other choice than to go towards more digitalisation. Digital government represents a change in how we work, how we define processes, how we interact with each other and how exchanges between people work. Digital government redefines how decisions and policies are taken thanks to all the data and evidence collected through the digitalisation of various procedures.

How would you define interoperability and how important is it, in your opinion, for the implementation of a modern and innovative digital government?

One of the best ways to achieve interoperability is to adopt open standards, solutions or data that can be re-used. This is one of the objectives of the ISA[2] programme. It is important because public administrations need to have exchanges of data. In any country, there is no ministry or public administration working in complete isolation and everything is being digitalised, so interoperability is today more important than ever. Interoperability must be considered in its entirety. The global sense of interoperability refers to its technical and semantical parts, which are maybe the easiest to work on and reach, but it also refers to its legal and organisational parts, which are usually more challenging to reach because most laws were made during a period when digital was not as important as today. In the future, it will be necessary to ensure that all new laws are adapted to the digital context and that 'older' laws are revised. Therefore, legal interoperability is essential, as well as organisational interoperability, to ensure that people can exchange information and that infrastructures are adequate. Interoperability is also important with regards to European competitiveness. The use of open source is a good way to achieve interoperability because everybody can look at the source code and as such foster the reuse of solutions developed in Europe. Openness is also a good way to ensure data sovereignty because the use of data is more transparent.

However, there are still many barriers that hinder the good deployment of interoperability such as complexity of emerging technologies. The technical interoperability must be ensured because data used in one administration will certainly also be used by others. Another barrier in some countries is the organisational bias. One of the problems with emerging technologies is the "hype" movement and having every public administration wants to be the first one to use it. For instance, many administrations started to implement their own chatbot, with different logics, different ways of interacting and different engines. At the end, this can be disturbing to the citizen. At least at the level of a country, these systems should be harmonised and developed by central services so as to be reused.

What have been the main challenges that European public administrations had to face due to the COVID-19 pandemic, especially when it comes to the delivery of public services?

The main difficulty during the COVID-19 pandemic was the lack of electronic identification for those countries that did not have yet in place. Another challenge was the reluctance to change. During the crisis, as more and more people were unable to go to the office and businesses were closed, the way of working had to be reinvented. Even in the Commission some procedures that still required paper signatures are now fully electronic. The main challenge was the necessary mind shift but, in a sense, it was also an opportunity. The best choice was to take decisions rapidly and to change the way we work, and how business processes are conducted.

Which are the emerging technologies that are currently most implemented and deployed in European public administrations? Have you registered any particular changes in trends at national level since the beginning of the COVID-19 pandemic?

There was already a lot of enthusiasm about blockchain before the COVID-19 crisis but blockchain requires a strong infrastructure and there are some concerns about the environment because blockchain is increasing the use of databases, which consumes a lot

of energy. For now, the shift within IPSO has been moved towards AI with the development of chatbots towards citizens and the use of AI in many administrative processes. Application Programming Interfaces (APIs) are also increasingly developed and used. APIs are already well established in the private sector and are significantly being used in the public sector. The use of APIs is a way to automatically exchange data while putting it in a way that can be consumed by others. In addition, a lot of countries are now adopting API frameworks. However, the use of emerging technologies does not automatically entail interoperability. Hence, the Interoperability Unit within DG DIGIT is working on these emerging technologies to see how interoperable they can be and how they can be re-used, how open standards can be implemented, etc.

Besides the challenges brought by the COVID-19 crisis, what are, in your opinion, the main challenges that governments will face in undertaking their digital transformation?

The first challenge is the organisational part to ensure that seamless data flows between administrations. Also, when adopting new solutions, inclusiveness and transparency must be ensured and be respected in all public administrations. With digital transformation, people are now more demanding regarding the way public administrations operate. Citizens, who are increasingly accustomed to using digital services, have higher expectations of digital public services than before. However, one of the biggest challenges is to ensure that everyone can use those services in the same way, especially given the ageing population in Europe. Some people still do not own a phone with internet access or a computer, but still need access to public services.

02

Latest developments in interoperability in Europe

Latest developments in interoperability in Europe

The objective of this chapter is to present the progress made since 2019 by the 35 European countries included in the sample of this study (henceforth referred to as "European countries") in implementing the European Interoperability Framework (EIF). More specifically, this chapter presents the context and background of the EIF Monitoring Mechanism for European countries. It also includes an overview of the performance of European countries in 2020 compared with the performance in 2019 in order to find correlations and commonalities and draw conclusions on the key areas of improvements to foster the implementation of the EIF. Finally, the chapter highlights key challenges and good practices that three European countries have put in place when implementing the EIF recommendations in their countries.

2.1 Context and background

2.1.1 Introduction to the EIF and its Monitoring Mechanism

The launch of the Digital Single Market Strategy in 2015 initiated the adoption of several initiatives promoting the modernisation of public administrations at the European, national and sub-national levels. In March 2017, the European Commission adopted a new Communication on Interoperability which introduced a revised EIF, accompanied by the Interoperability Action Plan (IAP) supporting its implementation. The EIF is meant to be a generic framework applicable to all public administrations in the EU. It aims to inspire and guide European public administrations in their efforts to design and deliver seamless European public services. Therefore, the EIF lays out interoperability guidelines in the form of 47 recommendations to foster interoperability, organised in three pillars:

- The **12 interoperability principles**, which are fundamental behavioural aspects to drive interoperability actions aimed at guiding European public services in their efforts toward interoperability.
- The **4+2 layers of interoperability** presenting different aspects of interoperability that should be addressed in the design of European public services and are considered as an integral element of the interoperability-by-design paradigm.
- The **conceptual model** for designing and delivering integrated public services. This model is modular and comprises loosely coupled service components interconnected through shared infrastructure. To be interoperable, European public services should be designed in accordance with the proposed model and by following certain interoperability and reusability requirements.

The implementation of the EIF contributes to the achievement of important initiatives such as the Digital Single Market Strategy, the eGovernment Action Plan, the Tallinn Ministerial Declaration on eGovernment, the Digital Europe Programme and the Berlin Declaration.

The monitoring, evaluation and reporting of the implementation of the EIF mandated by the Member States, especially the ISA^2 programme obligation[11], is ensured by an integrated framework created by the European Commission, the EIF Monitoring Mechanism. This EIF Monitoring Mechanism was developed, and it is maintained within the remit of the National Interoperability Framework Observatory (NIFO) action now part of Interoperable Europe, the successor the ISA2 programme. of the ISA^2 programme.

2.1.2 Measurement of the EIF implementation in European countries

In order to ensure and foster the implementation of the EIF recommendations across European public administrations, the EIF Monitoring Mechanism measures the level of implementation of the 47 EIF recommendations. This mechanism provides each European country with its own level of implementation of the EIF based on a recommendation-by-recommendation basis. The resulting data helps the European countries identifying the areas in which their performance could be improved, as well as the areas in which they are performing well.

The three scoreboards, namely the interoperability principles, the interoperability layers and the EIF conceptual model for integrated public services provision, cluster the 47 recommendations under common topics.

Figure 7 presents the three scoreboards of the EIF Monitoring Mechanism and the associated recommendations.

11 The ISA^2 programme's obligation on monitoring the EIF implementation refers only to the EU Member States, however, the scope of the monitoring exercise has been extended to 35 countries including the members of the European Free Trade Association (Iceland, Liechtenstein, Norway and Switzerland) as well as Ukraine, Montenegro, Turkey and the Republic of North Macedonia.

Figure 7 EIF Monitoring Mechanism structure

The interoperability principles are fundamental behavioural aspects to drive interoperability actions. They describe the context in which European public services are designed and implemented.

	Recommendation(s) n°
Principle 1 - Subsidiarity and Proportionality	1
Principle 2 - Openness	2-4
Principle 3 - Transparency	5
Principle 4 - Reusability	6-7
Principle 5 - Technological neutrality and data portability	8-9
Principle 6 - User-centricity	10-13
Principle 7 - Inclusion and accessibility	14
Principle 8 - Security and privacy	15
Principle 9 - Multilingualism	16
Principle 10 - Administrative simplification	17
Principle 11 - Preservation of information	18
Principle 12 - Assessment of Effectiveness and Efficiency	19

The **4 layers of interoperability**: legal, organisational, semantic and technical are complemented by cross-cutting governance components.

	Recommendation(s) n°
Interoperability Governance	20-24
Integrated Public Service Governance	25-26
Legal Interoperability	27
Organisational Interoperability	28-29
Semantic Interoperability	30-32
Technical Interoperability	33

The **conceptual model** is modular and comprises loosely coupled service interconnected components. Guides the planning, development, operation and maintenance of public services by Member States.

	Recommendation(s) n°
Conceptual Model	34-35
Internal information sources and services	36
Basic Registries	37-40
Open Data	41-43
Catalogues	44
External information sources and services	45
Security and Privacy	46-47

Source: analysis performed by Wavestone.

From the viewpoint of the data aggregation, the EIF Monitoring Mechanism aggregates the data of one or more key performance indicators (KPIs) to measure the implementation of one EIF recommendation, while one or more recommendations are used to measure the level of implementation of a specific interoperability principle (e.g., Principle 1 – subsidiarity and proportionality), layer (e.g., Interoperability Governance) or component of the EIF conceptual model (e.g., Internal information sources and services). Therefore, the EIF Monitoring Mechanism provides several granularity levels to the implementation of the EIF objectives: KPI, recommendation and EIF components level, i.e. interoperability principles, layers and elements of the conceptual model.

The KPIs, on which the assessment relies, are a series of measurable indicators collected as part of an annual data collection exercise. This data collection exercise focuses, on the one hand, on primary indicators, collected through an online survey disseminated to national contact points and, on the other hand, on secondary indicators, collected from external data sources, such as the Open Data Portal, DESI, and other EU initiatives presented in the following paragraph.

2.1.3 Other initiatives to foster interoperability

In addition to the EIF Monitoring Mechanism, the European Commission, through several of its initiatives, supports European countries in fostering interoperability and identifying areas where they could make further progress.

Closely linked to EIF Monitoring Mechanism, the EIF Toolbox (hereafter the Toolbox) is an interactive portal which supports public administrations in implementing the EIF and developing interoperable digital public services at local, national and European levels. The Toolbox provides access to information on reusable solutions or components to tackle specific aspects of interoperability when designing new public services or updating existing ones. The Toolbox is progressively being reshaped according to European

countries' needs. Its latest developments include the expansion of the scope of solutions featured in the Toolbox, the creation of an EIF community, and the mapping linking relevant EU legal initiatives to the different elements of the EIF such as the interoperability principles, layers and components of the conceptual model for integrated public services provision. In addition, a soon-to-be feature of the Toolbox will be the collection and sharing of good practices and concrete examples in implementing the EIF recommendations.

As already presented in Chapter 1, the Digital Public Administration factsheets (previously called Digital Government factsheets and before that eGovernment Factsheets), within the remit of the NIFO as well, are annual factsheets presenting the most recent developments that the public administrations of 35 European countries have undergone in the field of digital government and interoperability. Additionally, a dedicated factsheet for the EU, focusing on all the matters related to digital public administration and interoperability at the European Union level, is also available. These factsheets provide several useful elements, such as an overview of each country's basic data, some specific indicators related to the digital transformation within the country, the results coming from the EIF Monitoring Mechanism exercise, as well as the latest relevant political communications and legislations, among others.

Other tools helping European countries to gain intelligence on their interoperability efforts are presented below.

Supporting tools helping European countries to gain intelligence on their interoperability efforts

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe's digital performance and tracks the evolution of Member States'[12] digitalisation. The yearly DESI reports are reports are based on the data of the year prior to the year of publication. By equipping the Member states with annual data on the state of their digitalisation, DESI helps each one to identify areas requiring priority investment and action. In particular, the European Commission monitors indicators of digital public services in the EU to ensure citizens and governments are enjoying the full potential of technology.

The EU Open Data Portal (EU ODP) provides access to open data from international, EU, national, regional, local and geo data portals. All data in this catalogue is free to use and reuse for commercial or non-commercial purposes. Beyond the collection of metadata[13], the strategic objective of the portal is to improve accessibility and increase the value of open data.

The eGovernment Benchmark is a monitoring instrument of the European Commission which produces annual information on the use of digital technologies in the public sector in 36 European countries (also referred as the EU 27+[14]). The annual eGovernment Benchmark Report evaluates, by comparing past and present developments[15], the performance of online public services against four areas, known as "top-level" benchmarks: user-centricity, transparency, key enablers, and cross-border mobility.

Below is a list of European funding programmes available to support European countries in their digitisation efforts.

Available EU funding programme to support European countries in their digitalisation

The Digital Europe Programme (DEP) is a new EU funding programme focused on bringing digital technology to businesses, citizens and public administrations. This programme will grant strategic funding in five key capacity areas: supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring a wide use of digital technologies across the economy and society.

It has five specific objectives, the most relevant with regard to interoperability being the Specific Objective 5 "Deployment, best use of digital capacity and interoperability" which includes nine operational objectives, such as ensuring that the public sector and areas of public interests can deploy and access state-of-the-art digital technologies and offering to public administrations access to testing and piloting of digital technologies, including their cross-border use.

It is a part of the EU's next long-term budget, the Multiannual Financial Framework 2021-2027 and will complement funding available through other EU programmes, such as the Horizon Europe. The DEP work programme has yet to be validated and implemented by the Commission.

12 The DESI 2020 reports are based on 2019 data. The United Kingdom is still included in the 2020 DESI, and EU averages are calculated for 28 Member States.

13 Metadata is structured information that describes, explains, locates, or otherwise makes it easier to retrieve, use, or manage an information resource. Metadata is often called data about data or information about information. (Source: Riley J. 2017, *Understanding metadata. What is metadata and what is it for?* National Information Standards Organization)

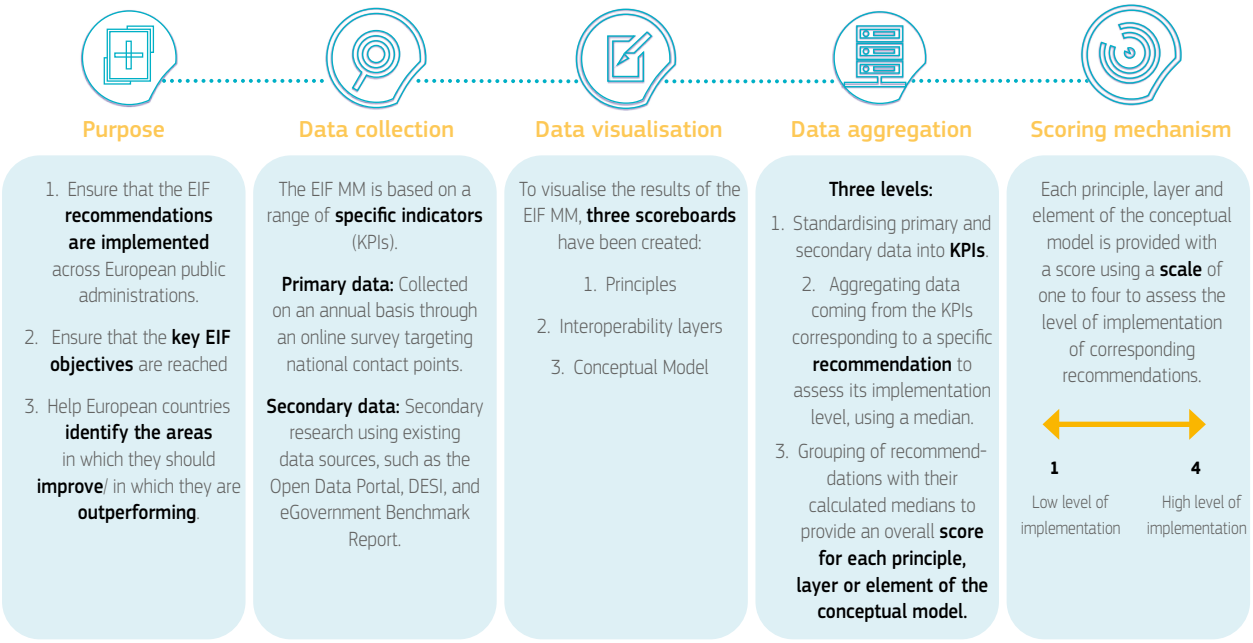
14 The eGovernment benchmark includes the 27 European Union Member States, Iceland, Norway, Montenegro, Republic of Serbia, Switzerland, Turkey and the United Kingdom, as well as Albania and North Macedonia.

15 For example, the 2020 eGovernment Benchmark report presents the findings for data collected in 2018 and 2019.

2.2 Overview of the interoperability performance in Europe

This section presents the overall results of the 2020 data collection exercise of the EIF Monitoring Mechanism. Figure 8 displays an overview of the key elements, including the methodology, that characterise the EIF Monitoring Mechanism.

Figure 8 Key elements of the EIF Monitoring Mechanism



Source: analysis performed by Wavestone.

Following a thorough analysis of the data collected from the 2020 data collection exercise of the EIF monitoring mechanism, the Digital Public Administration Factsheets and individual consultations with representatives of European countries, this section also explores, in particular for the interoperability principles and conceptual model components of the EIF, areas in which European countries could further improve the implementation of the associated recommendations. Since European countries are scoring maximum points in all interoperability layers of the EIF, there was no area of improvement identified. The areas of improvement are identified based on the assessment of interoperability principles and conceptual model components of the EIF that score lower compared to the European level, looking at the underlying recommendations and KPIs to highlight the exact challenges.

In order to provide a more detailed analysis of the results of the EIF monitoring mechanism, a global overview of the 2020 results at European level is provided for each scoreboard followed by a detailed analysis of areas of improvement, as detailed in Figure 9.

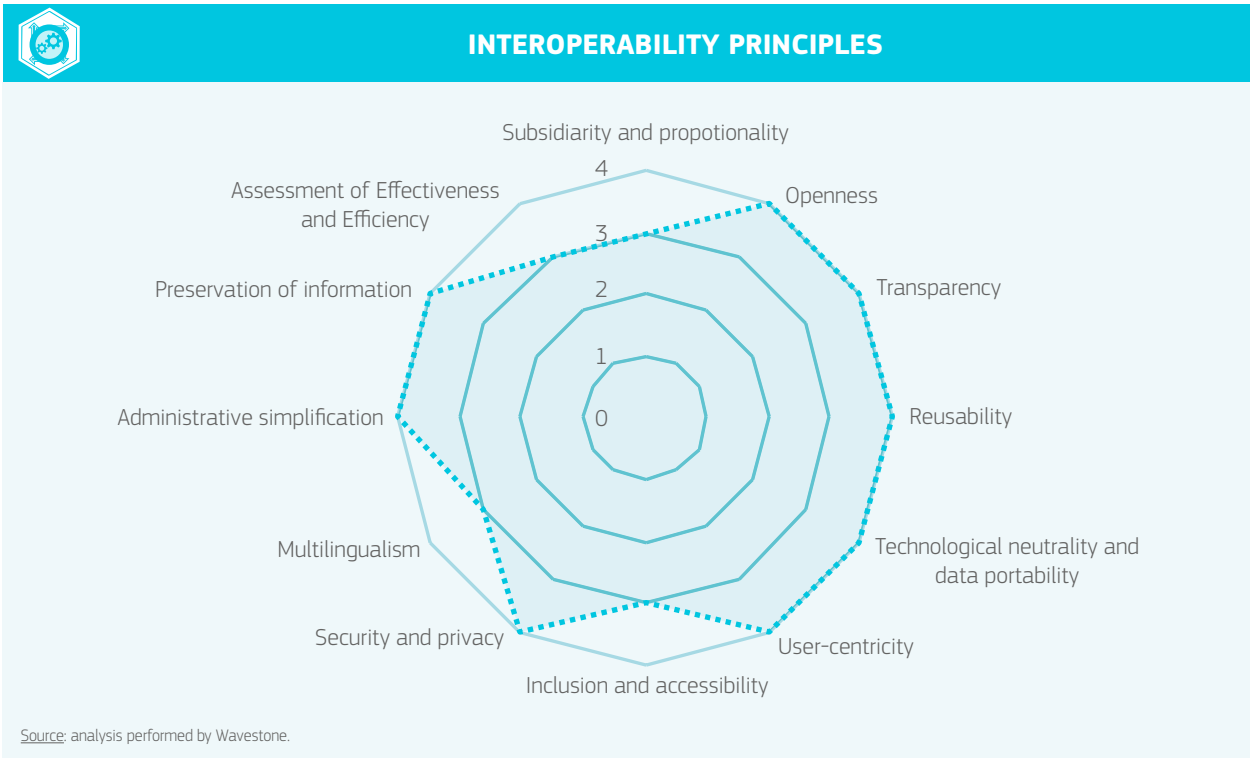
Figure 9 Analysis framework for areas of improvement

What can be improved?	Focus on the identified areas of improvements: the principle/conceptual model component's requirements that should be implemented in order to obtain the maximum score. Explanation of how the principle/conceptual model component is assessed in the frame of the EIF Monitoring Mechanism, in particular through what recommendation(s) and indicator(s)
How has it evolved?	When possible, identification of common trends at EU level, in comparison with 2019 results.
How are others doing?	Description of concrete example(s) of good practices in implementing the EIF recommendations in the identified areas of improvement.
Where to start?	Reusable solutions, developed under the ISA² and CEF programmes are presented for each of these areas. These solutions support European countries to tackle specific aspects of interoperability when designing interoperable solutions and are available in the EIF Toolbox.

2.2.1 The implementation of the interoperability principles in Europe

Figure 10 presents the 2020 results of the monitoring of the implementation for the **interoperability principles scoreboard** of the EIF.

Figure 10 Interoperability principles European results for 2020



Source: analysis performed by Wavestone.

For this scoreboard, the overall results are positive, and progress has been made compared to the 2019 results. Nevertheless, similarly to the 2019 results, there are several areas where improvements could be made by European countries, particularly with regard to the Interoperability Principles on subsidiarity and proportionality (Principle 1), inclusion and accessibility (Principle 7), multilingualism (Principle 9) and effectiveness and efficiency (Principle 12). These areas of improvements are further analysed in the following subsections.

Fostering subsidiarity and proportionality (Principle 1)

Principle 1 requires European countries' decision-making processes to follow the objectives of **subsidiarity and proportionality**. Decisions taken at EU level should be as close to the citizen as possible and limited to what is necessary to achieve the objectives of the treaties. European countries are free to develop their National Interoperability Frameworks (NIFs) in accordance with the EIF recommendations and these NIFs should therefore be adapted and extended in such a way that national specificities are properly taken into account.

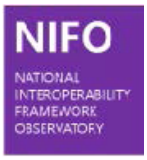
This principle is assessed through Recommendation 1, which states that European countries should "ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs". More concretely, the indicator measured in the frame of the EIF Monitoring Mechanism assesses the extent to which national strategies or frameworks take the EIF into account.

Subsidiarity and proportionality in **Finland**

Finland went from a score of three to four in Principle 1. Since the entry into force of the Act on Information Management in Public Administration (906/2019) at the beginning of 2020, the Finnish Ministry of Finance oversees the maintenance of the Information Management Map of Public Administration and of the general strategies for the development of information management in public administration to promote the interoperability of shared information pools and information systems. This Act states that each ministry shall, within its own mandate, ensure the up-to-datedness of the contents of the Information Management Map and maintain the general strategies. This work also contributes to the national implementation of the conceptual model for integrated public services set forth by the EIF. Principles are also taken into account in several Finnish projects, such as the project "Opening up and using public data".

Therefore, for Recommendation 1 and consequently for Principle 1, at European level, the 2020 results showed a partial implementation of EIF recommendations in existing or ongoing NIFs and policies. The analysis of the results revealed that the number of countries reporting a high level of alignment of their NIFs and strategies with the EIF increased from 14 in 2019 to 16 in 2020.

How to foster subsidiarity and proportionality?



The **Digital Public Administration Factsheets** are annual factsheets presenting the most recent developments that the public administrations of 35 European countries have undergone in the field of digital government and interoperability. Hence, they provide country-specific data allowing to tailor digital public services according to the proportionality principle. Additionally, a dedicated factsheet for the EU, focusing on all the matters related to digital public administration and interoperability at the European Union level, is also available.

Ensuring inclusion and accessibility (Principle 7)

Principle 7 calls for **inclusion and accessibility** throughout the development cycle of a European public service in terms of design, information, content and delivery. This principle should be taken into account in order to ensure that all citizens have access to European public services and that they can take full advantage of the opportunities offered by new technologies to access and use these services.

This principle is assessed through Recommendation 14 which states that European countries should "ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups" and that digital public services "should comply with e-accessibility specifications that are widely recognised at European or international level". The EIF Monitoring Mechanism therefore assesses the countries' compliance with the European accessibility standards of the Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications of public sector bodies.

When analysing the overall European countries' performance in implementing Recommendation 14, the results revealed a partial implementation of the accessibility standards set forth by the Directive (EU) 2016/2102 on the accessibility of the websites and mobile applications of public-sector bodies.

On the one hand, with regard to the website accessibility, the responses to the underlying KPI assessing Recommendation 14 confirm that the websites published before 23 September 2018 by European public bodies only partially take into account the inclusion and accessibility principle. This partial implementation is due to the deadlines for implementation of the Directive by European countries, which were set for mid-2021 at the latest. The results for this KPI are expected to increase in the next data collection exercise, as some countries, such as Bulgaria, the Czech Republic, Denmark, Finland and Greece, reported they will start monitoring the implementation of the accessibility principles in 2021. For example, in Bulgaria, the requirements of the Web Accessibility Directive were recently introduced into the Bulgarian legislation and monitoring activities started in early 2021.

On the other hand, regarding the implementation of accessibility standards on mobile applications, the results showed an overall increase among European countries compared to 2019. In the Czech Republic, for instance, compliance of public sector mobile apps has not yet been monitored and the monitoring process officially started in 2021.

Inclusion and accessibility in **Iceland**

In December 2020, public Icelandic websites were scanned and assessed on their level of compliance with the new accessibility provisions. The results show that the sites meet on average 80% of the requirements of the standard, according to the measurements of Siteimprove , the tool used to scan and evaluate websites.

In Italy, AgID, the Italian Digital Agency, published guidelines on website accessibility that the public administration will have to comply with. While, in France, the implementation of the Principle on inclusion and accessibility should improve in the coming months as many actions are put in place to improve the accessibility of services such as training for developers and teams across the administration, requirements for contractors, monitoring tools, political support, etc. Finally, Spain has developed a Web Accessibility Observatory which aims to help improve the accessibility level of the portals of the Spanish Public Administrations in all levels (General State Administration, Regional Governments and Local Governments).

How to ensure inclusion and accessibility?

The eSignature Building Block allows public administrations, businesses, and citizens to electronically sign any document, anywhere in Europe, at any time, in line with the eIDAS Regulation for e-signatures, e-seals and related services offered by Trust Service Providers. eID can be seen as enabling the access to public services to all citizens, such as those with limited mobility, thus fostering principles on inclusion and accessibility of digital public services.

Promoting multilingualism (Principle 9)

Principle 9 promotes **multilingualism** when designing European public services to make them accessible and usable by anyone that may need them, therefore the underlying Recommendation 16 calls for European countries to "use information systems and technical architectures that cater for multilingualism when establishing a European public service and decide on the level of multilingualism support based on the needs of the expected users". The implementation score for this recommendation is computed by assessing the extent to which users of each of the 21 proposed procedures across the seven life events (i.e. Birth, Residence, Studying, etc.) of the Single Digital Gateway Regulation can access instructions for completing the procedure in an official EU language that is widely understood by the largest possible number of cross-border users. This Regulation requires that more administrative procedures can be performed online by users in their own country and cross-border users. The most effective way to reduce the ensuing obstacles to the internal market is to provide cross-border and non-cross-border users with access to online information in a language they can understand, to enable them to complete the procedures. This Regulation encourages Member States to use technical solutions which would allow users to complete the procedures in as many cases as possible, in that language, while respecting the Member States' rules on the use of languages.

Multilingualism in **Hungary**

Hungary has seen its multilingualism score increase compared to 2019. This may be explained by the recent revision and translation of the 21 administrative procedures across the seven life events of the Single Digital Gateway Regulation. The approved descriptions are expected to be uploaded to the national portal of the Public Service Commission (PSC).

The results of the EIF Monitoring Mechanism with regard to multilingualism showed a heterogeneous implementation of the principle. Indeed, the possibility of accessing instructions for completing the procedures in an official EU language is not always ensured in the European countries, especially for procedures related to moving. The results revealed that the procedure for obtaining emission stickers issued by a public body or institution appears to be the least available in the additional EU languages. Thus, it was observed that there is a lack of multilingual options in some of the key services offered by European public administrations. Nevertheless, the median results increased in 2020 compared to 2019 for a large number of administrative procedures, such as procedures for requesting proof of residence, submitting an initial application for admission to public tertiary education institution, or registering a change of address.

For example, in Latvia, national and municipal organisations use the translation interface (API) developed in the hugo.lv platform to provide automatic translation of any necessary information in web pages and portals. Since 2020, hugo.lv has introduced new features, for example speech recognition and text-to-speech. While Finland has increased efforts to provide digital public services in additional languages as detailed in section 2.3.2.

How to further foster multilingualism?

The Multilingual semantic indexing is a public multilingual knowledge management infrastructure which supports e-commerce solutions, such as machine translation, localisation and multilingual search, by creating interoperable multilingual classifications and terminologies that will be easily reusable by small and medium-sized enterprises (SMEs) and public administrations. By aiming to create interoperable multilingual classifications and terminologies that will be easily reusable by small and medium-sized enterprises (SMEs) and public administrations, this action contributes to achieving multilingualism across Europe.

The CEF eTranslation Building Block is a machine translation tool that helps public administrations and businesses exchange information and documents across all official EU languages, Icelandic and Norwegian. Public administrations, citizens and businesses in the EU will thus be able to benefit from digital services in the language of their choice. eTranslation can be integrated into your information systems to make digital public services and content multilingual.

Assessing effectiveness and efficiency (Principle 12)

Principle 12 assesses the extent to which nine key elements, i.e., return on investments, total cost of ownership, reusability, adaptability, risks, administrative burden, simplification of administrative processes, user satisfaction and user-centricity, are taken into account in the evaluation of the **effectiveness and efficiency** of a European public service.

The principle is evaluated through Recommendation 19 which states that European public administrations should "evaluate the effectiveness and efficiency of different interoperability solutions and technological options considering user needs, proportionality and balance between costs and benefits". The implementation of this principle is measured by assessing the extent to which public administrations evaluate the efficiency and effectiveness of interoperability solutions.

Overall, the results at the European level for Recommendation 19, and thus for Principle 12, indicated a partial implementation with an average score of three. In particular, the results showed that return on investment and adaptability are the least considered when assessing the effectiveness and efficiency of public services, while simplification of administrative processes and reusability are more commonly taken into account across Europe. Compared to 2019, the results obtained for this recommendation showed that the consideration of seven of the nine key elements has increased among European countries: return on investments, total cost of ownership, reusability, adaptability, risks, user satisfaction and user-centricity[16].

Some good practices can notably be identified in Spain, such as the creation of a Data Intermediation Platform (PID), an interoperable data exchange platform ensuring the implementation of the once-only principle. Since its creation, there has been an important growth in the number and types of data enquiry and verification services that can be automatically accessed online by public authorities (such as unemployment situation and grants, cadastral information, etc.). It simplifies administrative procedures by allowing citizens or businesses to not have to deliver data or documents already held by public authorities. It also helps reducing fraud in applications and related procedures. Finally, this service enables all public administrations, irrespective of their size or resources, to enforce the law and makes a significant contribution to social equity, reduction of administrative burden and to adequate, sustainable efficiency and effectiveness.

Effectiveness and Efficiency in **Ireland**

In Ireland the adoption of the eGovernment Strategy 2017–2020 underpinning the government's commitment to being open, flexible and collaborative with people and businesses, using digitisation and technology has helped increase efficiency and effectiveness, and continuously improve public services. The strategy contains ten key actions, among which the development of a Digital Service Gateway, the improvement of existing eID and data-sharing capabilities.

How to better assess effectiveness and efficiency?

The Interoperability Test Bed (ITB) is a service offered by the European Commission's DIGIT to facilitate the conformance testing of IT systems. The Test Bed is itself a software system that can be both downloaded and installed locally, but also reused through a shared online installation operated by DIGIT. It offers an intuitive web user interface that allows administrators to define their project's overall testing setup as well as users to connect and run tests. The test bed allows solution owners to test their level of interoperability and to perform conformance testing to ensure that they fit their purpose.

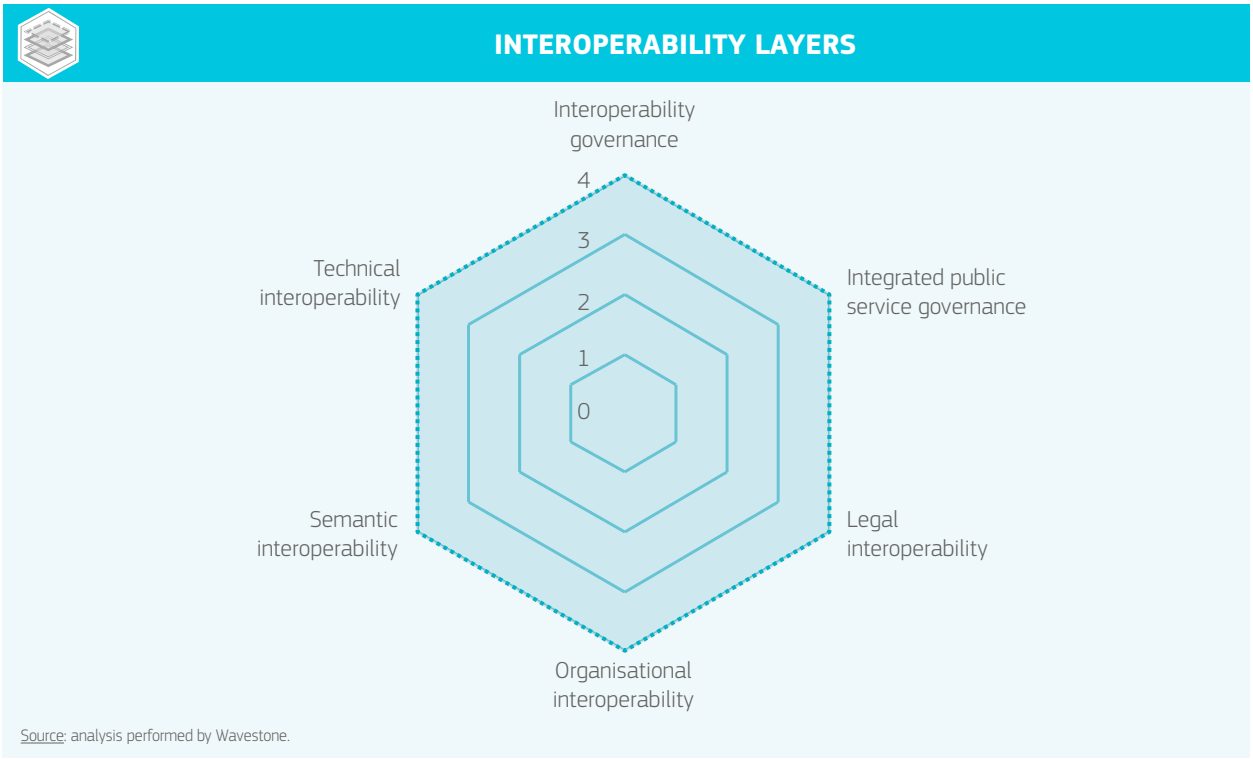
The IMAPS Solution v1.2 is a user-friendly online questionnaire, designed as a self-assessment tool to assist public service owners to evaluate key interoperability aspects, among which the effectiveness and efficiency, of their digital public service. It can be used to assess the interoperability of any public service and is applicable to services at all levels of government (international, national, regional and local).

16 These results have however to be nuanced as two countries that did not reply in 2019 have replied in 2020 (Switzerland and Iceland). The fact that the UK which replied in 2019 and but is not taken into account for the 2020 results should also be taken into consideration.

2.2.2 The implementation of the interoperability layers in Europe

Figure 11 depicts the 2020 results of the monitoring of the implementation for the **interoperability layers scoreboard** of the EIF.

Figure 11 Interoperability layers European results for 2020



Source: analysis performed by Wavestone.

The results for the interoperability layers revealed that, on average, European countries are scoring maximum points in all interoperability layers. Compared to the 2019 results, the only interoperability layer where there was an opportunity of improvement, the interoperability governance, has effectively improved from a score of three to four. Thus, particular efforts have been devoted to the governance of interoperability activities across administrative levels and sectors. In addition, improvements have been made with regard to the technical layer, in particular with respect to the interconnection of systems and services, as countries increasingly strive to ensure technical interoperability when designing European public services.

The implementation of the interoperability governance layer is evaluated through Recommendations 20 to 24, which address two aspects: the implementation of holistic governance for interoperability activities across administrative levels and sectors, the identification and selection of common standards and specifications to facilitate interoperability. The interoperability governance layer is assessed by six indicators assessing the existence governance of interoperability activities across all administrative levels and sectors; the definition of processes for the selection and adoption of standards and specifications; the deployment of common assessment methods for standard and specification at country level; the extent to which administrations are managing ICT standards and specifications to ensure interoperability; and the use of catalogues and the instance of participation in standardisation works.

With respect to the interoperability governance layer, there have been significant improvements mainly regarding the implementation of a holistic governance across all administrative levels and sectors, and the implementation of defined processes for the selection and adoption of standards and specifications. More specifically, almost all European countries now provide interoperability governance with a holistic approach across all administrative levels and sectors, with the exception of three countries that are still in the process of doing so and have a dedicated budget for 2021. Moreover, defined processes for the selection and adoption of standards and specifications are in place in most of the European countries. In Ireland, the Data Sharing and Governance Act 2019 empowers the Minister to introduce data standards and specifications on a statutory footing whilst the same act provides for a Data Governance Board that advises the Minister. That Board is in the process of being established.

The technical layer is evaluated through Recommendation 33 looking at "the use open specifications to ensure technical interoperability when establishing European public services", assessed by the promotion of the use of open specifications by public administrations.

With regards to the technical layer of the EIF, the 2020 results showed that almost all European countries promote the use of open specifications by public administrations. Indeed, the use of open specifications has been encouraged by many EU initiatives, such as the ICT standardisation in public procurement initiative led by DG GROW. In Croatia, the project managed by the Central State Office for Digital Society Development, called "Improvement of public electronic services", aims to define e-standards for new online services and the ongoing digitisation of public administration processes and its focus is on using open specifications. On the other hand, in the Czech Republic, the use of open specifications in public administration is promoted by the Chief Architect of the Public Administration Office, which is involved in relevant EU projects. Sectoral initiatives and cross-border projects consider and promote open specifications agreed on the operational level.

Other examples of national initiatives that contributed to improve the implementation of the interoperability governance and technical layers can notably be found in Spain and in the Netherlands. Whit regard to Spain, it appears that all ministries participate to the governance structure of the Spanish General State Administration. For instance, the IT Strategy Commission is the main Committee and is chaired by the Minister of Territorial Policy and Public Function. Forums for public-private cooperation, which are open to the participation of society, allow the management of complex issues for digital transformation with multiple stakeholders, under the leadership of the General State Administration. In addition, the General Secretary of Digital Administration plays a key role in all the cooperation and governance structures. In 2020, Spain also observed improvements with regard to its Interconnection Registry System (SIR), with a total of nearly 11 million record exchanges between public administrations were registered, a 67% increase compared to 2019.

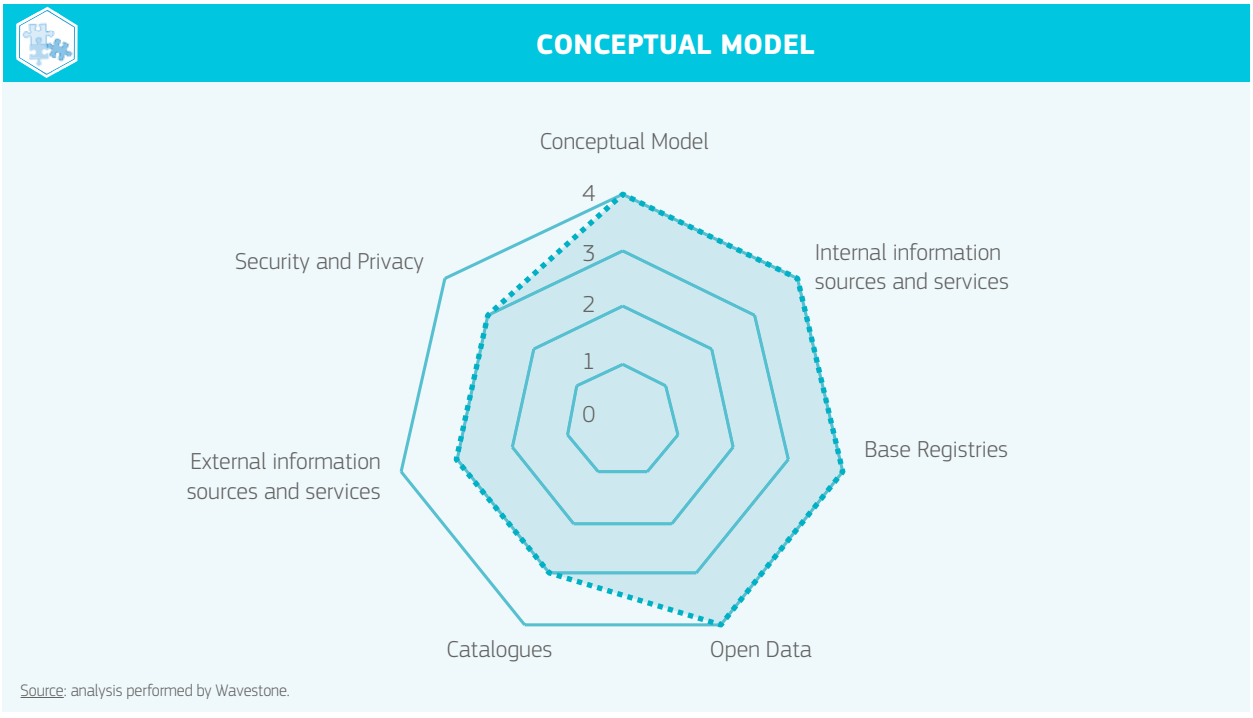
Technical interoperability in **the Netherlands**

The Netherlands have developed the Dutch Governmental Reference Architecture (NORA) to support the design of European cross-border services. NORA is a knowledge platform that was developed in 2005 and which gathers knowledge from several experts in the design of digital services. It supports the creation of domain specific architectures with information such as architecture principles for new developments, standards, specifications and useful building blocks. It ensures effective cooperation with other service providers and optimal reuse of existing solutions. The sharing of knowledge and information through the NORA platform has therefore been key in fostering interoperability in the country

2.2.3 The implementation of the EIF conceptual model in Europe

Figure 12 shows the 2020 results of the monitoring of the implementation for the **conceptual model scoreboard** of the EIF.

Figure 12 Conceptual model European results for 2020



Source: analysis performed by Wavestone.

Comparing to the 2019 scores, the results for 2020 presented a high level of performance among European countries in implementing the recommendations related to the components of the EIF conceptual model for integrated public services. This model promotes the aspect of reuse as a driver for interoperability and European countries are more and more strengthening and promoting the reuse of existing information, sources and services for the development and design of new public services, as well as for the update of existing ones. Besides an increased reuse of data, many improvements have been made in the area of open data. European countries are significantly integrating open data into their business process and in the development of new services and IT systems. European countries are committed to ensuring that open data is machine-readable and of good quality. Promoting data reuse and access, including open data, was one of the key achievements of European countries in 2020. However, three of the EIF conceptual model components, namely 'security and privacy', 'external information sources and services' and 'catalogues', have a score of three and would therefore require additional improvements.

Implementing catalogues of public services, open data and interoperability solutions

Catalogues are a key component of the conceptual model for integrated public services and aim at supporting the easy access to reusable resources (e.g. services, data, software). A variety of catalogues exist ranging from directories of services, to libraries of software components and metadata catalogues. The description of the content provided is equally important to the resources it contains as it enables interoperability in-between different catalogues.

The implementation of interoperable catalogues is evaluated through Recommendation 44 of the EIF Monitoring Mechanism calling on European countries to "put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them". The overall average score of three showed a partial implementation of the recommendation. The assessment takes into account nine main types of catalogues that European public bodies should have at their disposal to design integrated and interoperable public services, i.e. catalogues of public data, directories of services, libraries of software components, open data portals, registries of base registries, metadata catalogues, catalogues of standards, catalogues of specifications and catalogues of guidelines. The results, at European level, for this particular indicator outlined a partial implementation of these key catalogues within public administrations. While open data portals and catalogues of public data are used in the vast majority of European countries, it appears that other types of catalogues, such as libraries of software components and catalogues of specifications and guidelines are yet to be implemented uniformly across Europe.

The implementation of catalogues is also measured by another indicator which is to assess the use of common models/standards/specifications for describing catalogues of public services, public data and interoperability solutions. However, since this indicator has changed compared to the 2019 monitoring edition, no further comparison can be made.

Catalogues in **Spain**

One of the Spain's initiatives has been the implementation of an Administrative Information System (SIA) which enabled to have a single catalogue of information on administrative procedures and services for citizens. This system reinforces legal certainty in the administration's actions, as it incorporates the fundamental information on the different procedures. It also meets the basic principles of effectiveness and efficiency, aiming to become a necessary tool for the provision of information and integrated services. Another good practice is the piloting by Spain, together with Portugal, of a project aiming at creating a federated catalogue of public services and a user-centric website to visualise the data. For this project, they are notably using the Core Public Service Vocabulary Application Profile (CPSV-AP), a reusable and extensible data specification used for harmonising the way public services are described in a machine-readable format.

How to foster the implementation of catalogues?

Joinup is a collaborative platform created by the European Commission and funded by the European Union via the Interoperability solutions for public administrations, businesses, and citizens (ISA^2) Programme. It offers several services that aim to help e-Government professionals share their experience with each other. It provides a catalogue of solutions which can be reused by public administrations when developing their own solutions.

Using of external information sources and services

The EIF fosters the **use of external information sources and services** by European public administrations in the design of interoperable public services. Indeed, public administrations need to leverage services provided by third parties outside their organizational boundaries, such as payment services provided by financial institutions or connectivity services provided by telecommunications providers. They also need to tap into external information sources such as open data and data from international organizations, chambers of commerce, etc.

The use of external information sources and services is assessed through Recommendation 45 calling on European public administrations to "use external information sources and services while developing European public services, where useful and feasible to do so".

The 2020 results of the EIF Monitoring Mechanism revealed that European countries insufficiently rely on external sources and services for the development of their public services. On the one hand, it appears that the use of Internet of Things sources (e.g. sensors) and social web applications is quite low across Europe, despite an increased adoption compared to 2019. On the other hand, the use of payment services provided by financial institutions or other actors, connectivity services provided by telecommunications providers, open data, data from other organisations (e.g. international organisations, chambers of commerce, etc...), eID and eSignature are more widespread among European public administrations.

External information sources and services in **Spain**

Spain, has implemented several initiatives contributing to these positive results. Notably, they have created building blocks such as cloud services to provide access to base registries, digital identification, digital signing and digital payment. They also created a shared service to provide connectivity services through a unified and consensual public contract at the central administration level. Moreover, most of the public organisations use social media channels such as Twitter and provide open data, and a building block is available to offer an open-source application to create open data portals. Finally, there are specific programmes to adopt IoT technologies in municipalities in Spain to provide better public services.

How to make better use of external information sources and services?

LEOS is designed to help those involved in drafting legislation, which is usually part of a complex process, by facilitating efficient online collaboration. Comments, suggestions, version control, co-edition, everything is there. It offers a possibility to connect to external Law repository (like EUR-LEX in the case of EU laws) to fetch part of the legal text and import it into the drafted act.

Relying on the privacy and security principles

The principle of **security and privacy** is a crucial element to embed by design in the development of interoperable public services. Public services should follow the privacy-by-design and security-by-design approach to secure their complete infrastructure and should be compliant with the legal requirements on data protection and privacy.

The EIF therefore calls on European countries to "consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans" (Recommendation 46) and "use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services" (Recommendation 47). The implementation of this recommendation is assessed through the application of privacy and security elements and measures (e.g. risk management and business continuity plans and eArchive) and the number of trust services providers by country.

The score for security and privacy at the European level, showed an overall good implementation of Recommendation 46 within national frameworks, with an increase in the implementation of all privacy and security elements and measures, but with the exception of risk management. However, the scores for Recommendation 47 are heterogeneous, as the number of trust service providers present on national trusted lists complying with the eIDAS Regulation varies across countries and remains insufficient in some of them.

Privacy and security in **Sweden**

Sweden is an example of country in which the implementation of the Recommendation 46 has increased compared to 2019, reaching a maximum score of four in 2020. This increase is explained by the adoption of new initiatives such as trust services and eID, as well as data access and authorisation plans. Additionally, the Swedish government is working on a project aimed at enabling the use of employees' digital identification in external services outside of their organisation, fulfilling the same requirements as the eID for citizens.

How to better rely on privacy and security principles?

The eDelivery building block helps public administrations to exchange data and documents via AS4 Access Points, based on the AS4 messaging protocol. This allows different parties to exchange electronic data and documents across sectors and borders through a secure eDelivery message exchange network. It is thus compliant with the definition of trust service by the eIDAS regulation (ERDS - Electronic Registered Delivery Service).

The eID Building Block allows public administrations and private service providers to easily extend the use of their online services to citizens from other Member States, in line with the eIDAS Regulation. eID complies with the Regulation on eID and Trust Services, thus ensuring secure and protected data exchange in public services.

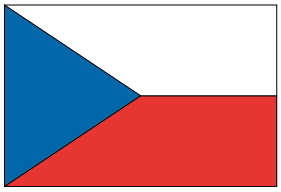
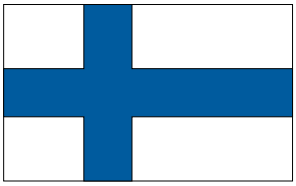
Key documents on the EIF and the European countries performances

- Willing to know more about the EIF and its components? The EIF Brochure will provide all the necessary information on the EIF, its objectives and model.
- Curious to dive into the data related to the implementation of the EIF recommendations by European countries? The Dashboard is an interactive tool that allows the browsing of data of one or multiple countries to compare their performances and to benchmark their results over time.
- In need of guidance on how to promote interoperability at national and European level? The EIF Toolbox allows user to access reusable solutions or components to tackle specific aspects of interoperability when designing a new digital solution. It also contains guidance documents on the theoretical background of the EIF.

2.3 Good practices for the implementation of the EIF

Following the identification and analysis of areas in which European countries could improve the implementation of the EIF recommendations, and therefore further foster interoperability, this section presents various good practices and challenges faced when implementing the EIF recommendations based on the experiences of three countries: the Czech Republic, Finland and Hungary.

Representatives of these countries were invited to share their countries' experience in fostering interoperability in a webinar on the EIF Monitoring Mechanism held on 15 June 2021.

Czech Republic	Finland	Hungary
		
Focus on the implementation of the **subsidiarity and proportionality** principles, illustrated by different topics.	Focus on the challenges arising from the implementation of the **subsidiarity and proportionality** and the **multilingualism principles**.	Focus on the **security and privacy components** of the EIF conceptual model due to their key role in digital ecosystem.

2.3.1 Czech Republic

Context

The 2020 results of the EIF Monitoring Mechanism for the Czech Republic show an above-average performance with respect to Principle 1, focused on subsidiarity and proportionality. Thus, the following subsection provides examples of good practices followed by the country in implementing Principle 1.

Public administrations in the Czech Republic follow a decentralisation policy scheme. Historically, the transfer of competences from state administration to regional and self-government was aimed at improving the efficiency of service delivery, including those

provided online. Gradually, with growing expectations of service users, as well as the ambition of the government to ensure the provision of user-friendly, modern and secure digital services to citizens and businesses comparable to those provided by the private sector, the need for a more efficient and cost-effective execution of public administration tasks in various sectoral domains was recognised. To solve key issues related to ICT in the public sector, the government decided to focus on the shift:

- From uncoordinated government ICT governance towards a coordinated approach based on common architecture, rules and principles;
- From outsourcing to external suppliers to developing internal capabilities for an effective management of ICT at the national level;
- From specialised administrative "counters" to digital services accessible from the central government portal, 24 hours a day and 7 days a week; and
- From isolated data sets to open data and interconnected public registers.

It was recognised that a prerequisite for ensuring better availability of digital public services is interoperability at all layers (i.e. legal, organisational, technical and semantic). Indeed, the promotion of interoperability has several benefits, such as the provision of cross-sectoral and cross-border services in a user-friendly manner and better sharing and reuse of public data.

Good practices to achieve a higher level of interoperability

In recent years, the Czech government has implemented several initiatives contributing to the implementation of Principle 1 on subsidiarity and proportionality to strengthen its digital public services and strengthen interoperability of ICT systems and services in the public sector. Among these initiatives, it is worth highlighting the implementation of a secure national network and shared digital services, encompassing a central government portal, system of base registers, eID means, eDelivery and the network of assisted public administration offices. Additionally, the implementation of an appropriate legislative framework defining the rules of public data governance and the responsibilities of different public institutions has further supported the implementation of recommendations associated with Principle 1.

Another practice contributing to the country's implementation of this Principle is the creation of a central governance body with legal mandate, named the Chief architect of eGovernment office. It is responsible for the approbation of digital governmental projects and ensuring their interoperability, by focusing on the use of shared government ICT services, re-use of solutions, as well as compliance with the National architecture plan, eGovernment principles and public services ICT strategy. This mandate includes the assessment of all governmental projects against national eGovernment principles that are derived from or aligned with the recommendations set out by the EIF.

In addition, sectoral digital strategies are in place and are coordinated under the Digital Czechia program. Regional and local administrations can still provide their specific digital services and choose how they interact with their citizens.

Finally, the Czech experience in implementing the principles of subsidiarity and proportionality allowed to draw key lessons learned, such as:

- The compliance with the interoperability framework has to be continuously re-established and reinforced;
- Cross-sectoral coordination is key when providing user-friendly digital services provision of which involves more government institutions;
- The interoperability framework should be clearly described, explained and promoted; and
- The current pandemic has also demonstrated areas where interoperability is still lacking.

Key success factors

- The implementation of a legislative framework for areas where interoperability is crucial;
- The establishment of a dedicated body with legal mandate for safeguarding interoperability; and
- The continuity of the interoperability-focused approach over time.

However, the Czech Republic still faces some challenges in implementing the recommendations associated with the EIF Principle 1. First, the need to continuously ensure the compliance of the process of central approval of digital government projects with the "interoperability-by-design" approach. And second, the need to facilitate the ongoing communication between the sectoral ICT representatives at all levels.

To overcome these challenges, the publication of the National architecture plan, the National architecture framework, and of the knowledge base, as well as the provision of support for public ICT architects at all levels of public administration proved to be effective step towards greater interoperability.

2.3.2 Finland

Context

The 2020 results of the EIF Monitoring Mechanism showed that Finland is overall performing well. In particular, Finland has been performing above EU average with regard to two interoperability principles: Principle 1 on subsidiarity and proportionality and Principle 9 on multilingualism. Good practices with regard to the country's implementation of these principles are detailed in the next subsection.

Good practices to achieve a higher level of interoperability

Finland leverages law as an enforcement tool to implement the recommendations of Principle 1. As Table 1 shows, over the past few years, the Finnish government has adopted new legislation that implements several of the EIF components, in order to address Recommendation 1: "Ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs". Therefore, legislation has been reaffirmed as the most effective tool to foster interoperability at the national and sectorial levels. In addition, a New Public Government Strategy was published in 2020 that also highlights some of the interoperability principles of the EIF, such as user centricity (Principle 6) through the implementation of policies ensuring that services are organised in a user centric and diverse way.

Table 1 Finland - using law as an enforcement tool to implement the EIF

Principle	Legal Framework	Implementation of the principle (example)
Openness (2.) and transparency (3.)	Constitution of Finland (713/1999), Act on the Openness of Government Activities (621/1999), **Act on Information Management in Public Administration (906/2019)**	The task of the Information Management Board, which started in 2020, is to promote the implementation of information management and data security procedures
Reusability (4.)	Act on Information Management in Public Administration (906/2019), **Support Services Act (571/2016),** Act on the Operation of the Government Security Network (10/2015), GDPR (EU 2016/679)	Digital and Population Data Service Agency maintain Suomi.fi Web Service, that helps and guides citizens and companies in handling everyday matters with public authorities and organisations of general interest.
Technological neutrality and data portability (5.)	Act on the Openness of Government Activities (621/1999), **Act on Information Management in Public Administration (906/2019)**	Sea above: Information Management Board
User-centricity (6.)	**Act on the Provision of Digital Services (306/2019),** Administrative Procedure Act (434/2003), Act on Electronic Services and Communication in the Public Sector (13/2003)	Digital and Population Data Service Agency maintain 'Suomidigi' -service, that provide the opportunity to share information, support, and tools to help digital service designers, creators, and decision makers build more streamlined and customer-centric services.
Inclusion and accessibility (7.)	**Act on the Provision of Digital Services (306/2019)**	The Regional State Administrative Agency is the authority supervising the implementation of accessibility requirements in Finland.
Security and privacy (8.)	Act on Information Management in Public Administration (906/2019), **GDPR (EU 2016/679), Data Protection Act (1050/2018), Information Society Code (917/2014)**	The Data Protection Ombudsman is a national supervisory authority which supervises the compliance with data protection legislation and provides information on the matters that organisations need to take into account when processing personal data. National Cyber Security Centre (part of the Finnish Transport and Communication Agency) develops and monitors the operational reliability and security of communications networks and services and provides situational awareness of cyber security.
Preservation of information (11.)	National Archives Act (831/1995), Act on Information Management in Public Administration (906/2019)	The task of Finland's National Archives is to ensure that documents belonging to the national cultural heritage are preserved and provide regulations and instructions for archiving data

Another good practice in Finland relates to the implementation of Principle 9 on multilingualism. Over the past decade, Finland experienced a particularly sustained increase in the provision of public services in foreign languages besides the two national ones (i.e. Finnish and Swedish). However, while the law requires public services be provided in both national languages, there is no similar legal obligation to provide public services in additional languages. In fact, such increase is explained by the rising number of speakers of non-national languages using national public services and cross-border services. This situation has led most central government authorities and large cities to provide their services in English as well as, less frequently, in additional languages. For example, it is possible to consult the Finnish Taxation Authority and submit a fiscal declaration in English, as well as in Polish, Russian, and Chinese, among others.

Several challenges are associated with providing public services in multiple languages, in particular for small municipalities, i.e. with less than 2000 inhabitants. These challenges include the cost of maintaining websites in different languages, in terms of capacity, skills and time, and the direct translations of the public information displayed on these websites appear not to be as useful as expected for foreigners and would require some broader tailoring or explanation.

Key success factors
Legislation has been reaffirmed as the most effective tool to foster interoperability at the national and sectorial levels.

2.3.3 Hungary

Context

The 2020 results of the EIF Monitoring Mechanism showed that Hungary is overall performing well. It is notably observed that Hungary has above-average performance in the third scoreboard, in particular with regard to score of 4 in the area related to "security and privacy". The following subsection provides examples of good practice illustrating the country's implementation of this conceptual model component.

Since 2014, the main objective of the Hungarian government has been to create a single digital administration space to replace existing siloed solutions and to provide more seamless eGovernment services to citizens and businesses. During the 2014-2020 financial period, all eGovernment developments financed by EU Funds via the Public Administration and Public Service Development Operational Programme (PADOP) had to comply with policy criteria set by the Ministry of Interior responsible for eGovernment and public administration ICT development. These policy criteria were widely based on the EU policy goals, including the recommendations of the EIF.

Different elements have made possible the implementation of the recommendations set by the EIF with regards to the legal, organisational, semantic and technical layers of interoperability within Hungarian public administrations. Those elements are:

- The centrally managed base registries, enumerated in the implementing decree of the E-Administration Act, which are obliged to provide their data exchange services via the Central Government Service Bus (KKSZB) technical interoperability platform. This obligation has led to an important increase in data exchange, the 2020 figures having doubled compared to 2019.
- The unified legal environment introduced by the E-Administration Act. This Act promotes the once-only principle and sets the most important interoperability criteria for all Hungarian public administration bodies.
- The introduction of centrally provided building blocks (regulated electronic administrations services (SZEÜSZ) and central electronic administration services (KEÜSZ)), which have been developed according to industry standards. They contributed to a higher level of reuse of existing solutions, and to further standardisation, thus increasing interoperability.
- The creation of platform services such as the Customisable State Administration Portal and the Municipality ASP, which are the most important ones and that are described below. They contributed to abolish local government silos (all municipalities now use the same back-office) and helped further increasing all dimensions of interoperability in the local government sector of Hungary.
- The integrated governance of public service provision, which is based on a repository of central solutions consisting of the above listed elements, as well as the National Telecommunications Backbone (NTG), the Government Data Centre (KAK), the Public Application Catalogue and the Public Application Development Environment.

The interoperability principles, layers and components of the EIF conceptual model have been taken into account when establishing the Hungarian eGovernment legal framework, governance model, hardware and software infrastructure, as well as service provision.

Good practices to achieve a higher level of interoperability

Both good practices detailed below integrate several building blocks in order to ensure a ready-to-use integrated solution for all Hungarian public administrations to make their digital public services available on a single platform, therefore increasing interoperability. They have been initiated by the Hungarian Ministry of Interior.

One of Hungary's good practices in implementing the EIF is the centralized ASP service for municipalities, which has been providing since January 2019 integrated back-office software for municipalities in a SaaS (Software as a Service) model, as well as a single portal for local e-services for almost all of Hungary's 3 200 local governments. The service also ensures the integration of all necessary building blocks and data exchange possibilities via the Government Service Bus. With the introduction of this service, the interoperability of the Hungarian local governments has taken a significant step forward, as the former silos almost disappeared and citizens can use a single portal to access the online services of all connected municipalities, whether it is a small, isolated village or a much larger city.

The other main good practice of Hungary is the Customisable State Administration Portal that offers a single platform for provision of eGovernment services to all public bodies that are required to offer their services online in accordance with the E-Administration Act. This portal also has built-in features, such as eID, eAuthentication of documents, intelligent online form management, ePayment service and eDelivery, provided through the integration of centrally available building blocks. The portal enables public bodies to easily publish their online forms and provide the necessary services so that citizens can easily access them from this single, mobile optimised and accessible portal.

Key success factors

Security and privacy are essential to providing appropriate eGovernment services that are trusted by their users. Therefore, all developments were also in line with the relevant legal provisions set out in the Electronic Information Security Act of 2013.

However, some challenges were faced by Hungary in implementing the good practices previously mentioned, among which incentivising public bodies that are still partially using their legacy solutions to deploy to centrally provided building blocks and existing main eGovernment platforms to replace their old services. To tackle this challenge, several tools are available to monitor the implementation of the new solutions, such as the temporary rule of procedure of governmental decision-making and impact assessments. An authority in the Ministry of Interior is in charge of enforcing e-administration obligations on designated bodies and of enforcing and monitoring interoperability duties.

Another challenge was to replace the traditional decision-making process with a data-driven approach, since data exchange is now possible and the necessary interoperability tools are widely available. Finally, other challenges that the Hungarian government intends to address in the future are the enhancement of cross-border interoperability and greater automation.

03

The role of the European Union

The role of the European Union

In continuity with the ambitious goal of the Juncker Commission 2014 – 2019 to project the Single Market onto the digital realm, making Europe fit for the Digital Age is among the current European Commission's key political priorities for the period 2019 – 2024. While the EU and its Member States had already embarked on the path to digital transformation in many sectors, the outbreak of the COVID-19 pandemic has accelerated the pace of this transformation, rendering digital technologies imperative for working, learning, entertaining, socialising, shopping and accessing services.[17] Indeed, the necessity of containing the spread of the virus has forced EU Member States to put in place a variety of restrictive measures limiting human contacts. Whilst, on the one hand, leading to disruptions in the continuity of businesses and provision of public services, on the other, lockdowns and curfews have contributed to a remarkable acceleration in the development and enhancement of human-centric digital solutions supporting both businesses and public administrations. In this context, the European Commission has shown substantial commitment in fostering the uptake by its Member States of digital solutions that are sustainable not only throughout the crisis, but also after its end.

To better contextualise the analysis, the chapter starts by providing insights on the impact of the COVID-19 pandemic on European public administrations and the main challenges faced by the Member States in the delivery of public services. It proceeds by shedding a light on the state-of-play of digital public administration and interoperability in the EU by examining the vast array of political and legislative initiatives in this field in the period 2020-2021. Finally, it also provides an account of the supporting funding programmes aimed at fuelling the digital transformation, whilst supporting the EU at large in the response to the COVID-19 emergency.

3.1 The impact of the COVID-19 crisis on European public administrations

Following the outbreak of the COVID-19 pandemic across Europe, EU Member States have been forced to put in place restrictive measures to contain the spread of the virus. Limitations to human contacts following lockdowns and curfews impacted businesses and public administrations alike. Nevertheless, the disruptive extent of such measures on the continuity of businesses and provision of public services was not homogenous across EU Member States and sectors. Often this highlighted pre-existing structural inefficiencies and, in some cases, Europe's digital divide, especially when it comes to internet access and broadband connectivity in rural areas.[18]

As documented by the Report on public administrations' digital response to COVID-19 in Europe, EU Member States' perceived levels of disruption when it comes to the delivery of public services during the first wave of the COVID-19 crisis vary considerably. The reported disruption levels ranged from no disruption, typically in countries that had a long history of delivering public services digitally, to a significant disruption (e.g. interruption of essential public services for several weeks at a time, inability of civil servants to work remotely), typically in countries where digital public services were less common. In particular, while the report documents that in the period from March to June 2020 only five EU Member States[19] reported no disruption in the delivery of public services, it is worth mentioning that four of them could indeed leverage highly digitalised public administrations and highly interoperable digital systems, according to, respectively, the European Commission's eGovernment Benchmark[20] and the European Interoperability Framework[21]. Higher levels of digitalisation and interoperability allowed countries to better respond to the crisis as these were for instance able to readily develop and implement digital solutions (such as informative mobile applications, online portals, chatbots and online repositories) and quickly mitigate the sudden disruption of several face-to-face public services. Indeed, besides healthcare – for which digital solutions were often put in place to mitigate the COVID-19 pandemic itself –, EU Member States had to rely on digital solutions to ensure a smooth delivery of key public services in different sectors, such as education, economic affairs, social protection and public order and safety. Overall, the report shows that countries which could count on more digitalised public administration, where digital interoperable public services, shared IT infrastructures and reusable common components were already in place, were better prepared to address this challenge and mitigate its effects on the delivery of public services.

17 European Commission, 2030 Digital Compass: the European way for the Digital Decade, p. 1.

18 Figures on the digital divide across the EU show that whilst the 72% of EU citizens uses the Internet at least once a week, there is still a 20% of them who has never accessed it. More information available at: https://digital-strategy.ec.europa.eu/en/library/eu-digital-divide-infographic

19 Czech Republic, Denmark, Estonia, Spain, and The Netherlands

20 https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2020-egovernment-works-people

21 https://joinup.ec.europa.eu/collection/national-interoperability-framework-observatory/2019-eif-monitoring-mechanism

3.2 Most recent European Commission political initiatives supporting digital transformation

The COVID-19 pandemic exposed the very often insufficient level of digitalisation of several EU Member States and public administrations, acting at the same time as an unexpected accelerator and multiplier for digital transformation. In light of this, the von der Leyen Commission has introduced a number of political initiatives to set the framework for the advancement of Europe's digital transformation during and after the crisis.

3.2.1 Next Generation EU

Europe's Moment: Repair and Prepare for the Next Generation – commonly known as Next Generation EU – is the political communication of the European Commission adopted in May 2020 setting up the EU coordinated response to the COVID-19 crisis and providing guidelines to ensure that the post-crisis recovery is sustainable, even, inclusive and fair for all Member States. At the heart of Next Generation EU is the Recovery and Resilience Facility (RRF) supporting Member States' investments and reforms to mitigate the socioeconomic impact of the crisis. To benefit from the support of the RRF, Member States were requested to submit their national recovery and resilience plans to the Commission for assessment and to the Council for approval[22].

In the area of digital, the Communication Europe's Moment: Repair and Prepare for the Next Generation acknowledges the role of new technologies in ensuring the continuity of businesses and public services and their socioeconomic impact, stressing the potential of developing a universally accepted public electronic identity to allow for simple, trusted and secure access to cross-border digital public services. Further, the Communication sets down the four key elements for a digital recovery: investments in more and better connectivity, especially in the rapid development of 5G networks; a stronger industrial and technological presence in strategic sectors such as AI, cybersecurity, supercomputing and cloud; the building of a real data economy as a motor for innovation and job creation; finally, a fairer and easier digital business environment characterized by increased cyber resilience.

3.2.2 Shaping Europe's Digital Future

The policy instruments adopted by the newly-installed von der Leyen Commission on 19 February 2020, just before the outbreak of COVID-19 in the EU, have set the broader framework for the advancement of Europe's digital transformation. Among these, the Communication on Shaping Europe's Digital Future provided the strategic orientation for this transformation, determining the goal for the EU to strengthen its digital autonomy and sovereignty over digital infrastructures, technologies, and data. In the Communication, the European Commission has laid down three key objectives: to develop, deploy and take up technology that works for people, to ensure a fair and competitive digital economy and, finally, to foster a European digital transformation that supports the goal of a more open, democratic and sustainable society. To do so, the Commission has committed to a number of actions. The most relevant in this context are explained in more detail in the sections below. In addition to these is the formulation, in 2021, of a reinforced EU governments interoperability strategy to ensure coordination and common standards for secure and borderless public sector data flows and services.

3.2.3 2030 Digital Compass: the European way for the Digital Decade

On 9 March 2021, the European Commission has presented the Europe's Digital Compass, a Communication that translates the ambitions for the European Digital Decade into concrete actions, indicating the current gaps in European strategic digital capacities and proposing a set of guiding principles underlying the transformation. The EU's digital transformation trajectory evolves along four cardinal points: skills, digital infrastructures, digital government, and digital businesses.

- Skills. Digital empowerment is key in the world of tomorrow. In addition to the minimum target of 80% EU population learning basic digital skills set out in the European Pillar of Social Rights Action Plan, the EU aims at reaching a total of 20 million employed highly skilled ICT specialists by 2030 to ensure Europe's global competitiveness, whilst closing the gender gap for IT professions.

- Digital infrastructure. As excellent and secure connectivity for everybody is at the foundation of an inclusive European digital society, the EU proposes that by 2030 all EU households will be covered by Gigabit connectivity, with all populated areas covered by 5G. Digital leadership and global competitiveness of the EU depend also on international connectivity: by building on the strength of its current partnerships, the EU commits to expanding its international engagement via investments in terrestrial and submarine cables as well as a secure constellation of satellites. Furthermore, with volumes of generated data increasing exponentially, the need for storing and processing closer to where data is generated will require the development and

22 Updated information regarding EU Member States' recovery and resilience plans is available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

deployment of new data-edge processing technologies. For this reason, the EU needs to invest in strengthening its own cloud infrastructures and capacity. Finally, by 2025, the EU aims to have its first Quantum computer, paving the way for Europe to achieve cutting-edge quantum capabilities applicable in fields such as health, communication security, Earth resource monitoring and renewable energy.

- Digital government. Central to the European Digital Compass are also the themes of government and business digital transformation. The COVID-19 pandemic has highlighted how essential it is for both the public and private sector to embrace digital technologies. Government-as-a-platform will be the new way of building digital public services, with 100% key public services transferred also online and 80% citizens using their digital ID throughout the EU. Finally, all citizens will have access to their medical records in an interoperable digital format (e-records). The latter is among the various actions supported by the European Commission in the 2018 Communication on enabling the digital transformation of health and care in the Digital Single Market.

- Digital businesses. The EU supports businesses in facing their digital transformation through several initiatives, including the New Single Market and Digital Europe programmes. The proposed level of ambition of the EU is that, by 2030, 75% EU companies will use cloud computing, AI, and Big Data and more than 90% EU SMEs will have reached a basic level of digital intensity.

In addition to the EU fundamental rights and principles rooted in primary EU law, the Compass puts forth a set of digital principles such as universal access to Internet services, digital education and health, a secure and trusted online environment that respects the environment and protects children and ethical principles for human centric algorithms.

3.2.4 New Industrial strategy for Europe

Considering the impacts of COVID-19, on 10 March 2020, the European Commission has presented the new Industrial Strategy for Europe setting out the need for the European industry to become greener, more circular, and more digital while remaining competitive at global level. Industry is shaped by digital technologies. These create new business models, allow industry to become more productive and provide workers with new skills. At the same time, European industry shapes digital technologies and does so by leveraging on its robust industrial base, high quality research, skilled workers, a vibrant start-up ecosystem, mature infrastructure, and a leading position in the use of industrial data. While setting out the key drivers of Europe's industrial transformation at large and proposing a comprehensive set of specific future actions tackling a variety of issues (from EU competition rules to Intellectual Property rights), when it comes to the field of digital, the new strategy calls for the acceleration of investments in the research and deployment of technologies such as AI, 5G and 6G, data and metadata analytics.

3.2.5 Fostering a European approach to AI

Artificial Intelligence has growingly become an area of strategic importance with applications in several fields. Following the adoption of the European Strategy for Artificial Intelligence in April 2018 and the White Paper on Artificial Intelligence in February 2020, the European Commission has adopted, in April 2021, the Communication Fostering a European approach to AI. The Communication presents an overview of opportunities and risks of AI and proposes to set out a proportionate and risk-based regulatory framework for AI.

In this context, the European Commission has presented two key documents putting its vision into practice. The first document reviews the Coordinated Plan on AI laid out for the first time in 2018. The 2021 upgrade of the Plan aims to accelerate EU and Member States' investments in AI, aligning them with the policy priorities to foster EU global leadership in trustworthy AI. Although not making interoperability its core topic, the Plan stresses the need for AI interoperability in several public sectors such as mobility and health.

The Proposal for a Regulation laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act) is the second document, presented in the format of an explanatory memorandum, that takes the EU vision on AI to a more concrete stage of its development by building the foundations of a legal framework for the development and deployment of AI.

3.2.6 Digital Education Action Plan

The Digital Education Action Plan 2021 – 2027 is a renewed EU strategic initiative that supports the sustainable and effective adaptation of EU Member States' education and training systems to the digital age. The Plan builds on the vision of a high-quality, inclusive, and accessible European digital education and addresses the challenges emerged with the COVID-19 pandemic. The two priority areas set out in the Plan are the development of a high-performing digital education ecosystem comprehensive of infrastructure, connectivity, digital equipment, digital skills, tools and content, and the enhancement of digital skills and competences.

In addition to this, the European Commission has also adopted solutions to complement initiatives at Member State level in the field of education. These include the offer of online learning materials and digital tools for school and Universities to support remote learning.

3.2.7 Digitalisation of justice in the European Union

Digitalisation of justice systems is an important objective of the EU, aligned with two key priorities of the von der Leyen Commission. In particular, it responds to the ambition of enhancing European democracy as well making Europe fit for the digital age. Effective justice systems are fundamental for attracting businesses and fostering growth. As digital technologies are enablers for more efficient and accessible justice systems, the EU is developing and integrating ICTs into access to legal information and the workings of judicial systems. The European Commission's Communication on Digitalisation of justice in the European Union, adopted in December 2020, provides a toolbox – which comprises binding and non-binding measures – to tackle the challenges identified for justice systems in the digital age. The proposed tools are categorised into four main categories: financial support to Member States; legislative initiatives for digitalisation of justice and improved cross-border cooperation; promotion of national coordination and monitoring mechanisms; and, finally, interoperable, accessible, user-centric, fast, secure and reliable IT tools and processes. These will allow for an easier, more rapid and cost-effective initiation of economic activities – either when setting up a company or when opening a company branch in another Member State – and will provide comprehensive and accessible information on companies.

3.2.8 The EU Cybersecurity strategy

In July 2020, the European Commission presented the new EU Security Strategy 2020 – 2025, featuring cybersecurity and critical information protection as issues of utmost strategic importance. The prosperity of the EU's economy, democracy and society depend heavily on the security of digital technologies. Therefore, cybersecurity must represent the cornerstone of a digital Europe. In December 2020, the new EU Cybersecurity Strategy for the European Digital Decade was adopted. The cyberattacks on European critical infrastructures such as hospitals and research centres, as well as on the digital systems of EU public administrations – increased even more during the COVID-19 pandemic – have compelled EU Member States to adopt a strengthened, coordinated and preventive approach to ensuring the security of essential public services[23].

Among the actions laid out in the Strategy is a plan for the development of a secure quantum communication infrastructure (QCI). The QCI will ensure the security of critical communications for European and National public authorities by providing EU-made ultra-secure encryption techniques. In addition, the Strategy puts forth the development of a contingency plan in case of cyberattacks affecting the integrity and availability of the global Domain Name System (DNS) root system. The plan foresees the creation of a public European resolver service (DNS4EU) that reduces the impact of dependencies on private non-EU services.

3.2.9 European Data Strategy

The European Strategy for Data adopted by the European Commission in February 2020 has presented the EU ambition to become a leader in the world data economy, a business that is set to reach in the EU the forecasted value of EUR 829 billion in 2025 (5.8% of EU GDP). By building on its legal framework derived from fundamental European values, the European Commission has committed to creating a European Data Space where data from public administrations, businesses and citizens could flow across EU borders and sectors in respect of EU laws on privacy and data protection, and according to the principles of findability, accessibility, interoperability and reusability.[24] To do so, the Commission has presented a number of policy and legislative measures based on pillars such as the creation of a cross-sectoral governance framework for data access and use and investments to strengthen Europe's capabilities and infrastructures for hosting, processing and using data in an interoperable manner.[25]

3.2.10 The Standardisation Strategy

Standardisation has a fundamental role in the EU Single Market as standards support market-based competition and help ensure the interoperability of complementary products and services. Standards set requirements for specific items, materials, components, systems, and services, or describe a method or procedure. Due to their role in protecting health, safety, security, and the environment, standards are important to the public. The EU has an active standardisation policy promoting standards as a way to better regulation and enhancing the competitiveness of European industry. With the standardisation package of 1 June 2016, the Commission has set out its vision on how European standard setting should evolve in light of technological developments, political priorities and global trends. Further, each year the European Commission publishes an Annual Work Programme for European standardisation, laying down the Commission's intentions

23 For instance, the Strategy puts forth the plan for the development of a European Cyber Shield through a network of AI-enabled Security Operations Centers that can detect signs of cyberattacks and enable preventive action before damage occurs.

24 https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-data-strategy_en

25 Some of the initiatives are detailed in the section below.

to use standardisation in support of new or existing legislation and policies. In order to address the new challenges facing the European Standardisation System (ESS), among which are the need to be more assertive and strategic at the international level[26] and that of responding to the standardisation needs arising from the green and digital transformation of the EU's industrial ecosystem, the European Commission has published a roadmap for the upcoming standardisation strategy and opened it for public consultation. The measures or proposals resulting from this initiative will help consolidating and improving the ESS so that it will continue supporting a well-functioning single market.[27]

3.2.11 The European Interoperability Framework for Smart Cities and Communities (EIF4SCC)

Cities and communities are confronted with complex and diverse challenges, ranging from climate change and urban mobility to energy efficiency and pandemics. To tackle those challenges, cities and communities are adopting a number of digital solutions, thus transforming themselves into Smart Cities and Communities. In this regard, interoperability represents one of the main challenges for local administrations, as well as a key component at the base of their interactions with the higher levels of public administration and the private sector. Through the European Interoperability Framework for Smart Cities and Communities (EIF4SCC) – the result of a joint proposal by DG DIGIT[28] and DG CNECT[29] - the European Commission aims at supporting local administrations and local policy makers by providing them with definitions, principles, recommendations, including practical use cases, and a common model that enables public service delivery across domains, cities, regions and borders.[30] Public stakeholder consultations have been concluded in April 2021; once realised, the Framework for Smart Cities and Communities will help pave the way to the new era of interoperable interactions at local level.[31]

3.3 Most recent European Commission legislative instruments supporting digital transformation

The European Commission is currently undergoing a period of revision of existing regulations and directives to ensure that the EU legal framework reflects the latest technology and digital developments. This section includes the most recent European Commission legislative initiatives supporting digital transformation.

3.3.1 Data Governance Act and Data Act

The European Strategy for Data anticipated the adoption in 2021 of a Data Act to foster business-to-government data sharing for the public interest as well as to support business-to-business data sharing, particularly addressing issues related to usage rights for co-generated data and overall setting out the right conditions for better control over data sharing for citizens and businesses.

The Commission also proposed, in November 2020, a Regulation on European Data Governance which aims at boosting data sharing across EU Member States and across sectors through a comprehensive set of rules. To do so, the Regulation lays down the conditions for the re-use of certain categories of data held by public sector bodies within the EU. Further, it sets up a notification and supervisory framework for the provision of data sharing services as well as the requirements applicable to such services, and a framework which allows for the voluntary registration of entities collecting and processing data made available for altruistic purposes. This initiative will therefore leverage the innovative potential of data sharing in sectors such as health, mobility, environment, agriculture, and public administration for the benefit of EU citizens and businesses.[32] With the Regulation on European Data Governance, the Commission commits to the establishment of a formal expert group – the European Data Innovation Board – consisting of the representatives of competent authorities of all the Member States, the European Data Protection Board, the Commission, relevant data spaces and other representatives of competent authorities in specific sectors.

3.3.2 A new legislation on a trusted and secure European eID

The European Commission has launched the consultation for the revision of the rules on electronic identification and trust services for electronic transactions in the Single Market (eIDAS Directive), in force since 2018. The cross-border legal framework provided by the eIDAS Regulation has so far supported a number of services such as electronic identification, authentication and website certification.

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26 https://ec.europa.eu/commission/presscorner/detail/en/SPEECH_20_1655

27 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13099-Standardisation-strategy_en

28 As part of the ISA² Programme (2016-2020).

29 In the framework of the ongoing initiative 'Joining forces to boost sustainable digital transformation in Europe's cities and communities'. More information available at: https://living-in.eu/

30 https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/news/eif4scc-smart-cities-communities

31 https://joinup.ec.europa.eu/collection/nifo-national-interoperability-framework-observatory/news/connecting-eif-smart-cities-communities-eif4scc

32 https://digital-strategy.ec.europa.eu/en/policies/data-governance

One of the sectors where the eIDAS has found large applicability is the banking sector.[33] However, as the digitalisation of society has increased dramatically since the adoption of eIDAS in 2014, the evaluation of the eIDAS Directive has considered the latest technology and policy developments. Therefore, the new European digital identity will facilitate further access to services online across the EU and, in full alignment with other political and legislative initiatives in the field of data, ensure that people will have a much greater control over what data they share and how it is used.[34]

In the same context, the European Commission has recently proposed a framework for a European Digital Identity, which will be available to all EU citizens, residents, and businesses. Thanks to their European Digital Identity wallets linking national digital identities with proof of other personal attributes (e.g. driving licences, diplomas, bank accounts) and rapidly accessible also from mobile phones, people will be able to prove their identity and share electronic documents. The European Digital identity will be available to anyone who will want to use it, widely usable for purposes of access to both public and private digital services in the EU and enable people to be in control of their data.

3.3.3 Digital Services Act package

Further commitment towards the digital transformation of Europe comes from the Digital Services Act package, consisting of two proposals for legislative initiatives – the Digital Services Act (DSA) and the Digital Markets Act (DMA). These have upgraded the rules governing digital services in the EU to keep the pace with their rapid and widespread development and regulate unfair practices in the Digital Market. The DSA and DMA have the goals of both creating a safer digital space in which users' fundamental rights are protected and establishing a space to foster innovation, growth, and competitiveness in the European Single Market and abroad.

More specifically, the DSA includes different rules for different online players such as intermediary services, hosting services, online platforms, and very large online platforms. These rules will benefit citizens who will be able to enjoy a better protection of their rights online, providers of digital services who will thrive in a secure and harmonised legal environment, as well as business users of digital services and society at large.

While the DMA establishes a set of criteria for qualifying large online platforms as 'gatekeepers' such as having a strong economic position, significant impact on the internal market and activities in multiple EU countries. To these, new obligations, and fines, penalties or other remedies for non-compliance will apply.[35]

3.3.4 A new legislation on the digitalisation of visa procedures

In its 2021 Work Programme, the European Commission has further committed to its work in the field of migration and asylum, proposing a number of measures on legal migration[36] that aim at restoring trust between EU Member States and bringing clarity to applicants. Among the objectives proposed in the new Pact on Migration and Asylum, presented in September 2020, is the full digitalisation of visa procedures for migrants by 2025. The possibility to submit online applications and apply for a digital visa will largely contribute to making migration and asylum procedures to enter the Schengen Area faster and more efficient.

3.3.5 NIS2 Directive

The Directive 2016/1148 concerning measures aimed at ensuring a high common level of network and information security in the Union – the so-called Network and Information Systems (NIS) Directive – was adopted in July 2016 and became the first piece of cybersecurity legislation for the EU at large. Despite being the cornerstone of the EU strategy on critical information infrastructure protection for some years, and partially due to the fast evolution of the digital and cyber threat landscapes, the NIS Directive quite soon started revealing its limitations[37]. Some critical information infrastructure sectors – namely providers of public electronic communications, networks or services and digital services such as social networking platforms and data centres – had not been included under the scope of the first NIS Directive. For this reason, the European Commission has adopted, in December 2020, a Proposal for the new NIS Directive (NIS2), which expands the sectoral scope of the existing legislation. Thanks to a stronger enforcement mechanism, the NIS2 Directive will reinforce the overall levels of implementation of its provisions and enhance the supervisory regime for National Authorities. Moreover, building on the successes of the 5G Toolbox, the NIS2 Directive will address the security of the supply chain for all key digital technologies.[38]

33 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0290&rid=8

34 https://digital-strategy.ec.europa.eu/en/news/digital-identity-and-trust-commission-launches-public-consultation-eidas-regulation

35 https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/digital-markets-act-ensuring-fair-and-open-digital-markets_en#what-does-this-mean-for-gatekeepers

36 https://eur-lex.europa.eu/resource.html?uri=cellar:91ce5c0f-12b6-11eb-9a54-01aa75ed71a1.0001.02/DOC_1&format=PDF

37 https://ec.europa.eu/digital-single-market/en/faq/faq-revision-network-and-information-security-directive

38 https://digital-strategy.ec.europa.eu/en/library/revised-directive-security-network-and-information-systems-nis2

3.3.6 Proposal for a regulation laying down harmonised rules on artificial intelligence

On 2 April 2021, the European Commission has published the Proposal for a Regulation laying down harmonised rules on Artificial Intelligence (Artificial Intelligence Act). As previously anticipated, this represents the second document that takes the EU's vision on AI to a more concrete stage of its development. The Proposal builds on the work carried out by the High-Level Expert Group on AI and incorporates the feedback of 1250 stakeholders, thus building on the strengths of an inclusive regulatory approach.[39] The Regulation will provide the legal foundation for the trustworthy development and deployment of AI, covering aspects such as safety, liability, fundamental rights, and data aspects.

3.3.7 Proposal for a regulation on establishing a European Health Data Space

The creation of a European Health Data Space (EHDS) is the European Commission's key priority in the area of health. The goals of the EHDS are to promote the safe exchange of patients' data and support research on new preventive strategies, treatments, medicines, medical devices, and outcomes. Further, the EHDS will encourage access to and use of health data for policymaking and regulation, and the uptake of innovative solutions that make use of digital technologies. The EHDS will be built on three main pillars: a strong system of data governance and rules for data exchange, data quality and interoperability, and a strong infrastructure.[40] On 3 May 2021, the European Commission published a public consultation on the EHDS. This will remain open until 26 July 2021, offering the opportunity to the public health community to make their contribution in light of increased complexities posed by digitalisation.[41]

3.3.8 Proposal for a regulation on establishing a European High-Performance Computing Joint Undertaking

The European High-Performance Computing Joint Undertaking (EuroHPC JU) was established in October 2018 as a legal and financial framework to pool EU and participating countries' resources to build a European world-class supercomputing and data infrastructure with exascale capabilities in the next two years, and post-exascale facilities by 2027. In the near future, Europe's leading role in the data economy will increasingly depend on its capability to develop key HPC technologies. For this reason, the European Commission has drafted a Proposal for a Council Regulation on establishing a EuroHPC which is a continuation of the existing initiative established under Council Regulation (EU) 2018/1488. The proposed Regulation introduces modifications to adapt the Regulation to the new multiannual financial framework (MFF) programmes and to the priorities of the von der Leyen Commission, in particular those outlined in the European Strategy for Data and in the Communication Shaping Europe's Digital Future.

3.4 Most recent European Commission funding programmes supporting digital transformation

3.4.1 Digital Europe Programme

The Digital Europe Programme (DEP), adopted in April 2021, is a new EU funding programme dedicated to the digital transformation of public services and businesses. The four work programmes through which the DEP will be implemented will be then adopted shortly afterwards. The programme has an overall budget of EUR 7.5 billion which will aim at boosting investments in five specific objectives (SO).[42] The largest part of expenditures will cover the building and strengthening of the EuroHPC (SO1), as well as the spread of Artificial Intelligence for public authorities and businesses (SO2). Cybersecurity represents another large heading of the DEP, with funds channelled to boost the overall EU cyber defence and finance cybersecurity equipment and infrastructure (SO3). Further, the DEP supports advanced digital skills through, among others, the creation of European Digital Innovation Hubs (EDIHs) which provide access to technical expertise and experimentation for companies involved in digital transformation projects (SO4).[43][44] Finally, the DEP supports the digital transformation of EU public administrations and their interoperability (SO5). In particular, the interoperability budget will be used to partially finance the European Digital Government Eco System (EDGES) and, more specifically, the Common Services Platform (CSP) and Interoperability Knowledge and Support Centre (IKSC). The aim of EDGES is to accelerate the digital transformation of public administrations across Europe and help upskill them, facilitate interoperability as a core enabler of Europe's digital autonomy, and foster the uptake of interoperable cross-border and cross-sector public services in alignment with regulatory requirements.

39 https://www.mfsa.mt/wp-content/uploads/2021/05/European-Commission-Proposes-Regulation-Laying-Down-Harmonised-Rules-on-Artificial-Intelligence-Artificial-Intelligence-Act-.pdf

40 https://ec.europa.eu/health/ehealth/dataspace_en

41 https://epha.org/the-european-health-data-space-an-opportunity-for-the-public-health-community/

42 https://digital-strategy.ec.europa.eu/en/activities/digital-programme

43 https://www.europarl.europa.eu/legislative-train/theme-new-boost-for-jobs-growth-and-investment/file-mff-digital-europe-programme

44 https://digital-strategy.ec.europa.eu/en/activities/edihs

In this context, the mature solutions in the past financed under ISA² will be moved to the CSP, which will serve as one-stop-shop for public administrations across the EU. On the other hand, all the pilots and solutions under development will stay under the umbrella of the Interoperability Knowledge and Support centre, which will serve as an incubator. When pilot solutions will reach a sufficient level of maturity, they will be transferred to the CSP, thus enabling public administrations to use these on a wider scale.[45]

3.4.2 Recovery and Resilience Facility

In addition to its structural long-term Multiannual Financial Framework (MFF) budget, the European Commission has instituted NextGenerationEU. As mentioned earlier, NextGenerationEU is an ***ad hoc*** temporary financial instrument of EUR 806.9 billion to help Member States recover from the COVID-19 crisis over the next four years. At the core of NextGenerationEU is the Recovery and Resilience Facility (RRF) which provides EU Member States EUR 723.8 billion worth of grants and loans to support investments and reforms. As described earlier, in order to benefit from the support of the RRF, Member States are required to submit their recovery and resilience plans. These plans should address the challenges identified in the European Semester, as well as the related to the twin transitions of green and digital.[46] In particular, Member States will have to demonstrate to what extent their plans contribute to the digital transition and how to address challenges resulting from it. Further, Member States will have to demonstrate that a minimum of 20% of expenditure is earmarked for digital. Investments in digital technologies should respect the principles of interoperability, energy efficiency and personal data protection, allow for the participation of SMEs and start-ups and promote the use of open-source solutions. Member States' intervention fields in digital are indicated in the Commission Staff Working Document as follows: connectivity; digital-related investment in research and development of AI, cybersecurity, blockchain and quantum technology; development of digital capacity and enhancement of digital skills; eGovernment, digital public services and local digital ecosystems (including e.g. eID and eHealth); digitalisation of businesses (in particular, via Digital Innovation Hubs); investments in and deployment of advanced technologies (e.g. data spaces, edge computing, cybersecurity, AI, HPC and quantum computing infrastructures, IoT); greening the digital sector.[47]

3.4.3 Connecting Europe Facility (CEF2) Digital

The goal of an integrated European Union is achieved, among others, through the building of a network of interconnected transnational infrastructures. This goal has been enshrined in the Regulation establishing the Connecting Europe Facility (CEF), a funding programme of the EU dedicated to supporting investments in cross-border infrastructures in the three sectors of transport, energy and digital.[48] Whilst the first programme ran from 2014 through 2020, the European Commission has established to renew the programme as part of the new MFF for the period 2021 – 2027. The current digital envelope – with a foreseen budget of EUR 2 billion in current prices – aims at catalysing investments in digital connectivity as a basis for better digital services, particularly supporting actions falling into the market failure category. Budget efforts foreseen under the CEF 2 Digital Programme include the deployment and access to high-capacity overland and submarine network infrastructures within the EU, and between the EU and third countries, as well as the provision of broadband connectivity for European households in peripherical areas of the EU. These investments are fundamental in bridging the digital divide.

It is important to remind, as also described above, that the eGovernment components supporting digitalisation (e.g. eID, eSignature, eDelivery, eTranslation) and previously falling under the CEF Programme[49], are currently encompassed by the fifth pillar of the Digital Europe Programme, 'Digital transformation of public administration and interoperability'.

3.4.4 Horizon Europe

As a continuation of Horizon 2020, Horizon Europe is one the EU's flagship programmes supporting the development of the European Research Area, a single market for research, innovation, and technology across the EU. Horizon Europe represents the biggest budget component of the Single Market, Innovation and Digital heading of the MFF, with a total of EUR 95.5 billion. Horizon Europe facilitates collaborations among researchers and strengthens the impact of research and innovation in developing, supporting, and implementing EU policies, including the green and digital transformations. In line with the European Commission's objective of implementing Open science practices,[50] the Horizon Europe budget is supporting the setup of the European Open Science Cloud (EOSC), a digital and physical environment for hosting and processing research data to support EU science.

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45 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021R0694&qid=1626367114708

46 https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027/whats-new_en

47 Updated information regarding EU Member States' recovery and resilience plans is available at: https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

48 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1316

49 https://ec.europa.eu/cefdigital/wiki/display/CEFDIGITAL/2020/12/16/The+CEF+Building+Blocks+and+Horizon+2020+eGovernment+Projects%3A+Building+a+Digital+Europe

50 https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/presentations/horizon_europe_en_investing_to_shape_our_future.pdf

3.4.5 REACT-EU

The NextGenerationEU budget not allocated to the RRF is dedicated to reinforcing several other existing EU programmes. Among these, REACT-EU (Recovery Assistance for Cohesion and the Territories of Europe) can benefit of the largest amount, consisting of EUR 50.6 billion. These are allocated to EU Member States on the basis of the socioeconomic impact of the COVID-19 crisis at national level[51] to support their transition towards and digital and green economy as well as in infrastructures providing basic public services to citizens.[52]

3.4.6 INVEST-EU

INVEST-EU is the EU's investment programme that will play a major role in kick-starting the EU economy by providing long-term funding to companies and helping mobilise private investments for projects that are aligned with key political priorities of the Commission, including the digital transition. Whilst the Programme amounts to EUR 26.2 billion (of which EUR 6.6 billion dedicated to research, innovation and digitalisation), with provisioning from the MFF and Next Generation EU resources, the overall investment to be mobilised on this basis is estimated at more than EUR 372 billion.[53]

3.4.7 Other structural programmes

Over half of EU funding is channelled through five European structural and investment funds (ESIF), jointly managed by the Commission and EU countries to invest in job creation and a sustainable European economy and environment. Among the five ESIFs, two are the ones supporting the digital transition. In particular, in 2021-2027, the European Regional Development Fund will contribute to the development of an inclusive digital society supporting initiatives such as the e-Government at national, regional and local level, as well as the building of high-speed digital infrastructures.

Finally, the European Social Fund is the EU's main instrument for investing in Europe's human capital, supporting workers, young people and people who look for job opportunities. The new European Social Fund Plus continues supporting actions in this direction and, in addition, helps tackling the socioeconomic consequences of the COVID-19 pandemic by reskilling and upskilling for the transition to a green and digital economy.

51 The impact of the COVID-19 crisis at national level is measured considering GDP drops, rise in unemployment and relative wealth of the country.

52 https://ec.europa.eu/regional_policy/en/newsroom/coronavirus-response/react-eu

53 https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_1045

Interview with Joao Rodrigues-Frade and Robert Czarny

Joao RODRIGUES-FRADE
Head of Sector
(Building Blocks Unit – DG DIGIT),
European Commission

Robert CZARNY
IT Product Officer – Blockchain / DLT Business Manager
(Building Block Unit – DG DIGIT),
European Commission

Based on your experience, how would you define the concept of digital government?

The answer to this question might reflect different views depending on the person who answers it. The European Blockchain Partnership programme (and the European Blockchain Services Infrastructure, EBSI, that the Partnership programme is establishing) defines 'digital government' as the progression from physical EU public administrations to online EU public administrations which are increasingly interconnected among one another. One of the goals of the EBSI's programme is particularly that of interconnecting public administrations, helping them make a better use of their data and become more user-centric and user friendly for citizens. This is a journey that the programme has been contributing to through the Building Blocks[1], helping public administrations put in place eGovernment platforms that are interoperable and based on open standards.

In your view, how is the role and definition of digital government going to change in the coming years, also in light of the current public health situation and the subsequent further boost to digital transformation?

The role and definition of digital government will absolutely change in the future; there is no way back. The question to keep in mind when working on governments' digitalisation is how to take into account the cross-border aspect of it as, so far, the main barrier for interoperability is the lack of cross-border standards at the EU level. Therefore, it is fundamental to foster interoperability along the digitalisation journey, rather than creating barriers.

In your view, has the current COVID-19 crisis impacted the further development and deployment of emerging disruptive technologies by public administrations in the EU? If so, how?

The COVID-19 crisis compressed the time of an evolution that was already happening. The pandemic reality boosted technological development, reducing the time needed by ten years, particularly for public administrations that are generally slower in adapting to developments in the digital field than the corporate world.

In your opinion, how can emerging disruptive technologies better and further support European public administrations in their digitalisation?

Blockchain can be seen as the 'black horse' of the technology race. Currently, on the highest hype there are AI and machine learning. However, Blockchain is a technology that can help other technologies grow (e.g., by putting boundaries to and framing AI algorithms). Blockchain is a complementary solution, a pillar that provides trust, transparency, scalability, and robustness. It helps to frame the rules of a given process or procedure with mathematical-cryptographical solutions.

Blockchain is a cross-domain technology with a cross-domain impact and complementary capability. Currently, Blockchain technology is already applied in the fields of digital identity, education, auditing information, tracing containers / batteries, genomics info sharing and sustainable energy, among others.

Indeed, Blockchain is not a remedy for everything, however, there are areas in which Blockchain is very good at providing value to end-to-end solutions for citizens. For instance, Blockchain is seen as simplifying the cross-border verification of information. Moreover, it is a sustainable solution for the future. However, it needs to become scalable to provide real value.

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1 A Building Block is an open and reusable digital solution that may take the shape of a framework, a standard, a software, or a software as a service, or any combination thereof. Building Blocks are endorsed by the European Commission to ensure that digital services are fully compatible with other on the market

04

Latest developments in digital public administration and interoperability in the world

Latest developments in digital public administration and interoperability in the world

The following chapter is to provide the readers with some insights on the most recent global initiatives developed since 2019 by international organisations such as the OECD, the United Nations, and the World Bank among others, to support countries in their digital transformation and in bridging the digital divide. The full list of sources used for the writing of this chapter can be found in Table 8, in the Appendix.

Digital transformation has been a priority for international organisations for many years now, but as already mentioned in previous chapters, the COVID-19 crisis accelerated this process. Indeed, this is reflected in the number of new or rescoped initiatives aimed at providing recommendations and guidance to governments ad public administrations on their road towards further digitalisation.

4.1 The impact of the COVID-19 crisis on public administrations in the world

As the COVID-19 pandemic spread around the globe, governments quickly had to adopt measures to contain the virus, flatten the curve of infected people and ensure that the healthcare systems would be able to cope with the situation. Lockdowns around the world implied severe economic consequences across sectors, countries, and societies. Life moved online, as employees started working from home, children were home-schooled and, whenever possible, companies reworked their business models to maintain processes and preserve revenues.

What the COVID-19 crisis has demonstrated is that affordable and reliable broadband access lies at the heart of our societies and economies, and that citizens and businesses worldwide are extremely reliant on digital infrastructures and services. Indeed, the OECD mentions in its Digital Economic Outlook that internet traffic in some countries increased by more than 60% after the outbreak of the pandemic. However, what the crisis also reinforced is the digital divide and digital gap that prevails between regions and countries around the globe. Indeed, according to the World Economic Forum's Digital Development Joint Action Plan, the crisis revealed that 50% of the world population is still excluded from broadband connectivity, and thus from digital technologies altogether. Among these least connected countries, 21 out of 25 are in Africa, where mobile broadband connectivity remains very expensive, and broadband penetration is quite limited. The crisis also put an additional strain on socially marginalised groups, such as rural communities, the disabled as well as women and girls who are often excluded from opportunities in the digital sphere. The crisis has thus demonstrated the importance of an inclusive digital transformation and widespread, reliable access to the internet and to emerging disruptive technologies, on which a successful recovery from the crisis would also depend on[54].

To ensure service continuity, governments around the world scaled up on digital infrastructure: artificial intelligence (AI) and automation have been increasingly used to automate manual tasks, to provide faster services or reduce human workload and social interactions[55]. In addition to AI, cloud solutions have been harnessed around the globe as government employees have been mandated to work remotely while they experienced a surge in service demand and new channels for digital service delivery became necessary[56]. Regions in which cloud technologies have already been initiated prior to the crisis have been greatly advantaged: in California, 90% of the state employees have been switching to teleworking smoothly, due to the region's previous efforts on pursuing cloud[57]. The adaption of cloud technology did not only facilitate employees' remote work but also supported the governments in reaching out to citizens more quickly, such as in Singapore, where bulk messages about critical updates on the pandemic were sent to citizens via the omnichannel cloud-based government communication tool[58], which provides various channels and possibilities for up-to-date communication between government authorities and citizens. Lastly, a digital architecture comprising the 'whole' government was developed in several countries by introducing government platforms, as in the UK.[59] These enables the sharing and exchange of digital solutions between different parts of the government. As a result, security is improved, public notification capacities increased and collaboration across state agencies intensified. The adoption of emerging disruptive technologies and tools are likely to remain even after the pandemic as indicated by government officials, stating, for example, that automation significantly improves their business[60].

54 OECD (2020), Digital Transformation in the Age of COVID-19: Building Resilience and Bridging Divides, Digital Economy Outlook 2020 Supplement, OECD, Paris, www.oecd.org/digital/digital-economy-outlook-covid.pdf.

55 Deloitte, Accelerated digital government – COVID-19 brings the next generation of digitization to government in *Government Trends 2021*, 2021.

56 Deloitte, Accelerated digital government – COVID-19 brings the next generation of digitization to government in *Government Trends 2021*, 2021.

57 Adam Stone, "2020 puts cloud computing in government to the test", Government Technology, September 2020.

58 Open Government Products, "Postman.gov.sg", accessed, 4 June 2021.

59 Deloitte, Accelerated digital government – COVID-19 brings the next generation of digitization to government in *Government Trends 2021*, 2021.

60 Deloitte, Accelerated digital government – COVID-19 brings the next generation of digitization to government in *Government Trends 2021*, 2021.

4.2 Key digital initiatives of the international organisations to foster digital transformation during and after the crisis

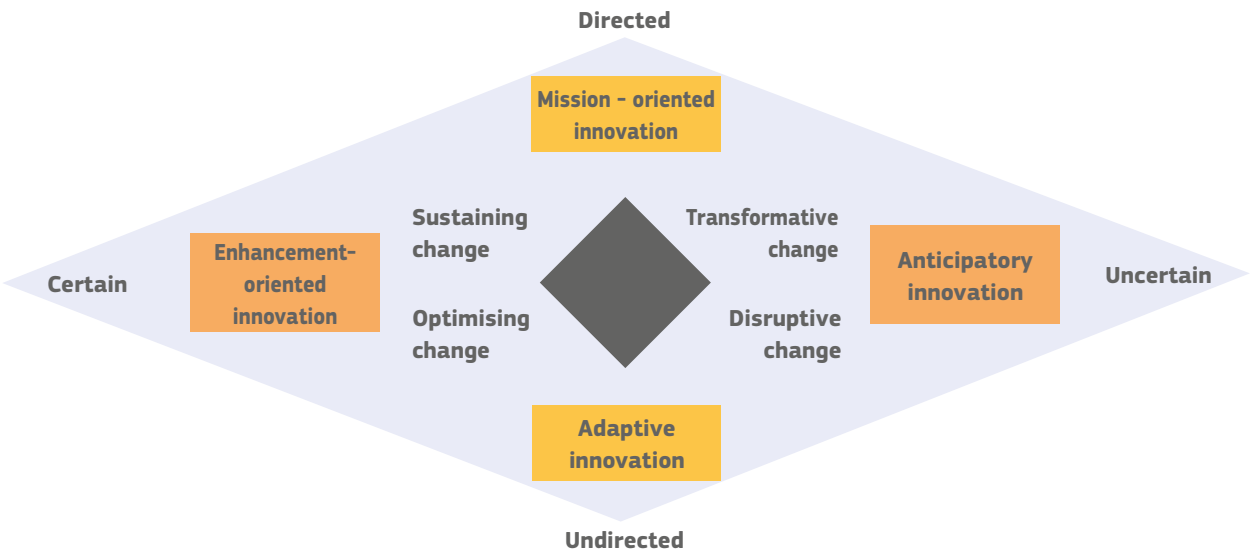
For international organisations, digital transformation has been a key priority for many years now, and various initiatives to promote the digitalisation of public services and the fostering of digital transformation among governments have been initiated. The COVID-19 crisis bolstered the importance of these initiatives and led to the emergence of new as well as to the re-specification of existing ones. International organisations such as the OECD and the UN are not only active in providing and developing initiatives and publications on the topic of digital transformation but have also created dedicated units within their organisation to focus on and promote digital transformation around the globe. Within the OECD, the OECD Directorate for Public Governance and the OECD Observatory for Public Sector Innovation (OPSI) department are of particular interest in relation to digital transformation of the public sector and digital government. In addition, the AI policy observatory provides information, data and a multi-disciplinary analysis on artificial intelligence including a dashboard of AI policy initiatives from over 60 countries. While within the UN, UN-DESA takes on the responsibility for digital government development, trainings and the UN University to promote digitalisation.

The following section lists and summarises initiatives, reports, roadmaps and publications of international organisations such as the OECD, the World Bank, the United Nations on the topics of digital transformation and digital government. These have been selected since 2019 and are chronologically ordered, listing the most recent first.

4.2.1 The COVID-19 crisis: A catalyst for government transformation

This OECD brief of November 2020 does not only summarise and contextualise government responses and government transformation in response to the COVID-19 pandemic, but also provides suggestions on how to aid government transformation. During the emergency period measures such as lockdowns and curfews proved necessary and led to a disruption in the regular rhythms of normal operations in our lives. In this context, the brief emphases the importance for governments to respond quickly, transparently and effectively, while also guaranteeing accountability, maintaining trust in public policies and actions in an effort to maintain both social and economic robustness. More specifically on new technologies, the brief mentions the importance of new online ways of communication, engagement and collaboration between governments and citizens and businesses, devoting particular attention to the issue of digital inclusiveness and participation**.** Indeed, the brief further states the importance for governments to ensure inclusiveness when it comes to innovation strategies to make sure these respond to citizens' needs and expectations, e.g. the constitution of Mexico City has been developed through a crowdsourcing experiment including digital, targeted and in-person processes to enhance achieve a representative participation of all residents. Similarly, in Paraguay a platform for participatory mapping of projects programs and needs related to the COVID-19 crisis has been build and promotes, articulates and strengthens the relationship between government and citizens and their cooperation in initiatives. Lastly, the brief introduces the Innovation Portfolio Approaches indicating that change comes from unexpected directions, as shown by the COVID-19 pandemic and its accelerating effects on the digital transformation of governments. The innovation portfolio approach rests on the assumption that four different types of innovation exist, as seen in the Figure 13 below and that one organisation can barely address all types of innovation.

Figure 13 The innovation portfolio approach



Source: Authors' own elaboration based on OECD (2020) The COVID-19 crisis: A catalyst for government transformation?

Based on the Public Sector Innovation Facets model, four facets of innovation have been identified, which differ in two core features, how directed the innovation process is and how certain it is:

- Enhancement-oriented innovation focuses on how things are done and how these activities, processes and government policies could be improved;
- Mission-oriented innovation is based on a driving ambition to achieve a defined objective or aim;
- Adaptive innovation essentially deals with the realisation that situations are not evolving as expected and how activities, processes or government policies need to be adapted;
- Anticipatory innovation entails how emerging possibilities and developments change what activities, processes or government policies could or should be.

Different types of changes emerge at the intersection of the facets of innovation. However, a multi-facetted innovation approach is essential for even and successful innovation of the public sector. Based on this, it is important to develop an ecosystem-wide perspective on innovation, thus ensuring strong relationships between government, society, and economy, so that governments could rely on the diverse innovation capabilities of the whole ecosystem to apply a multi-facetted innovation approach to be resilient in case of crisis, as seen with innovation during the COVID-19 pandemic.

4.2.2 INATBA Global Conversation on Standards, Governance and Interoperability

The International Association for Trusted Blockchain Applications (INATBA), initiated by the European Commission and launched in April 2019, provides developers and users of DLT a global forum to interact with regulators and policy makers. Its main goals are:

- Establish a permanent dialogue with public authorities and regulators;
- Promote open, transparent and inclusive global governance models for blockchain and DLT;
- Support the development and adoption of interoperability guidelines and global standards;
- Develop sector-specific guidelines and specifications.

On 28 May 2020 INATBA organised the Global Conversation on Standards, Governance and Interoperability aimed at discussing how blockchain and distributed ledger technology (DLT) ecosystems could collaborate more efficiently and productively to enhance digitalisation of governance around the globe. Global leaders participated in the online sessions, exchanging insights on how blockchain solutions may be used on governance level as supply chain operating system and how "*blockchain could become the operating system of the network economy*". Among others, China, India and Australia are already deploying blockchain solutions on different levels of the government. While China is promoting blockchain technologies on all government levels, Australia developed a roadmap for the introduction of blockchain in the Australian economy together with the industry and research sector. Blockchain technologies are for example applied in:

- The wine sector for the agricultural supply chains;
- The university sector for trusted credentials;
- The finance sector for transferable customer checks [61].

Finally, India is trying to leverage blockchain initiatives to promote trust, while curbing inefficiencies in the process of document verification and threat of inside jobs[62]. The conversation also covered the topic of interoperability in relation to blockchain and governance, reinforcing the importance of establishing standards for blockchain and DLT technologies.

4.2.3 COVID-19 Response: Digital Development Joint Action Plan and Call for Action

This document issued in April 2020 by the World Bank, the International Telecommunication Union (ITU), GSMA and World Economic Forum highlights that digital technologies provide the only way to ensure business continuity as well as the adequate provision of services and to cope with the measures introduces to combat the spread of the virus (e.g. social distancing) for businesses, individuals and governments. It provides recommended actions for telecommunication and critical infrastructure operators, as well as service providers, operating for instance in the health and financial sectors, to ensure agile responses to the crisis. The recommended actions are structured along five objectives:

61 Australian Government Department of Industry, Science, Energy and Resources (2020), National blockchain roadmap – progressing towards a blockchain-empowered future, available at: https://www.industry.gov.au/data-and-publications/national-blockchain-roadmap.

62 An inside job is a crime committed by or with the assistance of a person working on the premises where the crime occurred.

- Increasing bandwidth, strengthening resilience and security networks, and managing congestion;
- Connecting vital services and ensuring the continuity of public services to safeguard the welfare of populations;
- Powering FinTech and digital business models to support the most impacted businesses and communities;
- Promoting trust, security, and safety online;
- Leveraging the power of mobile big data.

Pursuing these objectives and structuring action along them will provide a good basis to promote and bring forward the use of digital technologies and to ensure agility and continuity in service delivery.

4.2.4 UN Secretary-General's Roadmap for Digital Cooperation

This roadmap published in 2020, which builds on recommendations made by the High-level Panel on Digital Cooperation, and input from Member States, the private sector, civil society, the technical community, as well as other stakeholder groups, presents a set of recommended actions for the international community to enhance global digital cooperation. The following eight areas have been identified as key areas to focus on:

- Achieving universal connectivity by 2030;
- Promoting digital public goods to create a more equitable world;
- Ensuring digital inclusion for all, including the most vulnerable;
- Strengthening digital capacity-building;
- Ensuring the protection of human rights in the digital era;
- Supporting global cooperation on artificial intelligence;
- Promoting trust and security in the digital environment;
- Building a more effective architecture for digital cooperation.

It is worth mentioning that the recommendations put forward in the roadmap are linked to several initiatives under the UNs' umbrella or in which the UN is participating alongside other international organisations, such as GIGA and the Global Connectivity Implementation Plan, among other. The roadmap states that actions within these areas are envisaged to accelerate digital cooperation globally, to seize the opportunities but mitigate risks collectively. It further emphasises that digital cooperation must be seen as multi-stakeholder effort and hence the involvement and participation of the private sector, technology companies, civil society as well as additional stakeholders is essential.

Taking a closer look at initiatives under the UN Secretary-General's Roadmap for Digital Cooperation

GIGA – Connecting every school to the internet

GIGA is an initiative by ITU and the UN's Children Fund (UNICEF) and has been launched in 2019 with the aim of providing connectivity to every school around the globe and providing every young person access to educational resources and opportunities. The initiative consists of four pillars: Map, Connect, Finance, and Empower. Since its inception, it has mapped over 800 000 schools, while more than 3 000 of them have been already connected throughout Kenya, Sierra Leone, Kazakhstan, Brazil, and Eastern Caribbean States until March 2021.

During the COVID-19 pandemic the initiative supported the immediate response to the pandemic and in particular its detrimental effects on education, economic stabilities as well as future opportunities and welfare in lower-income countries. These countries have been facing exacerbated challenges through their limited or non-existent infrastructure in relation to distance learning and the provision of essential services.

Global Connectivity Implementation Plan

Global Connectivity is an initiative by ITU and UNICEF, supported by the Office of the Secretary-General's Envoy on Technology to develop a baseline framework for universal and affordable digital connectivity, including:

- Proposed enablers of connectivity;
- Expected outcomes for each enabler for both the basic connectivity stage and the meaningful connectivity stage;
- Possible indicators to measure outcomes.

The initiative indicates that these points facilitate and support a detailed and outcome-oriented analysis of the state of play and enables the setting of ambitious but feasible targets for 2030.

4.2.5 The Age of Digital Interdependence

The UN Secretary-General High-Panel on Digital Cooperation aims at fostering digital cooperation among governments, private sector, civil society and international organisations, academic institutions, and technical communities. Its final report, The Age of Digital Interdependence, has been issued in June 2019 and includes several recommendations to optimise the adoption of digital technologies, their use and how to mitigate potential related risks in the international community. Recommendations are clustered around five topics:

- Build an inclusive digital economy and society focusing around global connectivity, digital public goods, and digital inclusion;
- Develop human and institutional capacity, including digital capacity building;
- Protect human rights and human agency, looking at digital human rights in relation to data protection, privacy, and a digital identity as well as surveillance technologies, online harassment and violence but also taking into account developments on artificial intelligence and its users' agency and safety;
- Promote digital trust, security, and stability;
- Foster global digital cooperation.

Additionally, in early 2021 the Office of the Secretary-General's Envoy on Technology has been established. The Office is meant to take the leading role in facilitating a multi-stakeholder dialogue on emerging technologies as well as to advise stakeholders of the international community on key technological trends, to guide the strategic approach of the United Nations to foster digital transformation and to serve as advocate and centre for digital cooperation.

4.2.6 The Path to Becoming a Data-Driven Public Sector

This OECD publication from 2019 outlines the role data can play in the digitalisation process of governments and societies, and how the use of data has increased by several governments, despite challenges such as skills shortfalls, legacy technologies and legal obstacles. While it emphasises the importance of data it also mentions that data has not yet been used or viewed as fundamental to create public value. The publication outlines the key features of a data-driven public sector as:

- Recognising data as important strategic asset with defined value and measured impacts;
- Supporting the removal of barriers to managing, sharing and re-using data;
- Using data for design, delivery and monitoring of public policies and services;
- Promoting open publication of data as well as the use of data within and across public sector authorities and organisations.

Overall, the report emphasises the importance of taking a whole-of-government approach to develop a data governance model and proposes a model of a 'data-driven public sector' to maximise the value added and opportunities brought by today's data.

4.2.7 State of the art in the use of emerging technologies in the public sector

This OECD Working Paper published in 2019, highlights the main challenges and opportunities of emerging technologies in the public sector. Analysing evidence from 20 countries it provides insights on strategies and practices on how emerging technologies are integrated in the public sector around the globe. It emerges that AI and blockchain technologies yield considerable potential and opportunities for the public sector to ensure agility, efficiency, user-friendliness and trustworthiness. However, while governments made progress in using emerging technologies to better meet public-service users' needs, they still face considerable challenges in leveraging them for public sector purposes. These can be classified into three main groups:

- Technical and practical challenges, e.g. availability of quality data or missing standards;
- Resource and capacity constraints, e.g. low digital literacy and skills in the public sector or misallocation of investment and funding;
- Institutional, legal and cultural barriers, e.g. insufficient institutional and political buy-in or regulatory gaps

The working paper stresses the importance of adopting a systematic and 'whole-of-government' approach to successfully approach digital transformation in the public sector. Additionally, it recommends promoting synergies across public organisations and collaboration with the private sector to reassess existing legal and regulatory frameworks and establish suitable governance frameworks

05

Appendix

Appendix

Table 2 Overview of the EIF Monitoring Mechanism Model for Scoreboard 1 – the 12 Principles

SCOREBOARD 1 - TWELVE PRINCIPLES				
Thematic area	**Recommendation**	**Recommendation text**	**KPI**	**KPI text**
Principle 1 - Subsidiarity and Proportionality	Rec. 01	Ensure that national interoperability frameworks and interoperability strategies are aligned with the EIF and, if needed, tailor and extend them to address the national context and needs.	KPI 01	Extent to which strategies or frameworks take the EIF into account
Principle 2 - Openness	Rec. 02	Publish the data you own as open data unless certain restrictions apply.	KPI 02	Open data maturity
			KPI 03	Existence of national guidelines to assist data providers in their publication process
			KPI 05	Number of open datasets published by Member States
			KPI 72	Status of implementation of the INSPIRE Directive
	Rec. 03	Ensure a level playing field for open source software and demonstrate active and fair consideration of using open source software, taking into account the total cost of ownership of the solution.	KPI 06	Active consideration of the use of open source software when developing new IT solutions, account for it in the total cost of ownership of the IT solution
	Rec. 04	Give preference to open specifications, taking due account of the coverage of functional needs, maturity and market support and innovation.	KPI 07	Promotion of the use of open specification to public administrations
Principle 3 - Transparency	Rec. 05	Ensure internal visibility and provide external interfaces for European public services.	KPI 08	Extent to which a Member States is meeting the requirements set by the Single Digital Gateway Regulation on the online availability and accessibility of the administrative procedures
Principle 4 - Reusability	Rec. 06	Reuse and share solutions, and cooperate in the development of joint solutions when implementing European public services.	KPI 09	Extent to which Member States apply the recommended measures for central bodies of the European Sharing and Reuse Framework to check the reuse of existing IT solutions before developing a new one
			KPI 10	Existence of collaborative platforms in each Member State that facilitate the reuse, sharing and development of IT solutions (e.g. open source software, semantic assets)
	Rec. 07	Reuse and share information and data when implementing European public services, unless certain privacy or confidentiality restrictions apply.	KPI 11	Existence of an Open Data portal (extent to which data can easily be found at one central place for reuse purposes)
			KPI 12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector
			KPI 13	Reuse of Open Data in decision making
			KPI 14	Instance of national, regional or local events (e.g. hackathons or other Open Data events) held annually to promote Open Data and PSI reuse (organised by public, private or third sector organisations)
			KPI 15	Existence of monitoring activities to measure the re-use of the own open data of the Member States.
			KPI 16	Existence of specific activities to support for the reuse of Open Data
			KPI 17	Existence of specific communication activities to promote national Portal or Open Data in general
			KPI 18	Existence of references of the reuse of Open Data in your National Open Data portal
Principle 5 - Technological neutrality and data portability	Rec. 08	Do not impose any technological solutions on citizens, businesses and other administrations that are technology-specific or disproportionate to their real needs	KPI 19	Extent to which citizens and businesses are free to adopt technologies or IT products that are most appropriate for their needs when accessing or reusing public services
	Rec. 09	Ensure data portability, namely that data is easily transferable between systems and applications supporting the implementation and evolution of European public services without unjustified restrictions, if legally possible.	KPI 20	Extent to which data is easily transferable between systems and applications
Principle 6 - User-centricity	Rec. 10	Use multiple channels to provide the European public service, to ensure that users can select the channel that best suits their needs.	KPI 21	Internet use - Interaction with public authorities
			KPI 22	Digital Public Services Dimension comprising of eGovernment (DESI_5_DPS)
			KPI 23	Mobile Friendliness
	Rec. 11	Provide a single point of contact in order to hide internal administrative complexity and facilitate users' access to European public services.	KPI 24	Existence of a single points of contacts in the areas of information relevant for citizens and businesses
	Rec. 12	Put in place mechanisms to involve users in analysis, design, assessment and further development of European public services.	KPI 25	Existence of a customer-centric approach to design and deliver public services used by public administrations

SCOREBOARD 1 - TWELVE PRINCIPLES				
Thematic area	**Recommendation**	**Recommendation text**	**KPI**	**KPI text**
Principle 6 - User-centricity	Rec. 13	As far as possible under the legislation in force, ask users of European public services once-only and relevant-only information.	KPI 26	Extent to which the five major Base Registries (Population, Vehicle, Tax, Land, Business) are available for reuse in digital public services
			KPI 27	Usage of authentic sources
Principle 7 - Inclusion and accessibility	Rec. 14	Ensure that all European public services are accessible to all citizens, including persons with disabilities, the elderly and other disadvantaged groups. For digital public services, public administrations should comply with e-accessibility specifications that are widely recognised at European or international level.	KPI 28	Compliance with the European accessibility standards of the Directive on the accessibility of the websites and mobile applications of public -sector bodies
Principle 8 - Security and privacy	Rec. 15	Define a common security and privacy framework and establish processes for public services to ensure secure and trustworthy data exchange between public administrations and in interactions with citizens and businesses.	KPI 29	Level of security and privacy defined for public authorities
Principle 9 - Multilingualism	Rec. 16	Use information systems and technical architectures that cater for multilingualism when establishing a European public service. Decide on the level of multilingualism support based on the needs of the expected users.	KPI 30	Extent to which users of each of the 21 proposed procedures across the 7 life events of the Single Digital Gateway initiative are able to access instructions for completing the procedure in an official EU language broadly understood by the largest possible number of cross-border users
			KPI 31	Cross-border Mobility for life event 'Regular business operations'
			KPI 32	Cross-border Mobility for life event 'General administration: moving'
			KPI 33	Total number of language resources in different Member States
Principle 10 - Administrative simplification	Rec. 17	Simplify processes and use digital channels whenever appropriate for the delivery of European public services, to respond promptly and with high quality to users' requests and reduce the administrative burden on public administrations, businesses and citizens.	KPI 34	Online Availability - User Centricity
			KPI 35	User Centricity for citizen and business life events
			KPI 36	Online Availability - Citizen cross border mobility
			KPI 37	Online Availability - Business cross border mobility
Principle 11 - Preservation of information	Rec. 18	Formulate a long-term preservation policy for information related to European public services and especially for information that is exchanged across borders.	KPI 38	Existence of long-term preservation policy for information owned and management by public administrations
Principle 12 - Assessment of Effectiveness and Efficiency	Rec. 19	Evaluate the effectiveness and efficiency of different interoperability solutions and technological options considering user needs, proportionality and balance between costs and benefits.	KPI 39	Extent to which public administrations evaluate the efficiency and effectiveness of interoperability solutions

Table 3 Overview of the EIF Monitoring Mechanism Model for Scoreboard 2 – the layers

SCOREBOARD 2 - INTEROPERABILITY LAYERS				
Thematic area	**Recommendation**	**Recommendation text**	**KPI**	**KPI text**
Interoperability governance	Rec. 20	Ensure holistic governance of interoperability activities across administrative levels and sectors.	KPI 40	Existence of holistic governance of interoperability activities across all administrative levels (local, regional and national) and sectors
	Rec. 21	Put in place processes to select relevant standards and specifications, evaluate them, monitor their implementation, check compliance and test their interoperability.	KPI 41	Existence of defined processes for the selection and adoption of standards and specifications
	Rec. 22	Use a structured, transparent, objective and common approach to assessing and selecting standards and specifications. Take into account relevant EU recommendations and seek to make the approach consistent across borders.	KPI 42	Extent to which administrations are managing ICT standards and specifications to ensure interoperability
			KPI 43	Existence of a CAMSS or similar assessment method for standard and specification at Member State level
	Rec. 23	Consult relevant catalogues of standards, specifications and guidelines at national and EU level, in accordance with your NIF and relevant DIFs, when procuring and developing ICT solutions.	KPI 44	Use of ICT Catalogues
	Rec. 24	Actively participate in standardisation work relevant to your needs to ensure your requirements are met.	KPI 45	Instance of participation in standardisation works
Integrated public service governance	Rec. 25	Ensure interoperability and coordination over time when operating and delivering integrated public services by putting in place the necessary governance structure.	KPI 46	Extent to which a governance structure for the provision of public services is implemented
	Rec. 26	Establish interoperability agreements in all layers, complemented by operational agreements and change management procedures.	KPI 47	Existence of interoperability agreements through which public administrations cooperate with each-other

SCOREBOARD 2 – INTEROPERABILITY LAYERS				
Thematic area	**Recommendation**	**Recommendation text**	**KPI**	**KPI text**
Legal interoperability	Rec. 27	Ensure that legislation is screened by means of 'interoperability checks', to identify any barriers to interoperability. When drafting legislation to establish a European public service, seek to make it consistent with relevant legislation, perform a 'digital check' and consider data protection requirements.	KPI 48	Extent to which ICT is taken into account when preparing new legislation
Organisational interoperability	Rec. 28	Document your business processes using commonly accepted modelling techniques and agree on how these processes should be aligned to deliver a European public service.	KPI 49	Existence of modelling techniques to document business processes to deliver public services
	Rec. 29	Clarify and formalise your organisational relationships for establishing and operating European public services.	KPI 50	Extent to which organisational relationships between providers and consumers are formalised
Semantic interoperability	Rec. 30	Perceive data and information as a public asset that should be appropriately generated, collected, managed, shared, protected and preserved.	KPI 12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector
	Rec. 31	Put in place an information management strategy at the highest possible level to avoid fragmentation and duplication. Management of metadata, master data and reference data should be prioritised.	KPI 51	Existence of metadata, master data and reference data management policies
			KPI 52	Existence of agreements on reference data in the form of taxonomies, controlled vocabularies, thesauri, code lists and reusable data structure/models to achieve semantic interoperability
	Rec. 32	Support the establishment of sector-specific and cross-sectoral communities that aim to create open information specifications and encourage relevant communities to share their results on national and European platforms.	KPI 53	Existence of sector-specific and/or cross-sectoral communities exist in fields affected by interoperability
Technical interoperability	Rec. 33	Use open specifications, where available, to ensure technical interoperability when establishing European public services.	KPI 07	Promotion of the use of open specifications to public administrations

Table 4 Overview of the EIF Monitoring Mechanism Model for Scoreboard 3 – the conceptual model

SCOREBOARD 3 – CONCEPTUAL MODEL				
Thematic area	**Recommendation**	**Recommendation text**	**KPI**	**KPI text**
Conceptual Model	Rec. 34	Use the conceptual model for European public services to design new services or reengineer existing ones and reuse, whenever possible, existing service and data components.	KPI 54	Extent to which public administrations take into account the conceptual model proposed by the EIF
	Rec. 35	Decide on a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining European public services.	KPI 55	Existence of a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining public services
Internal information sources and services	Rec. 36	Develop a shared infrastructure of reusable services and information sources that can be used by all public administrations.	KPI 56	Existence of a shared infrastructure of reusable services and information sources that can be used by all public administrations
Base Registries	Rec. 37	Make authoritative sources of information available to others while implementing access and control mechanisms to ensure security and privacy in accordance with the relevant legislation.	KPI 26	Extent to which the five major Base Registries (Population, Vehicle, Tax, Land, Business) are available for reuse in digital public services
			KPI 57	Extent to which public administrations make authoritative sources of information available to others public administrations
	Rec. 38	Develop interfaces with base registries and authoritative sources of information, publish the semantic and technical means and documentation needed for others to connect and reuse available information.	KPI 26	Extent to which the five major Base Registries (Population, Vehicle, Tax, Land, Business) are available for reuse in digital public services
			KPI 58	Existence of agreements on reference data in the form of taxonomies, controlled vocabularies, thesauri, code lists and reusable data structure/models to achieve semantic interoperability of the Base registries
	Rec. 39	Match each base registry with appropriate metadata including the description of its content, service assurance and responsibilities, the type of master data it keeps, conditions of access and the relevant licences, terminology, a glossary, and information about any master data it uses from other base registries.	KPI 59	Existence of registry of Base Registries
			KPI 51	Existence of metadata, master data and reference data management policies
	Rec. 40	Create and follow data quality assurance plans for base registries and related master data.	KPI 60	Extent to which base registries draw up and implement a data quality assurance plan to ensure the quality of their data
			KPI 61	Existence of a master data management and Quality Assurance (QA) plans for one or more of the five major Base Registries: Population, Vehicle, Tax, Land, Business

SCOREBOARD 3 - CONCEPTUAL MODEL				
Thematic area	**Recommen-dation**	**Recommendation text**	**KPI**	**KPI text**
Open Data	Rec. 41	Establish procedures and processes to integrate the opening of data in your common business processes, working routines, and in the development of new information systems.	KPI 62	Extent to which procedures and processes are defined to integrate opening of data in common business processes, working routines, and in the development of new information systems
	Rec. 42	Publish open data in machine-readable, non-proprietary formats. Ensure that open data is accompanied by high quality, machine-readable metadata in non-proprietary formats, including a description of their content, the way data is collected and its level of quality and the licence terms under which it is made available. The use of common vocabularies for expressing metadata is recommended.	KPI 63	Extent to which each Member State is DCAT-AP compliant
			KPI 64	Existence of a national plan to improve the quality of the (meta)data in the coming 12 months
			KPI 65	Proportion of the data available in machine readable format
	Rec. 43	Communicate clearly the right to access and reuse open data. The legal regimes for facilitating access and reuse, such as licences, should be standardised as much as possible.	KPI 12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector
			KPI 69	Existence of national guidelines or tools to assist publishers in choosing an appropriate licence for their data
Catalogues	Rec. 44	Put in place catalogues of public services, public data, and interoperability solutions and use common models for describing them.	KPI 70	Existence of catalogues of public services, public data and interoperability solutions
			KPI 71	Use of common models/standards/specifications for describing catalogues of public services, public data and interoperability solutions
External information sources and services	Rec. 45	Where useful and feasible to do so, use external information sources and services while developing European public services.	KPI 66	Extent to which public administrations are using external information sources and services while developing public services
Security and Privacy	Rec. 46	Consider the specific security and privacy requirements and identify measures for the provision of each public service according to risk management plans.	KPI 67	Application of privacy and security principles
	Rec. 47	Use trust services according to the Regulation on eID and Trust Services as mechanisms that ensure secure and protected data exchange in public services.	KPI 68	Number of trust services providers by country

Table 5 2020 results for European countries for Scoreboard 1

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Principle 1 - Subsidiarity and Proportionality	1	Extent to which strategies or frameworks take the EIF into account	3	3	4	3	3	1	4	4	4	4	3	3	3	3	3	4	3	4	3	3	4	3	3	4	4	4	4	4	3	3	3	4	4	3	3	4
Principle 2 - Openness	2	Open data maturity	4	4	2	4	4	4	3	4	4	4	4	4	4	1	-	4	4	4	1	4	2	1	-	4	-	1	4	1	3	1	4	4	4	1	-	4
	3	Existence of national guidelines to assist data providers in their publication process	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	4	-	4	-	4	4	4	4	4	4	4	4	4	-	4
	5	Number of open datasets published by Member States	2	4	4	1	2	1	4	4	2	1	4	4	1	1	1	2	3	3	4	3	4	2	1	4	1	2	2	3	1	3	2	3	3	4	1	1
	72	Status of implementation of the INSPIRE Directive	3	4	4	3	2	2	3	3	4	2	1	3	3	1	2	3	1	2	1	4	4	3	-	3	-	2	2	3	3	2	3	4	4	1	-	-
	6	Active consideration of the use of open source software when developing new IT solutions, account for it in the total cost of ownership of the IT solution	4	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	1	1	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4
	7	Promotion of the use of open specification to public administrations	4	4	4	4	4	4	4	4	4	4	4	-	4	4	-	4	-	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Principle 3 - Transparency	8	Extent to which a Member States is meeting the requirements set by the Single Digital Gateway Regulation on the online availability and accessibility of the administrative procedures	4	4	3	4	4	3	3	4	4	-	3	-	4	4	-	4	2	3	4	4	4	4	1	-	4	4	3	3	2	4	3	4	4	4	4	4
Principle 4 - Reusability	9	Extent to which Member States apply the recommended measures for central bodies of the European Sharing and Reuse Framework to check the reuse of existing IT solutions before developing a new one	3	3	3	3	3	1	2	4	4	3	2	-	3	4	3	3	3	4	3	3	3	2	3	4	3	4	3	3	2	4	3	4	3	2	2	3
	10	Existence of collaborative platforms in each Member State that facilitate the reuse, sharing and development of IT solutions (e.g. open source software, semantic assets)	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	1	4	4	1	4	4	1	4	4	4	-	4	4	4	4	4	1	4
	11	Existence of an Open Data portal (extent to which data can easily be found at one central place for reuse purposes)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	4	-	4	-	4	4	4	4	4	4	4	4	4	-	4
	12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector	4	4	4	4	4	4	1	4	4	4	4	4	4	4	-	4	4	4	4	4	1	4	-	4	-	4	4	1	1	4	4	4	4	4	-	4
	13	Reuse of Open Data in decision making	4	4	4	4	4	4	1	4	4	4	4	4	4	4	-	4	4	4	1	4	1	1	-	4	-	4	4	1	4	4	4	4	4	1	-	4

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Principle 4 - Reusability	14	Instance of national, regional or local events (e.g. hackathons or other Open Data events) held annually to promote Open Data and PSI reuse (organised by public, private or third sector organisations)	3	4	3	3	3	3	4	4	4	4	4	4	3	2	-	4	4	4	1	3	2	1	-	4	-	3	4	2	3	3	3	4	4	3	-	4
	15	Existence of monitoring activities to measure the re-use of the own open data of the Member States.	4	4	4	4	4	1	4	4	4	4	4	4	4	1	-	4	4	4	1	4	4	1	-	4	-	1	4	1	1	1	4	4	4	1	-	1
	16	Existence of specific activities to support for the reuse of Open Data	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	4	4	4	4	-	4	-	4	4	1	1	4	4	4	4	4	-	4
	17	Existence of specific communication activities to promote national Portal or Open Data in general	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	4	-	4	-	4	4	4	4	4	4	4	4	4	-	4
	18	Existence of references of the reuse of Open Data in your National Open Data portal	4	4	4	4	4	4	1	4	4	4	4	4	4	1	-	4	4	4	1	4	4	1	-	4	-	1	4	4	4	4	4	4	4	4	-	4
Principle 5 - Technological neutrality and data portability	19	Extent to which citizens and businesses are free to adopt technologies or IT products that are most appropriate for their needs when accessing or reusing public services	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	20	Extent to which data is easily transferable between systems and applications	3	3	3	3	3	3	4	3	3	3	3	3	3	3	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	4	3	3	3	4
Principle 6 - User-centricity	21	Internet use - Interaction with public authorities	3	3	3	2	2	3	3	4	4	4	-	3	3	3	4	3	-	4	-	3	3	3	2	4	-	4	2	2	1	3	3	3	4	-	3	-
	22	Digital Public Services Dimension comprising of eGovernment (DESI_5_DPS)	3	4	3	3	3	3	3	4	4	4	4	3	3	3	1	4	3	4	1	4	3	4	1	4	1	1	3	3	2	3	3	4	4	1	1	1
	23	Mobile Friendliness	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	-	3	4	4	2	4	4	4	4	4	3	4	4	4	4	4	4	-
	24	Existence of a single points of contacts in the areas of information relevant for citizens and businesses	4	4	3	3	3	4	4	4	4	4	-	2	3	4	3	4	1	4	-	4	4	4	2	-	2	4	3	4	2	4	4	4	4	-	3	1
	25	Existence of a customer-centric approach to design and deliver public services used by public administrations	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	4	4	4	4	4	-	4	4	4	4	4	4
	26	Extent to which the five major Base Registries (Population, Vehicle, Tax, Land, Business) are available for reuse in digital public services	4	3	4	4	4	4	3	4	4	4	3	-	4	4	3	4	4	4	1	4	4	4	3	4	3	4	4	4	4	4	4	3	4	3	4	4
	27	Usage of authentic sources	3	3	3	3	2	2	2	4	4	4	2	2	2	3	4	3	3	4	-	4	3	4	1	4	4	4	3	3	1	2	3	4	3	1	3	-
Principle 7 - Inclusion and accessibility	28	Compliance with the European accessibility standards of the Directive on the accessibility of the websites and mobile applications of public -sector bodies	3	1	3	3	3	3	3	3	3	3	2	3	-	3	3	3	3	3	3	3	3	3	-	3	3	3	3	3	3	3	3	4	-	4	3	4
Principle 8 - Security and privacy	29	Level of security and privacy defined for public authorities	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Principle 9 - Multilingualism	30	Extent to which users of each of the 21 proposed procedures across the 7 life events of the Single Digital Gateway initiative are able to access instructions for completing the procedure in an official EU language broadly understood by the largest possible number of cross-border users	3	3	-	2	4	3	3	4	4	-	-	-	1	3	-	4	-	4	2	3	4	4	2	-	-	4	2	-	3	2	3	3	3	-	3	-
	31	Cross-border Mobility for life event 'Regular business operations'	3	3	4	3	3	4	4	3	4	4	3	4	2	3	3	3	4	4	-	3	4	4	1	3	1	3	2	3	1	4	2	4	3	3	2	-
	32	Cross-border Mobility for life event 'General administration: moving'	3	3	3	2	2	3	3	3	3	4	4	3	2	1	4	3	3	3	-	2	3	4	2	3	1	3	2	3	2	2	3	3	3	2	3	-
	33	Total number of language resources in different Member States	3	3	1	2	1	4	3	3	1	2	3	4	4	4	1	2	3	4	-	4	1	1	-	2	-	1	3	1	4	1	1	4	4	-	-	-
Principle 10 - Administrative simplification	34	Online Availability - User Centricity	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	3	4	3	4	4	4	3	4	4	4	4	4	4	-
	35	User Centricity for citizen and business life events	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	3	4	3	4	4	4	3	4	4	4	4	4	4	-
	36	Online Availability - Citizen cross border mobility	3	4	3	2	2	3	3	3	4	4	3	3	2	1	3	4	3	4	1	3	4	4	2	4	1	4	2	3	1	2	3	3	4	2	3	-
	37	Online Availability - Business cross border mobility	4	3	3	4	2	4	3	4	4	4	4	4	1	3	4	4	4	3	-	4	4	4	2	3	2	4	2	3	1	3	3	4	4	4	1	-
Principle 11 - Preservation of information	38	Existence of long-term preservation policy for information owned and management by public administrations	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	4	4	4	4	4	4	-	4	4	4	4	4	4	1	4	4	4	4	1	4	4
Principle 12 - Assessment of Effectiveness and Efficiency	39	Extent to which public administrations evaluate the efficiency and effectiveness of interoperability solutions	3	4	3	3	3	4	3	4	3	3	4	-	2	3	2	1	2	4	2	4	4	3	4	4	3	4	3	3	2	3	4	2	1	-	4	3

Table 6 2020 results for European countries for Scoreboard 2

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Interoperability governance	40	Existence of holistic governance of interoperability activities across all administrative levels (local, regional and national) and sectors	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	1	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	-	4	4
	41	Existence of defined processes for the selection and adoption of standards and specifications	4	4	4	4	-	4	4	4	4	4	4	4	4	4	4	1	4	4	4	1	4	4	1	4	4	4	4	4	4	4	4	4	4	4	4
	42	Extent to which administrations are managing ICT standards and specifications to ensure interoperability	3	4	3	3	4	4	4	4	3	3	3	2	3	3	1	1	4	3	2	2	4	4	4	4	3	4	2	3	2	4	3	2	1	2	3	3
	43	Existence of a CAMSS or similar assessment method for standard and specification at Member State level	1	1	1	4	1	4	4	1	4	-	1	1	1	1	-	4	-	1	-	1	4	1	1	4	1	1	-	-	-	4	1	4	1	-	4	-
	44	Use of ICT Catalogues	3	3	3	3	3	3	3	-	2	2	1	1	3	3	-	4	2	2	1	1	4	3	3	1	3	3	1	1	1	3	1	3	1	2	1	3
	45	Instance of participation in standardisation works	3	2	3	2	2	4	3	4	3	3	3	3	-	4	-	1	4	3	1	1	4	2	4	4	2	4	3	2	2	2	4	4	4	-	3	1
Integrated public service governance	46	Extent to which a governance structure for the provision of public services is implemented	4	4	2	4	4	4	4	4	3	3	4	4	4	4	2	3	4	4	2	3	4	2	4	4	3	3	3	2	2	4	4	3	4	3	4	3
	47	Existence of interoperability agreements through which public administrations cooperate with each-other	4	4	4	4	4	4	4	4	4	4	-	4	4	4	-	4	4	4	4	4	4	4	4	4	4	4	4	4	1	4	4	4	4	4	4	4
Legal interoperability	48	Extent to which ICT is taken into account when preparing new legislation	4	4	3	4	4	1	4	4	4	3	3	4	4	4	3	1	3	4	4	4	4	4	3	4	4	3	4	4	4	3	4	4	3	2	-	4	4
Organisational interoperability	49	Existence of modelling techniques to document business processes to deliver public services	4	4	4	4	4	4	4	4	4	1	4	4	4	4	-	1	4	4	4	4	4	4	1	4	1	4	4	1	4	4	4	4	4	-	4	4
	50	Extent to which organisational relationships between providers and consumers are formalised	3	3	3	4	3	3	3	3	3	4	3	4	3	4	3	4	4	3	3	3	3	3	3	3	4	3	4	3	3	3	3	3	3	3	3	4
Semantic interoperability	12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector	4	4	4	4	4	4	1	4	4	4	4	4	4	4	-	4	4	4	4	4	1	4	-	4	-	4	4	1	1	4	4	4	4	4	-	4
	51	Existence of metadata, master data and reference data management policies	3	1	3	4	1	2	2	4	3	1	2	-	2	4	-	3	4	2	4	2	4	1	3	4	-	4	2	2	3	4	4	3	1	-	4	4
	52	Existence of agreements on reference data in the form of taxonomies, controlled vocabularies, thesauri, code lists and reusable data structure/models to achieve semantic interoperability	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	1	4	4	-	1	4	4	1	4	4	1	4	4	-	4	4	4	4	-	4	4
	53	Existence of sector-specific and/or cross-sectoral communities exist in fields affected by interoperability	4	4	4	4	4	-	4	4	4	4	4	-	-	4	4	4	-	4	4	1	4	4	4	4	1	4	-	-	-	4	4	4	4	1	4	4
Technical interoperability	7	Promotion of the use of open specifications to public administrations	4	4	4	4	4	4	4	4	4	4	4	-	4	4	-	4	-	4	1	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

Table 7 2020 results for European countries for Scoreboard 3

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Conceptual Model	54	Extent to which public administrations take into account the conceptual model proposed by the EIF	4	4	3	4	4	4	3	4	4	4	3	3	4	4	1	1	4	4	4	4	1	4	4	1	3	4	3	3	3	4	4	4	4	2	4	4
	55	Existence of a common scheme for interconnecting loosely coupled service components and put in place and maintain the necessary infrastructure for establishing and maintaining public services	4	4	4	4	1	-	4	4	4	1	4	-	4	4	-	1	4	4	4	4	1	4	4	4	4	4	4	-	4	4	4	4	1	4	4
Internal information sources and services	56	Existence of a shared infrastructure of reusable services and information sources that can be used by all public administrations	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1	4	4	4	4	4	4	4	4	4	4	1	4	1	4	4	4	4	4	4	4
Base Registries	26	Availability of Base Registries for reuse	4	3	4	4	4	4	3	4	4	4	3	-	4	4	3	4	4	4	1	4	4	4	3	4	3	4	4	4	4	4	4	3	4	3	4	4
	57	Extent to which public administrations make authoritative sources of information available to others public administrations	4	4	4	4	4	4	4	4	4	4	4	-	4	3	2	4	3	4	4	4	4	3	3	4	4	4	4	4	4	4	3	4	3	4	3
	26	Extent to which the five major Base Registries (Population, Vehicle, Tax, Land, Business) are available for reuse in digital public services	4	3	4	4	4	4	3	4	4	4	3	-	4	4	3	4	4	4	1	4	4	4	3	4	3	4	4	4	4	4	4	3	4	3	4	4
	58	Existence of agreements on reference data in the form of taxonomies, controlled vocabularies, thesauri, code lists and reusable data structure/models to achieve semantic interoperability of the Base registries	4	4	-	3	1	4	4	4	4	4	4	-	1	4	1	1	1	4	4	4	4	3	-	4	3	4	-	3	1	4	4	3	4	2	4	4
	59	Existence of registry of Base Registries	4	1	4	4	4	4	4	4	4	4	4	-	-	4	1	1	-	4	4	4	4	4	4	4	1	4	4	1	4	4	1	4	1	4	4	4
	51	Existence of metadata, master data and reference data management policies	3	1	3	4	1	2	2	4	3	1	2	-	2	4	-	3	4	2	4	2	4	1	3	4	-	4	2	2	3	4	4	3	1	-	4	4
	60	Extent to which base registries draw up and implement a data quality assurance plan to ensure the quality of their data	3	3	3	3	3	3	4	4	3	4	3	-	3	3	2	1	3	3	3	3	4	3	3	4	3	4	3	3	3	3	3	3	3	3	3	4
	61	Existence of a master data management and Quality Assurance (QA) plans for one or more of the five major Base Registries: Population, Vehicle, Tax, Land, Business	4	4	-	4	1	4	4	4	4	4	-	-	4	4	-	1	-	4	4	4	4	4	4	4	4	4	4	4	1	-	4	4	4	-	4	4

Thematic area	KPI n°	KPI	European Average	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy	Latvia	Liechtenstein	Lithuania	Luxembourg	Malta	Montenegro	Netherlands	North Macedonia	Norway	Poland	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Switzerland	Turkey	Ukraine
Open Data	62	Extent to which procedures and processes are defined to integrate opening of data in common business processes, working routines, and in the development of new information systems	4	4	4	4	-	4	4	4	4	-	4	-	4	4	4	4	4	4	1	4	4	4	4	4	4	4	4	1	1	4	4	4	4	-	1	4
	63	Extent to which each Member State is DCAT-AP compliant	4	4	4	1	4	4	4	4	4	4	4	4	4	1	-	4	3	4	1	4	4	4	-	4	-	4	2	4	3	4	4	3	4	3	-	4
	64	Existence of a national plan to improve the quality of the (meta)data in the coming 12 months	4	4	1	1	4	4	4	4	4	4	4	1	4	1	-	4	4	1	1	4	1	4	-	4	-	1	4	1	4	4	4	4	4	4	-	4
	65	Proportion of the data available in machine readable format	3	4	4	2	4	3	4	4	3	3	3	3	3	3	-	4	4	4	1	3	4	4	-	4	-	4	3	3	3	3	3	3	4	3	-	1
	3	Existence of national guidelines on the publication of Public Sector Information	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	4	-	4	-	4	4	4	4	4	4	4	4	4	-	4
	12	Existence of policies supporting the reuse of Public Sector Information within public administration, by the private sector	4	4	4	4	4	4	1	4	4	4	4	4	4	4	-	4	4	4	4	4	1	4	-	4	-	4	4	1	1	4	4	4	4	4	-	4
	69	Existence of national guidelines or tools to assist publishers in choosing an appropriate licence for their data	4	4	4	4	4	4	4	4	4	4	4	4	4	4	-	4	4	4	1	4	4	4	-	4	-	4	4	4	4	4	4	4	4	4	-	1
Catalogues	70	Existence of catalogues of public services, public data and interoperability solutions	3	3	3	3	2	3	1	4	4	3	4	2	3	3	2	2	2	2	2	3	3	4	2	3	4	1	3	1	2	2	3	3	4	3	2	3	2
	71	Use of common models/standards/specifications for describing catalogues of public services, public data and interoperability solutions	3	3	4	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3	4	-	3	3	3	3	3	2	3	4	3	4	3	3	3	3
External information sources and services	66	Extent to which public administrations are using external information sources and services while developing public services	3	3	3	3	4	3	2	4	4	4	3	-	3	3	3	4	3	3	3	3	4	4	2	4	4	3	4	3	3	3	4	4	4	4	2	4	4
Security and Privacy	67	Application of privacy and security principles	4	4	4	4	2	4	4	4	2	4	4	-	3	4	2	4	4	3	3	3	4	4	4	4	3	4	3	4	2	4	4	4	4	2	4	3
	68	Number of trust services providers by country	2	-	4	2	2	1	3	1	1	1	4	4	2	3	1	1	4	1	1	2	1	1	-	4	-	4	3	3	3	3	4	4	1	-	-	-

Table 8 here below regroups all the sources that have been used to draft **Chapter 4** – Latest developments in digital public administration and interoperability in the world.

Table 8 Sources

Author	Source
Adam Stone	Adam Stone (2020), 2020 puts cloud computing in government to the test.
Australian Government	Australian Government Department of Industry, Science, Energy and Resources (2020), National blockchain roadmap – progressing towards a blockchain-empowered future
Deloitte	Deloitte (2021), Accelerated digital government – COVID-19 brings the next generation of digitization to government.
ITU & UNICEF	ITU & UNICEF (2020), Global Connectivity Implementation Plan.
	ITU & UNICEF (2019), GIGA – Connecting every school to the internet.
INATBA	INATBA (2020), Global Conversation on Standards, Governance and Interoperability.
OECD	OECD (2019), State of the art in the use of emerging technologies in the public sector.
	OECD (2019), The Path to Becoming a Data-Driven Public Sector.
	OECD (2020), The COVID-19 crisis: A catalyst for government transformation?
	OECD (2020), Digital Transformation in the Age of COVID-19: Building Resilience and Bridging Divides, Digital Economy Outlook 2020 Supplement.
Open Government Products	Open Government Products (2020), An omnichannel communication tool for the Singapore Government.
United Nations	UN (2020), Impact of COVID-19: perspective from Voluntary national reviews
	UN (2020), Compendium of digital government initiatives in response to the COVID-19 pandemic.
	UN (2020), Report of the Secretary-General Roadmap for Digital Cooperation.
World Bank, ITU, GSMA, World Economic Forum	World Bank, ITU, GSMA, World Economic Forum (2020), Digital Development Joint Action Plan and Call for Action, COVID-19 response.

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The ISA² Programme has evolved into Interoperable Europe - the initiative of the European Commission for a reinforced interoperability policy. The work of the European Commission and its partners in public administrations across Europe to enhance interoperability continues at full speed despite the end of the ISA2 programme. Indeed, enhanced interoperability will be necessary to unlock the potential of data use and reuse for improved public services, to enable cross-border collaboration, and to support the sector-specific policy goals set by the Commission for the future.

Interoperable Europe will lead the process of achieving these goals and creating a reinforced interoperability policy that will work for everyone. The initiative is supported by the Digital Europe Programme.

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