MINISTRY OF FOREIGN AFFAIRS
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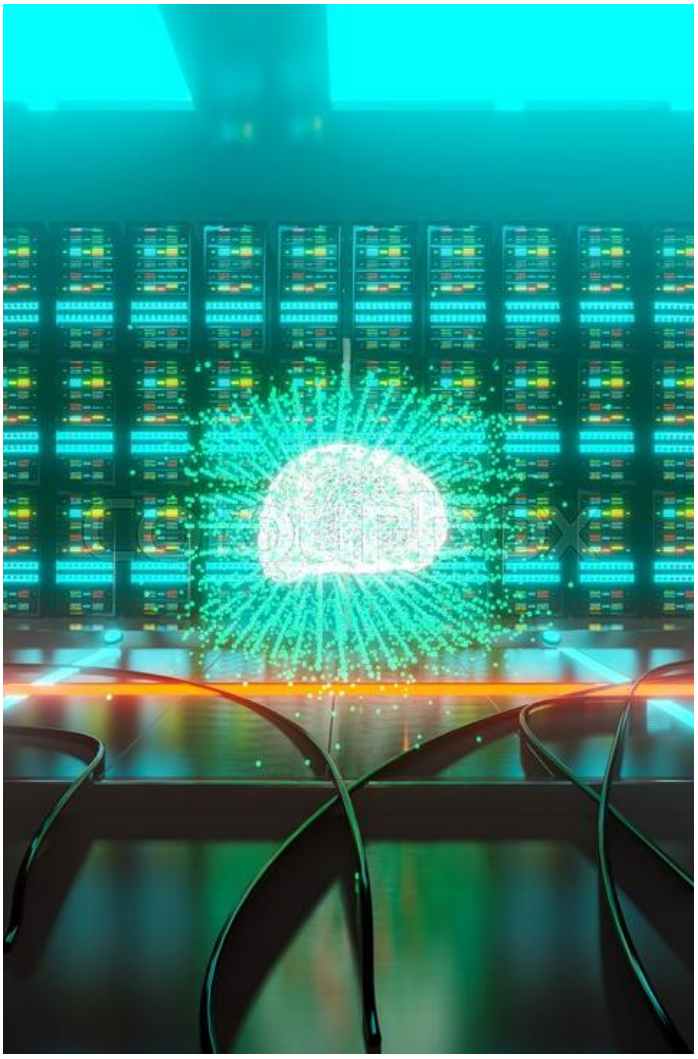
HIGHER EFFICIENCY THROUGH INCREASED DIGITALISATION IN THE PUBLIC SECTOR IN THE CEE REGION

OPPORTUNITIES FOR DANISH COMPANIES



Authors:
Lenka Andrýsová, Royal Danish Embassy in Prague
Balazs Szendrei, Royal Danish Embassy in Budapest
Elżbieta Wójtowicz, Royal Danish Embassy in Warsaw
Lesya Logvinenko, Royal Danish Embassy in Kiev

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EXECUTIVE SUMMARY

This report was commissioned by the Danish Ministry of Foreign Affairs and aims to uncover needs in the field of digitalisation in the Czech, Hungarian, Polish, and Ukrainian public sector. The document provides an overview of the current state of digitalisation and existing IT solutions in the countries. Having read the report, Danish businesses will understand the level of digital development of the public sector in the countries and learn more about their upcoming projects. The report discusses main public and private stakeholders e.g. ministries, subordinate institutions, or IT companies to present the complexity of local digital ecosystems.

Digitalisation is very high on the agenda in the Czech Republic, Hungary, Poland, and Ukraine. This is reflected not only in the number of digitalisation-related strategies and the presence of the digitalisation component in the countries' policies, but also in concrete projects and functioning systems. All the countries dispose of units which set directions for the development of digital infrastructure and monitor their implementation. As for the current state of the countries' digital development, all four countries have been working on and can present their own versions of digital identity, e-services, citizens' portals, e-procurement, e-taxes, or an e-health system. The systems might differ between the countries in terms of functionalities as they are adjusted to local conditions. The general tendency is to digitalise the most popular and state-critical services where, for example, enormous savings can be achieved. The parties involved in building the digital infrastructure in the Czech Republic, Hungary, Poland, and Ukraine include local providers or state institutions with programming capacities.

The main task for the upcoming years for the Czech Republic, Hungary, Poland, and Ukraine is to focus on strengthening digital skills among their citizens and increase trust towards public e-services. The countries declare enormous investments in the 5G network and create friendly ecosystems for the future technologies such as the Internet of Things, artificial intelligence, or blockchain. Considering the vulnerability of the healthcare sector, all the countries present ambitious plans for telemedicine and use of AI and prediction methods for analysing health data. The COVID-19 pandemic has shown clear advantages of online communication with public institutions for both citizens and the countries. Another area which will be developing very fast is edtech. Education is an investment in future generations, and lack of tools for online education has led to decreased satisfaction from education among pupils and worse final examination results during the pandemic. All the EU members presented in this report have allocated over 20% of the RRF fund for digital infrastructure and systems increasing resilience against unexpected future disruptions such as pandemics. Ukraine also has its own National Economic Strategy to stimulate the economy financed by the state budget.

Despite the price of Danish services, Danish solutions and knowledge can have great applicability in the countries due to their maturity, high-quality user experience, and extensive experience from the public sector. On the other hand, Danish businesses must be aware of local conditions, local eGovernment environments, and local procurement laws. Building a local network is a huge task and should be approached with appropriate resources and patience. This report gives recommendations on how to conduct market research, keep updated with the latest news from the markets, and provides resources e.g. links to procurement portals, names of stakeholders and events to follow to help you succeed in these markets.

CZECH REPUBLIC

1.1 Current state of digitalisation in the public sector

1.1.1 DESI index

Czechia ranks **17th** in the DESI 2020 and has continuously been improving its ranking over last years. The score is 50.8, which is still lower than the EU average (52.6). Czech strengths do not lie in the public digitalisation, but rather in e-commerce in the part "integration of digital technologies", where the Czech Republic scores above the EU average. For example, Czechia has most e-shops per capita and Czechs use internet banking or read news online above the EU average. Although the score in "Digital public services" has been improving, Czechia is lagging behind other EU countries with ranking 22 out of 28. Only half of individuals who need to submit official forms to public administrations do so electronically (the EU average is 67%). Despite the government's effort to promote the digital use of public services, the number of e-government users is growing at a slower pace. At the end of 2019, the central Citizen's Portal was already offering 120 services online, but it had only 45 000 registered users.

Figure 1. DESI Ranking Czechia[1]

	Czechia			EU
	DESI 2018	DESI 2019	DESI 2020	DESI 2020
	value	value	value	value
5a1 e-Government users % internet users needing to submit forms	**33%** 2017	**52%** 2018	**51%** 2019	**67%** 2019
5a2 Pre-filled forms Score (0 to 100)	**49** 2017	**51** 2018	**53** 2019	**59** 2019
5a3 Online service completion Score (0 to 100)	**82** 2017	**82** 2018	**82** 2019	**90** 2019
5a4 Digital public services for businesses Score (0 to 100) - including domestic and cross-border	**81** 2017	**80** 2018	**80** 2019	**88** 2019
5a5 Open data % of maximum score	**NA**	**NA**	**64%** 2019	**66%** 2019

Source: DESI Index 2020

1.1.2 UN e-government ranking

According the UN e-government survey 2020, the Czech Republic significantly improved compared to 2018. Its ranking is **39** with EGDI at 0.8135, Online Service Index 0.7235, Telecommunications Infrastructure Index 0.814 and Human Capital Index 0.903. In 2018, Czechia was on 54th place having EGDI at 0.70840. In 2020, Czechia moved from a group of high to very high level of e-government (the border index is 0.75). E-participation index, index showing the use of ICT to engage people in public decision-making, administration and service delivery of Czechia was 0.7262, which ranked Czechia 65th out of 193 countries making the Czech Republic a country with a high level of e-participation. Online services delivery indicator shows the use of ICT by Governments for the delivery of public services at the national level. Czech Republic has 0.7235. The Czech Republic offers good pre-conditions for e-government. Its telecommunication Infrastructure Index (TII) is 0.814.

Mobile cellular telephone subscriptions per 100 inhabitants: 119.11
Percentage of Individuals using the Internet: 80.69

[1] Digital Economy and Society Index (DESI) 2020, Czechia, https://digital-strategy.ec.europa.eu/en/policies/desi-czech-republic

Fixed (wired) broadband subscriptions per 100 inhabitants: 30.22
Active mobile broadband subscriptions per 100 inhabitants: 87.98

Local level and municipalities have different levels of e-government. The UN focused on Prague only. Local Online Service Index comprises 80 indicators relating to four criteria: technology, content provision, services provision, and participation and engagement. Prague reached 0.6 and ranked 22nd out of 100 municipalities. Open Government Data Index OGDI in the Czech Republic is 1 (very high).

1.1.3 Digitalisation - What's already done and how it is used, existing systems

Basic Registers

Basic registers of public administration build the key electronic databases and constitute pillars of the Czech eGovernment and make it possible to process the electronic public administration. The content of the basic registers is updated and include legally binding data. There are four basic registers: population register (information about citizens), register of entities (information about companies), register of territorial identification, addresses and real estate and register of rights and obligations.
Legislation: Act No. 111/2009 Coll., on basic registers
Stakeholder: Administration of Basic Registers – it operates basic registers, provides access to data to public authorities and interconnects data in basic registers.[2]
Number of users: N/A, i.e. this is basically infrastructure and all users indirectly use it.
Current developments: The Council of Basic Registers was established in 2020, the document Global Architecture of Basic Registers was created and within the Digital Czechia strategy, priority projects for the development of new generation basic registers were defined, including documents for their financing within the National Recovery Plan.

Digital Post (Data Boxes)

Data boxes are official "email boxes" for communication with public authorities and replace the classic method of delivery in paper form. Data boxes are set up automatically for public authorities and legal entities and entrepreneurs by law, all others at their request.
Legislation: Act No. 300/2008 Coll., Act on Electronic Acts and Authorized Conversion of Documents
Number of established data boxes: 1 270 847
Number of sent messages: 871 233 957[3]
Operator: Czech Post, national enterprise (Česká pošta, s.p.)
Subcontractor: O2 IT Services, a.s. – contract is set up by 2022, five years contract the value of CZK 1.8 billion.[4]
More information on Datové Schránky[5]

Citizen´s portal (Portál občana)

The citizen´s portal is a gateway to the electronic services of the state, a self-service place for secure and confidential communication between the citizen and the state. It is a "website" providing e-services to citizens with an approach to digital post as well. The e-service is directly provided on the portal, or a citizen can be referred/linked to another relevant portal of other

[2] http://www.szrcr.cz/
[3] https://www.datoveschranky.info/statistiky
[4] https://www.idnes.cz/ekonomika/domaci/datove-schranky-ceska-posta-o2-verejna-zakazka.A170511_153352_ekonomika_rts
[5] https://www.datoveschranky.info/

authorities without the need to re-log in and verify identity. In order for a citizen to start using the services on the Citizen's Portal, they must first prove their identity at registration.
Link: https://obcan.portal.gov.cz/prihlaseni
Legislation: Act No. 365/2000 Coll., on public administration information systems, Act No. 300/2008 Coll., on electronic acts and authorized conversion of documents, Act No. 111/2009 Coll., on basic registers, Act No. 250/2017 Coll., on electronic identification, Act No. 12/2020 Coll., on the right to digital services
Number of users: 65 000 citizens, 0.5 % population
Administrator/Operator: eGovernment Department, Ministry of Interior
Contacts:

- Mgr. Jiří Kárník (jiri.karnik@mvcr.cz)
- Ing. Roman Vrba (roman.vrba@mvcr.cz)

More information to be found on Ministerstvo Vnitra České republiky[6]

Public administration portal (Portál veřejné správy)
It is a main information signpost helping citizens to orientate themselves in their legislative duties, but also in the electronic services of the government.[7]
Operator: eGovernment Department, Ministry of Interior
Contacts:

- Mgr. Jiří Kárník (jiri.karnik@mvcr.cz)
- Ing. Roman Vrba (roman.vrba@mvcr.cz)

More information to be found on Ministerstvo Vnitra České republiky[8]

Electronic Identity (elektronická identita)
When citizens logs in the Citizen´s portal, they can login using:

a. eID card ("e-občanka"): An ID card with an activated chip which enables a guaranteed proof of identity when using online public administration services. People need to buy a reader or have a special computer with in-built reader so that they can use it and download an app available here info.eidentita.cz. This solution is provided by the Ministry of Interior.
b. Name, password and SMS (provided by the Ministry of Interior)
c. Data Box (provided by the Ministry of Interior)
d. STARCOS chip card (provided by I.CA)
e. MojeID service (provided by CZ-NIC)
f. eGovernment Mobile Key service (provided by the Ministry of Interior)
g. BankID (banking identity service) (provided by banks)
    - BankID is a new project developed by banks based on new legislation. Since 2021, banks start to gradually implement BankID. They unite in a private company called Bankovní identita, a.s. [9]The aim of this company is to develop BankID and give companies the opportunity to offer the benefits of banking identity to their clients. With BankID, companies can connect to banks and provide their services. The advantages rely in pre-filling out various forms and signing contracts electronically. The signing function is called BankID SIGN and should be soon activated.

[6] https://www.mvcr.cz/clanek/portal-obcana.aspx
[7] https://portal.gov.cz/
[8] https://www.mvcr.cz/clanek/portal-verejne-spravy.aspx
[9] https://www.bankid.cz/

- Contacts: Jan Blažek (Chairman of the Board), Martin Růžička (Executive Director)

Legislation: Act No. 250/2017 Coll., on electronic identification
Number of users: eID: 13 % of ID card holders[10]

Electronic Signature (Elektronický podpis)
Citizens can sign documents online with their electronic signature which is called "qualified certificate" which is accepted in the entire EU. This certificate can be obtained by a citizen at three authorized providers: Czech Post (Česká pošta, s. p.), První certifikační autorita, a. s., and eIdentity a. s. It is a paid service. The price varies. PostSignum (Česká pošta s.p.) costs 396 CZK, eIdentity a.s. 477.95 CZK and První certifikační autorita, a.s. 495 CZK per year.
Legislation: Act No. 227/2000 Coll., Act on Electronic Signature and on Amendments to Certain Other Acts (Act on Electronic Signature).
Newly, BankID by Bankovní identita, a.s. makes it possible to sign documents electronically. This service is now tested and will soon be officially used.

More information to be found on Ministerstvo Vnitra České republiky[11] and PostSignum[12] and website of the company Bankovní identita, a.s.[13]

Czech POINT
It is an assisted place of public administration. You can find Czech POINT at almost 1 000 post offices marked with the Czech POINT logo. They issue verified outputs from several public administration information systems, for example from the criminal record, the real estate cadastre, or you can, for example, register a company or request new access data to the data box.
Legislation: Act No. 365/2000 Coll., on public administration information systems

eHealth
e-Prescriptions ("e-recept") are mandatory from 2018. In 2019, doctors and healthcare providers issued on average six million per month. Certificates of work incapacity ("e-neschopenka"): As of January 2020, employers, healthcare providers and patients are obliged to use certificates of work incapacity only in electronic form. After the first month, the system had already registered over 22 000 healthcare providers and more than 200 000 patients.

Customer´s portals of public health insurance companies (moje.vzp.cz): Citizens can check their healthcare spending's on their portals. At the same time, citizens can send official documents to their public insurance company through this system. Some of the public insurance companies issue electronic health insurance cards, but this is not widely spread.

Other e-tools examples:
e-Taxes
The Czech Finance Ministry has presented in 2021 a new version of e-taxes (mojedane.cz). This platform provides access to electronic filing of tax reports.

[10] https://www.irozhlas.cz/zpravy-domov/nejvyssi-kontrolni-urad-sluzby-verejna-sprava-naklady-vyuziti_2007131010_tzr
[11] https://www.mvcr.cz/clanek/prehled-kvalifikovanych-poskytovatelu-certifikacnich-sluzeb-a-jejich-kvalfikovanych-sluzeb.aspx
[12] https://www.postsignum.cz/kvalifikovane_certifikaty.html
[13] https://www.bankid.cz/novinky/zaruceny-digitalni-podpis-sign

e-Highway toll
The Czech Ministry of Transport as of 2021 only provides electronic highway tolls on https://edalnice.cz/.

e-Invoice
The potential of e-Invoice is not fully used. Mandatory electronic invoicing is regulated by law only between businesses to government communication (B2G). There is no legislative arrangement that would require mandatory electronic invoicing between business entities to each other (B2B). The e-Invoicing solution for B2G is in place but not mandatory. The e-Invoice solution is not used widely.
More instruments are described in Digital Government Factsheet 2019, Czech Republic.[14]

1.1.4 Digital competences– are citizens e-ready? General attitude towards digitalisation

Czechs have a positive attitude to new digital instruments tools, when we look at the existing e-tools in the private sector. As DESI 2020 report shows, 85 percent of population use the internet. 92 percent of internet users read news online, 68 percent use social media, 78 percent use internet banking, and 73 percent do shopping online. See the table below.

Table 1. Digital Economy and Society Index (DESI) 2020, Czechia[15] - e-readiness

	Czechia			EU
	DESI 2018 value	DESI 2019 value	DESI 2020 Value	DESI 2020 value
3a1 People who have never used the internet % individuals	11% 2017	10% 2018	9% 2019	9% 2019
3a2 Internet users % individuals	81% 2017	84% 2018	85% 2019	85% 2019
3b1 News % internet users	91% 2017	91% 2017	92% 2019	72% 2019
3b2 Music, videos and games % internet users	72% 2016	70% 2018	70% 2018	81% 2018
3b3 Video on demand % internet users	4% 2016	5% 2018	5% 2018	31% 2018
3b4 Video calls % internet users	42% 2017	49% 2018	52% 2019	60% 2019
3b5 Social networks % internet users	57% 2017	64% 2018	68% 2019	65% 2019
3b6 Doing an online course % internet users	4% 2017	4% 2017	7% 2019	11% 2019
3c1 Banking % internet users	67% 2017	72% 2018	78% 2019	66% 2019
3c2 Shopping % internet users	65% 2017	67% 2018	73% 2019	71% 2019
3c3 Selling online % internet users	13% 2017	16% 2018	14% 2019	23% 2019

Source: DESI Index 2020.

[14] https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Czech%20Republic_2019.pdf
[15] https://digital-strategy.ec.europa.eu/en/policies/desi-czech-republic

The attitude of citizens to public digital tools is, however, less positive compared to the private sector. Only half of individuals who need to submit official forms to public administrations do so electronically (the EU average is 67%). Despite the government's effort to promote the digital use of public services, the number of e-government users is growing at a slower pace. At the end of 2019, the central Citizen's Portal was already offering 120 services online, but it had only 45 000 registered users. One of the reasons may be that the digital instruments are not that user-friendly, or that communication campaign did not convince people to use instruments. As DESI report 2020 states, Czechia is pursuing its e-government strategy with a view to delivering more public services electronically and in a user-friendly way. However, take-up remains low and a large proportion of the population still prefers to interact with the public administration through traditional means.

1.1.5 COVID-19's impact on digitalisation in Czechia

COVID-19 increased a need for digital tools. The government had to quickly respond to current needs and developed Smart Quarantine (part of it was e-facemask[16]) or interfaces for various subsidies and support programs. Take-up of these instruments depended on benefits for the final user. Some of the subsidies could only be used if the applications were submitted electronically. E-facemask was not that successfully used, though.
In July, new apps Tečka and čTečka related to covid passport were launched.[17]
COVID-19 has shown a need for further digitisation, but is not the only motivation. The key aftermath would be a better access to finance for e-government projects because of National Recovery Plan, but also experience of lockdown when public authorities were closed and not able to fulfil all their tasks electronically and distantly.

1.2 Policy and strategy overview

1.2.1 Country strategies on digitalisation

The Czech Republic has created many strategies, which shows that digitalisation is a priority.

Digital Czechia (Digitální Česko)[18]
The implementation plans adopted in 2019 included 808 actions and an annual budget of CZK 115 million (€4.5 million). The majority of these actions related to the digitisation of public administration and public services.

National strategy for artificial intelligence (AI)[19]
It is intended to support research, stimulate international cooperation, help industry, businesses and public administration to integrate AI solutions, provide relevant skills to people and assess the impact of AI on the economy and society. The strategy deals with ethical, legal, security and social aspects of the AI as well. The overall objective is to make Czechia a model European country for AI.

e-Health strategies (Národní strategie elektronizace zdravotnictví, Strategie Zdraví 2030)[20]

[16] https://erouska.cz/en
[17] https://koronavirus.mzcr.cz/aplikace-tecka-ctecka/
[18] https://www.mvcr.cz/webpm/soubor/vladni-program-digitalizace-ceske-republiky-2018-digitalni-cesko-uvodni-dokument.aspx
[19] https://www.databaze-strategie.cz/cz/mpo/strategie/narodni-strategie-umele-inteligence-v-cr?typ=download
[20] https://ncez.mzcr.cz/cs/narodni-strategie-elektronickeho-zdravotnictvi/narodni-strategie-elektronickeho-zdravotnictvi

In 2019, the government adopted a strategic framework for healthcare until 2030. Digitalisation is one of its specific goals. Explicitly, it mentions telemedicine, eHealth, electronic files available to patients and within health system. Both strategies are very ambitious. The questionable part is real implementation. These documents could serve and have served for formulation of National Recovery Plan, which includes information about financing of the projects.

Cloud computing, eGovernment cloud[21]

Based on cloud in public administration, ministries and authorities should be communicating effectively together. Citizens would not have to repeatedly provide the same information to the state, as the authorities will have access to everything. Currently, the Ministry of Interior collects proposals of companies providing cloud services compatible with demands of the Ministry.

Strategy "The Country for the Future"[22]

The aims of the strategy are to provide online services for citizens and businesses, to set up efficient and centrally managed IT, create an interconnected data pool (data only once) in order to use all the information already received by the state administration from a citizen or company in the past, to cyber-secure online services including critical centres, to prepare a society for trends such as IoT, AI, Big Data etc.

Strategy of development of ICT services of public administration (2015)[23]

This strategy puts forward key tasks in front of the Czech public sector, such as an extent of unnecessary duplication in software applications and in their technical infrastructure amounting to billions of CZK. The UK saves in average of 50 % of its original costs by switching to shared services in the form of commercial and government clouds and Denmark achieves average savings of 39 %. More areas are mentioned. Some of the areas mentioned already improved since 2015.

National Cyber Security Strategy of the Czech Republic 2021-2025 (Národní strategie kybernetické bezpečnosti České republiky)[24]

1.2.2 National Recovery Plan[25]

National Recovery Plan focuses on digitalization. 22 % of the financial allocation is planned to be spent on digitalization.

1.2.2.1 Digital services for citizens and businesses

Amount: EUR 116 million, CZK 2.955 billion, DKK 0.86 billion

- Conditions for quality data pool management and ensuring controlled data access
- Electronic healthcare (eHealth) (detailed below)
- Digital services for end users
- Development of open data and public data pool

https://www.mzcr.cz/vlada-schvalila-strategicky-ramec-zdravi-2030-2/

[21] https://www.mvcr.cz/clanek/egovernment-cloud.aspx?q=Y2hudW09NQ%3d%3d

[22] https://www.mpo.cz/cz/podnikani/podpora-vyzkumu-a-vyvoje/novy-program-na-podporu-inovaci-the-country-for-the-future--246526/

[23] https://www.databaze-strategie.cz/cz/mv/strategie/strategie-rozvoje-ict-sluzeb-verejne-spravy?typ=download

[24] https://www.nukib.cz/cs/kyberneticka-bezpecnost/strategie-akcni-plan/

[25] https://www.planobnovycr.cz/o-planu

- Digital services in the justice sector

Digital services for end users

- By 30 November 2024, increase the DESI value in individual indicators 5 and 2 - Pre-filled forms from the current value of 52.5 to min. 65 points.
- Increase in the number of electronic submissions to state authorities and organizations by 31 October 2025 by 100 % compared to the number as of 31 December 2019.

eHealth

A necessary condition for the implementation of the objectives is the implementation of the reform to increase the competence of the National Center for Electronic Healthcare in 3Q 2021 at the latest.

Key aims:

- Digital transformation in healthcare - promoting interoperability according to the „Commission Recommendation on Electronic Health Record Exchange Format". Connection of 80 % of health service providers to the system of exchange of health records by 30th November 2025
- Creation and implementation of digital services in healthcare and creating a catalogue of services.
- Introduction of at least ten new central digital services by 30th November 2025
- Reform of access to digital services and data for the implementation of an interconnected portal solution of electronic healthcare with a data fund of basic registers and a Citizen´s portal. Access to the services of a personalised portal through the identification means of recognized by the government.
- The intention of the reform is to generally respect the rules for the support of innovative technologies in telemedicine healthcare.
- Secondary use of health data.
- Cyber security of hospitals in Prague.

e-Justice

- to increase the transparency of court proceedings and the availability of information in the field of justice through the user-friendly web portal Justice.cz, which is a prerequisite for secure provision of basic information and digital services (such as various submissions, accesses and access to records, etc.) to interested parties.

1.2.2.2 Digital systems of state administration

Amount: EUR 280 million, CZK 7.133 billion, DKK 2.08 billion

- Competence centres for eGovernment support
- Building and development of systems supporting electronic healthcare
- Building and development of basic registers and facilities for eGovernment
- Building and development of agenda information systems

- Cyber security
- Creating the preconditions for digital justice

State Administration

- To create an effective environment for the digitalisation by
  - Data sharing among institutions and bodies through basic registers, an interconnected data pool, eGovernment Service Bus
  - Creation or development of functionalities of backend information systems of institutions in order to perform agendas focusing on mutual cooperation enabling a higher degree of internal digitalisation of offices and institutions
  - Cyber security of selected central authorities and providers of health services, especially in the Prague region
  - Sharing knowledge through competence centres, incl. their transfer to individual authorities and institutions.

Related public tenders:

- Building and development of agenda information systems and basic registers and facilities for eGovernment
- Cyber Security
- Creating preconditions for digital justice

1.2.2.3 Digital high-speed networks

Amount: EUR 231.5 million, CZK 5.900 billion, DKK 1.72 billion

- Improving the environment for building electronic communications networks
- Support for the development of the ecosystem of 5G networks and the further development of these networks
- Building a high-capacity connection
- Coverage of 5G corridors and support of 5G development

High-speed networks

- Construction and commissioning of 120 base stations for signal coverage of 5G networks
- Coverage of at least 210 km of railway corridors with increased signal level 5G and improving 5G signal in railway wagons
- Equip at least 350 railway wagons with repeaters for 5G signals
- Construction and testing of an intelligent transport system for corridors (C-ITS) in 5G networks.
- Increase in the number of address points with access to the VHCN
- Analysis by external consultants of proposals regarding utilisation of 5G network in specialized sectors

1.2.2.4 Digital economy and society, innovative start-ups and new technologies

Amount: EUR 224 million, CZK 5.710 billion, DKK 1.66 billion

Infrastructure for aerospace industry

- To build the infrastructure needed for the development of production for the aerospace industry, which depends on the development, high accuracy of production and data collection for the creation and use of models (digital twins) in the real world.
- To speed up the simulation in the design of aircraft and their components, which is very important in air transport for demanding 3D calculations of flow and flow and the overall acceleration of complex multiphysical simulations.
- a qualitative leap in computer control of aircraft and a rapid prediction of aircraft behaviour based on its model

Optical quantum network

- Creation of a backbone optical quantum network in the Czech Republic, which will connect to neighbouring countries and integrate into the European quantum communication infrastructure

Sandboxes for financial sector and AI

- the creation and operation of sandboxes (i.e. test environments) in the financial sector and AI, as support tools for (i) the rapid commercialization of more accessible, safer and more modern services in these areas; (ii) the creation and growth of innovative companies and (iii) the digitization of the economy

- Support of 5G, automation, robotisation, AI, Blockchain Services Infrastructure

1.2.2.5 Digital transformation of companies

Amount: EUR 196 million, CZK 5.000 billion, DKK 1.46 billion

- Creating an infrastructure for digital transformation
- European and National Digital Innovation Centres
- European reference test centres
- Direct support programs for digital business transformation

Direct support programs for digital business transformation

- individual projects for the digitalisation of manufacturing and non-manufacturing companies, with the aim of increasing digital processes in supported companies

1.2.2.6 Acceleration and digitization of construction proceedings

Amount: EUR 68.6 million, CZK 1.750 billion, DKK 0.51 billion

- Introduction of recodification of construction law into practice
- Creation of the "Agenda Information System" (AIS)
- Development and use of public administration data fund in spatial planning
- Full use of the benefits of digitalisation of construction management

Digitization of construction proceedings

- **Agenda Information System** - creation of a process information system intended for officials of building authorities and employees of the bodies concerned. Investment includes a purchase of the necessary HW and SW licenses, their technical support, implementation of applications covering the necessary functional and non-functional requirements, proper system testing, provision of service, operation and development of the application.
- **Central database of documents** used to provide data and services primarily for spatial planning and construction management authorities, but also other users from public administration, designers of spatial planning documentation, etc. Data will be possibly provided in the form of open data. Efficient sharing of data from other public administration systems (especially the register of territorial identification, addresses and real estate).

1.2.2.7 Innovation in education in the context of digitalisation

Amount: EUR 190.6 million, CZK 4.857 billion, DKK 1.42 billion

- Curriculum reform and its implementation
- Digitalisation of existing contents and forms of education
- Digital and information literacy along with the critical thinking of pupils and students
- Implementation of DigCompEdu

Digital education

- **Digital equipment** for all pupils and prevention of the digital exclusion: mobile digital devices for disadvantaged pupils
- **Digital technologies at schools** (eg. AR, VR, 3D printing, robotic aids, etc.) important for the implementation of the revised curriculum (see previous reforms). At least 4500 schools will be equipped with advanced digital technologies for teaching new informatics and 1120 schools in the years 2022-2025 will be supported by IT guru network.
- **Creating a digital ecosystem for the effective sharing of educational resources for teachers**
- **ICT equipment for distance learning** for primary schools and lower levels of grammar schools

1.2.2.8 Developing the cultural and creative sector

Amount: EUR 101 million, CZK 2.57 billion, DKK 0.75 billion

- Digitalisation of the cultural and creative sector

Direct support programs for digital business transformation (CZK 800 mil, DKK 234 mil)

- Digitization of cultural content in areas such as its preservation, creation, presentation and distribution in order to ensure its most effective and widest use. Digitalisation and access to content can facilitate cooperation between cultural institutions and destination management organizations, or service providers, thereby increasing its multiplier effect.
- Mapping of good practice in the digitalisation of cultural content and the emergence of a methodology for the digitalisation of cultural content. Preference will be given to projects enabling capacity sharing.
- The Ministry of Culture also digitises the grant system, including the commissioning of the subsidy portal, which will enable efficient administration of applications and make the orientation in subsidy programs clearer.

1.2.2.9 Establishment of an Intensive Medicine Simulation Centre including optimisation of the education system

Amount: EUR 63 million, CZK 1.6 billion, DKK 0.47 billion

Description: Simulation centre is a building with specially equipped rooms, perfectly imitating real clinical workplaces, a range of mechanical and electronic simulators and aids, including HW and SW equipment, which allows the induction of various simulation scenarios with visual and audio registration of trainees, ensuring effective teaching and enabling the subsequent evaluation of the training process by a professional team. This centre will provide specialised training for doctors, dentists and pharmacists.

Digital healthcare education

- electronic management of specialized education of health professionals, which will greatly simplify obtaining information about specialised education for participants (specific requirements for doctors, availability of training places, quality of education in individual facilities)
- creation and interconnection of online systems, through which it would be possible to coordinate the specialised education of physicians at all levels
- building an infrastructure for specialised and lifelong education of health professionals
- the construction of a simulation centre, especially for intensive care medicine, will contribute to the quality of education in an area that is now a priority with regard to COVID-19

1.3 Stakeholders

1.3.1 Political ownership

Ministry of Interior

The Ministry of the Interior formulates eGovernment policy and coordinates the development and implementation of eGovernment, with emphasis placed on public administration information systems and the public administration portal.

Political responsibility lies with the Minister and the Deputy Minister for Strategies and Programme Management under the Ministry. The chief expert at this Ministry is a chief architect of eGovernment. He guides and supervises the central, regional and local public administrations to ensure compliance with the National Architecture Plan as well as with ICT systems and services sharing and reuse principles.

The Department of eGovernment is responsible for drafting and implementing the national eGovernment strategy together with other public administrations. The Department is responsible for implementation of key eGovernment projects, and administration of several central information systems. It provides support and guidelines to the Czech POINTs, the national network of public administration contact points. It also actively participates in the process of drafting national eGovernment legislation.

- *Minister of Interior* - Jan Hamáček, ČSSD
- *Deputy Interior Minister for Information and Communication Technologies* - Jaroslav Strouhal
- *Chief architect of eGovernment* - Petr Kuchař
- *Director of eGovernment Department*- Roman Vrba

National Agency for Communication and Information Technologies (NAKIT)

NAKIT is a state enterprise which is a service organisation of the Ministry of Interior. NAKIT is responsible for operation, maintenance and development of ICT. It designs innovative and secure solutions. The agency is a partner of technology vendors in the areas of cybersecurity and specific aspects of network, application and cloud infrastructure.

It administers public ICT projects related to the operation and development of the state's critical infrastructure, as well as the hosting and housing of systems and applications.

- *NAKIT Director* - Vladimír Dzurilla

Government Council for Information Society (Rada vlády pro informační společnost)

The Government Council for the Information Society is mainly responsible for coordinating the implementation of the Strategic Framework of the Development of Public Administration in the Czech Republic for 2014 - 2020. It helps to reach political consensus on the ICT conception. Its members represent key stakeholders from various ministries dealing with ICT.

- *President of the Council, Chief Digital Officer of the Government* - Vladimír Dzurilla

National Registers Authority

The National Registers Authority ensures proper interoperability between registered systems of public administration and the four base registries by the Information System of Basic Registers.

- *Director of the National Registers Authority* - Michal Pešek

Municipalities and Regions
Within their respective spheres of competence, regional and municipal authorities ensure the implementation of their eGovernment strategies, while the central coordination is ensured by the central authorities and the Ministry of Interior. The Ministry of the Interior provides cities and municipalities with quality eGovernment services through technical solutions and support and is in charge of the coordination of municipalities, esp. service development, implementation projects and regional activities in the computerisation of public administration with other state and local governments.

Ministry of Health
National e-Health Centre is responsible for the strategic and conceptual development of e-Health.
- *Director of Department of IT and Electronic Healthcare* - Ing. Martin Zeman

Other ministries developing projects
Ministry of Regional Development, Ministry of Culture.

1.3.2 Associations

ICT Union
ICT Union is a professional association of companies active in the field of information technology and electronic communication, as well as other areas such as business and education. Its goal is to increase the awareness of the importance of adopting and making use of modern information technology in the society.
- *President of ICT Union* - Zdeněk Zajíček

Chamber of Commerce
The Chamber of Commerce is a business association which has many working sections. Two of the deal with IT and unite companies from the Czech Republic in these sectors.
Support of Entrepreneuring and Digital Agenda Section chaired by Zdeněk Zajíček
IT and Telecommunications Section chaired by Tereza Rychtaříková

Examples of IT suppliers to the Czech public sector:

O2 IT Services s.r.o.
IBM Česká republika, s.r.o.
GORDIC spol. s r.o.
AutoCont CZ a.s.
NESS Czech s.r.o.
Atos IT Solutions and Services, s. r. o.
OKsystem s.r.o.
ICZ a.s.
Cisco Systems, s.r.o.
Asseco Central Europe, a. s.
TOTAL SERVICE a.s.
SYSCOM SOFTWARE spol. s r.o.
T-SOFT a.s.
SEFIRA, spol. s r.o.
Com-Sys TRADE, spol. s r.o.
Software602 a.s.
KOMIX s.r.o.
CGI IT Czech Republic s.r.o.

1.4 Specific sub-sectors

1.4.1 Concrete opportunities for Danish companies

Digital first transition
The Czech Republic wishes to increase the adoption of the eGovernment services and make them popular among the public. Danish companies may provide consultancy and professional services to NAKIT and other Czech institutions on:

- Communication strategy
- Institutions and their involvement in the communication
- Management structure for the communication
- Communication channels
- Impact measurement and evaluation
- Gap analysis between the best practices in Denmark and the Czech Republic.
- Adoption of tailored solutions for the Czech Republic.

Danish best practices would quickly lead to adoption of eGovernment services in the Czech Republic and generate savings across the whole life cycle of the public administration as well as in the national economy.

National Master Data

The opportunity is in consultation and professional services delivery to the public administration in the Czech Republic.

- Gap analysis between the Danish legislation and Czech legislation:
    - Prerequisites for use of master data by private entities in Denmark.
    - Legal constraints and personal data protection in Denmark.
- Master data architectural approach used in Denmark:
    - Interfaces between the private sector and basic registers.
    - Usage payment models.
- Infrastructure for distributing master data.
- Best practices sharing and calculated benefits.

NemKonto

There are two types of projects that can be done in relation to NemKonto in the Czech Republic, a consulting project and possible reuse of an asset built in Denmark but adapted to the Czech eGovernment landscape. The starting point shall be a consulting project.
The outcomes of the consulting project would define following:

- Analysis of legal frameworks.
- Definition of necessary legislative changes in the CZ (possible reuse of Danish legal framework for NemKonto)
- Definition of impacts and benefits for citizens, businesses and government institutions - cost benefit analysis.
- Definition of possible EU funding.
- Project budget and schedule.

eID for Business

The opportunity is seen in the delivery of consulting projects to NAKIT or another public administration authority in the Czech Republic. The outcome of the consulting approach will help to define the extent of reusability of Danish solutions and assets from the Danish system of NemID for Businesses.
The scope of the consulting project shall be defined as:

- Analysis of legal frameworks.
- Definition of necessary legislative changes in the Czech Republic (possible reuse of Danish legal framework for NemID for Business).
- Functional definition and deliverables.

- Definition of impacts and benefits - cost benefit analysis.
- Definition of possible EU funding.
- Project budget and schedule.

IT public procurement processes

The opportunity is seen in the delivery of consulting projects directly to NAKIT or another relevant public administration authority related to Danish approach and its possible implementation in the Czech Republic. The scope of the consulting project shall be defined as:

- Analysis of legal frameworks.
- Definition of necessary legislative changes in CZ.
- Functional definition and deliverables.
- Definition of impacts and benefits - cost benefit analysis.
- Definition of possible EU funding supporting the implementation of a new public procurement scheme in the Czech Republic.
- Project budget and schedule.

1.5 Challenges for Danish companies in digitalisation (including public procurement process)

Together with PwC, we have identified several key obstacles for Danish companies to implement potential projects in the Czech Republic. The most important one is public procurement process. Any projects planned and managed by the state administration (applies for all levels of state administration) have to comply with the Czech Public Procurement Law and thus a public tender has to be carried out. There are several facts that pose serious obstacles for Danish companies to succeed in Czech public tenders with respect to IT projects.

- The main generally used selection criterion is price: the rates of the Danish companies are many times higher than the rates of their Czech counterparts.
- Fluency of the key members of the suppliers in Czech language is a mandatory requirement.
- Knowledge and practical experience with the Czech eGovernment environment and/or digital solution is usually a mandatory requirement.
- Practical knowledge of the Czech legislation both with regard to provision of government services and with regard to the eGovernment is usually a mandatory requirement.

Ways of increasing the chances for Danish companies:

- Amendment of the selection criteria by discussions with relevant public authorities in order to explain them that value based selection criteria are more suitable and overall beneficial for selection of digitization/IT solutions rather than just price.
- Establishment of a cooperation with a Czech counterpart, who would be the primary bidder within the public tender.
- Establishment of a subsidiary in the Czech Republic.

1.6 Conclusions and recommendations

- Select a project suitable for your company which is planned or could be planned in the Czech Republic
- Together with Trade Council, identify the relevant stakeholder/people

- Meet the relevant stakeholder, introduce your company and reference projects and discuss with them potential cooperation. If desired, Trade Council along with the Ambassador can support you at the meeting.
- Map potential networking activities (i.e. conferences) or co-organize one with Trade Council
- Follow Social Media of stakeholders (Twitter, LinkedIn), i.e. Vladimír Dzurilla
- Consider a type of your involvement which would suit you best: consultancy, advise, product offer (already developed or future tailored made) or partnership with a Czech company
- Discuss your approach with the Trade Council and plan next steps together

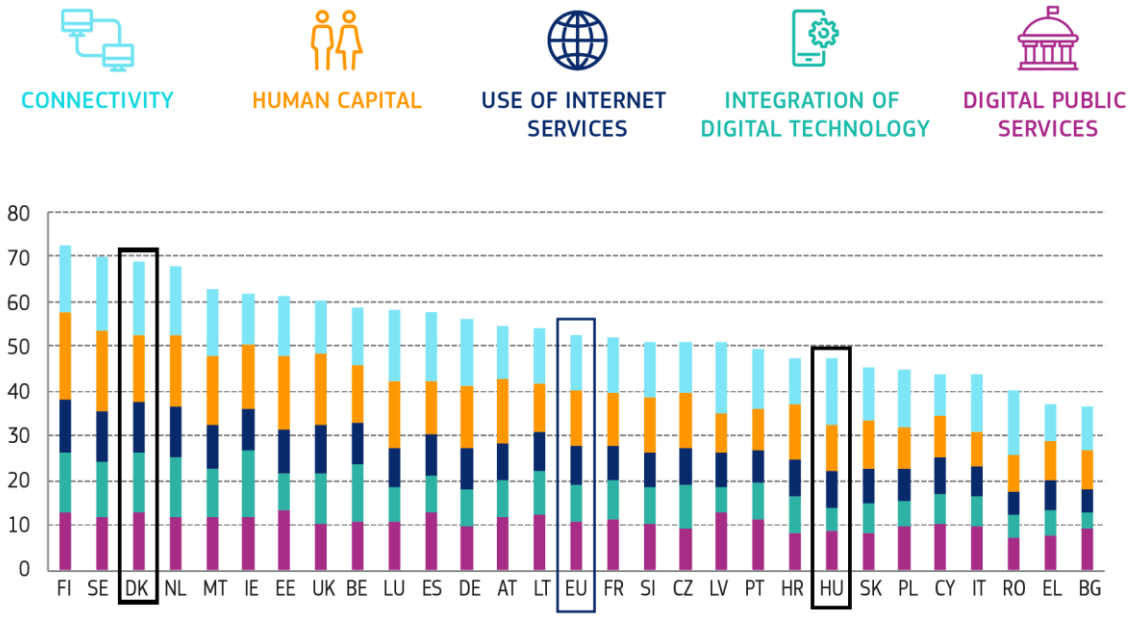
HUNGARY

2.1 Current state of digitalisation

2.1.1 DESI Index

According to the 2020 DESI index of the European Union, Hungary ranks 21st of 28 EU Member States in the Digital Economy and Society Index (DESI) 2020. It is in the middle of the second half of the EU countries in digitalisation. Comparing to Denmark, which occupies the third most digitalised place on the graph, Hungary still has a lot to improve in its digital effort.

Figure 2: DESI index and its components in the Member States in 2020[26]

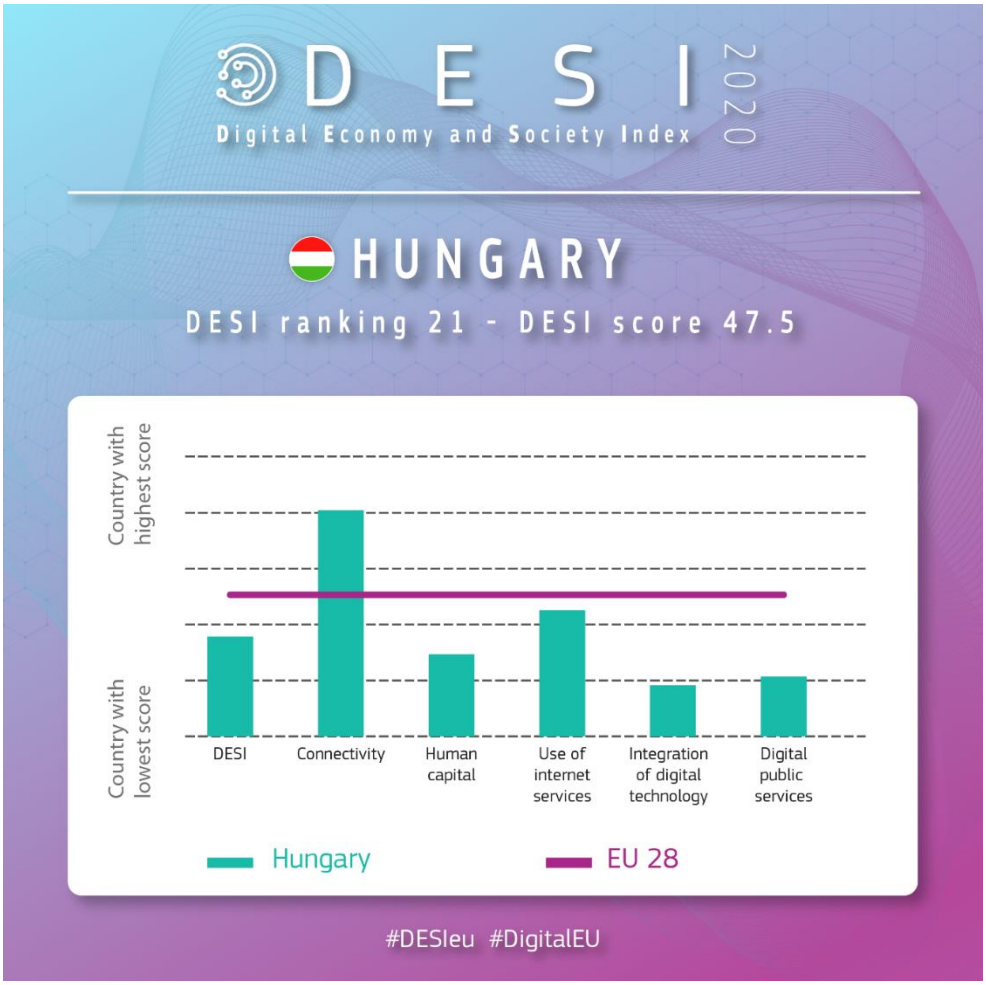


Source: DESI Index 2020.

Taking a closer look of Hungary's DESI profile, it shows inequalities in the adoption and progression of different dimensions of the index. For example, the use of internet services is well above the country's average DESI score, however, still below the EU average. Moreover, connectivity greatly exceeds both Hungary's country score and the EU average, ranking amongst the top in the EU. It still lags behind in digital public services and in the integration of digital technologies in businesses. The country **ranks 24th on digital public services** despite a marked improvement in all indicators in this area. Most companies are not exploiting the opportunities offered by digital technologies, such as cloud computing and big data, and few of them sell online. Thus, Hungary occupies the last place in digitalisation within businesses.
On human capital, over half of the population lacks basic digital and software skills.

[26] Digital Economy and Society Index (DESI) 2020 | Shaping Europe's digital future (europa.eu)

Figure 3: DESI index and its components in Hungary in 2020[27]



Source: DESI Index 2020.

Even though Hungary is still lacking behind on all aspect of the DESI index (except connectivity), it has come closer to the EU average and is slowly closing the gap.

Table 2. Development of DESI Index between 2018-2020 in Hungary[28]

	Hungary		EU
	rank	score	score
DESI 2020	**21**	**47.5**	**52.6**
DESI 2019	22	42.3	49.4
DESI 2018	22	40.0	46.5

Source: DESI Index 2020

[27] https://ec.europa.eu/digital-single-market/en/scoreboard/hungary
[28] DESI Hungary 2020

2.1.2. Overview of current state of digitalisation

A large number of projects, many of which are co-financed by the EU, are in place to implement the strategies. The Superfast Internet Programme aims to deploy high capacity fibre broadband in underserved areas. The EDIOP (2)6.1.2 programme on bridging the digital skills gap targets the working age population, while the development of community internet access points helps digitally illiterate individuals. The Modern Enterprises Programme remains the main tool for improving the digitisation of small and medium-sized enterprises (SMEs).

Digitalisation of public services

Digital public services have been one of the most challenging areas of the digital economy and society in Hungary. Although the country still ranks a lowly 24th, it has started to catch up with the rest of the EU by improving the quality of e-government services. It now ranks 20th on e-government users, pre-filled forms (measuring the re-use of information across administrations to make life easier for individuals) and on online service completion (measuring the sophistication of services). The scores for online service completion and for business services are just below the EU average.

Figure 4: DESI-Digital public services in Hungary 2020[29]

	Hungary			EU
	DESI 2018 value	DESI 2019 value	DESI 2020 value	DESI 2020 value
5a1 e-Government users	45%	53%	55%	67%
% internet users needing to submit forms	2017	2018	2019	2019
5a2 Pre-filled forms	28	31	42	59
Score (0 to 100)	2017	2018	2019	2019
5a3 Online service completion	75	82	87	90
Score (0 to 100)	2017	2018	2019	2019
5a4 Digital public services for businesses	73	79	85	88
Score (0 to 100) - including domestic and cross-border	2017	2018	2019	2019
5a5 Open data	NA	NA	32%	66%
% of maximum score			2019	2019

Source: DESI Index 2020.

It is important to note that the Hungarian e-government services are only partly digitalised (electronic document delivery, acceptance of electronic forms) and most of the data processing and administration is handled manually. Based on a study[30] conducted in 2018 the public administration cases, which can be initiated online, vary from totally form-based initiation to initiation via electronic communication.

The most important electronic services, which provide the basis for the digital public administration[31], are the following and are all provided by NISZ[32]:

[29] DESI Hungary 2020 (page 12)
[30] KÖFOP-2.1.2-VEKOP-15-2016-00001; Public administration development as a basis for good governance
[31] Based on 2015. CCXXII. decree for electronic administration
[32] The National Infocommunications Service Company Ltd.

Name of the service	Service provider	Purpose of the service
Safe delivery service (Biztonságos kézbesítési szolgáltatás)	NISZ Zrt. Magyar Posta Zrt.	Delivering electronic documents from and to citizens from authorities
Electronic document storage (KÜNY-tárhely, Cégkapu, HKP, Ügyfélkapu)	NISZ Zrt.	Service providing electronic storage for delivered documents for citizens, enterprises and authorities
Document authentication/ copy (Hibrid, Inverz Hibrid)	Magyar Posta Zrt.	Conversion of electronic/paper-based documents to official electronic documents
Central authentication agent (KAÜ)	NISZ Zrt.	Responsible for authentication to e-government services
Order Records (RNY)	NISZ Zrt.	Handling the mandates of citizens for online administration processes
Personalized administration portal (SZÜF)	NISZ Zrt.	Provides online services (e.g. form initiations, appointments etc.)
E-paper (E-papír)	NISZ Zrt.	Electronic communication platform with various authorities
Electronic form initiation service (ÁBT – ÁNYK űrlapbenyújtási-támogatási szolgáltatás)	NISZ Zrt.	Provides electronic forms administration services to various authorities
E-sign services (NISZ-TKASZ)	NISZ Zrt.	Adding electronic signature to documents

Recent development in online public services

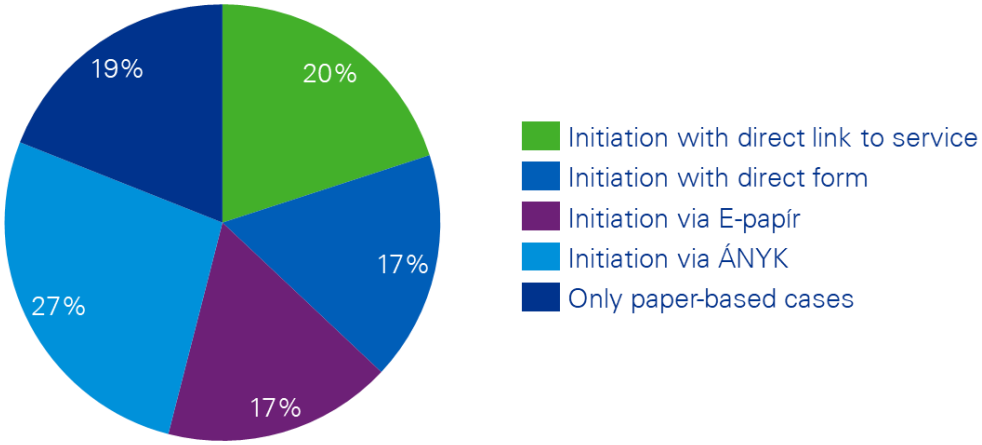
- In 2020 May, the Parliament accepted the digitalisation of the housing stock. Digitalisation of administration regarding real estate is expected to result in efficiency improvements and automatically updated registries in other governmental databases. Additionally, a new identification process will be implemented using e-signatures.
- Since January 2019, all municipalities have been providing their online services on a single platform through intelligent online forms with pre-filled information.[33]
- In 2018, a new platform for public e-procurement has been launched (Digital Governmental Agency, DKÜ) that centralised the procurement activities of several government entities.[34]
- In 2019, the electronic services of the police improved significantly: it became possible to process 220 cases fully online with the use of pre-filled online forms and e-payment.

[33] https://szuf.magyarorszag.hu
[34] https://dkuzrt.hu/

- In the health sector, a nationwide e-health infrastructure (`Elektronikus Egészségügyi Szolgáltatási Tér-EESZT`)[35] was launched already in 2017.
- A new identity card, an e-ID card was introduced in 2016.[36] The new e-ID card has a chip, which contains all essential personal information and could be used for e-authentication. Various public services can be reached via the e-ID card, including login to the public service portal, postal services and even public transport services. Although, e-ID definitely has advantages, most of the users are not aware of all the possibilities e-ID offers. Furthermore, a central state window for eIdentification is also available (account+password identification) so that citizens can arrange different types of public services (incl taxation, eHealth, etc).

To further improve digital public services, all public administration bodies are obliged to introduce structured online forms for services used at least 100 times a month. If implemented properly, this may not only increase the number of e-government service transactions, but may also result in large efficiency gains in public administration.

Figure 5: Distribution of public administration cases by service in 2018[37]



Source: KÖFOP-2.1.2-VEKOP-15-2016-00001 (2018) Public administration development as a basis for good governance

The above-mentioned study from 2018 also emphasises the fact that there is a large difference between authorities and how these authorities make public administration available online. The more advanced services are the ones for which there is a direct page available for case administration or there is a form available online.

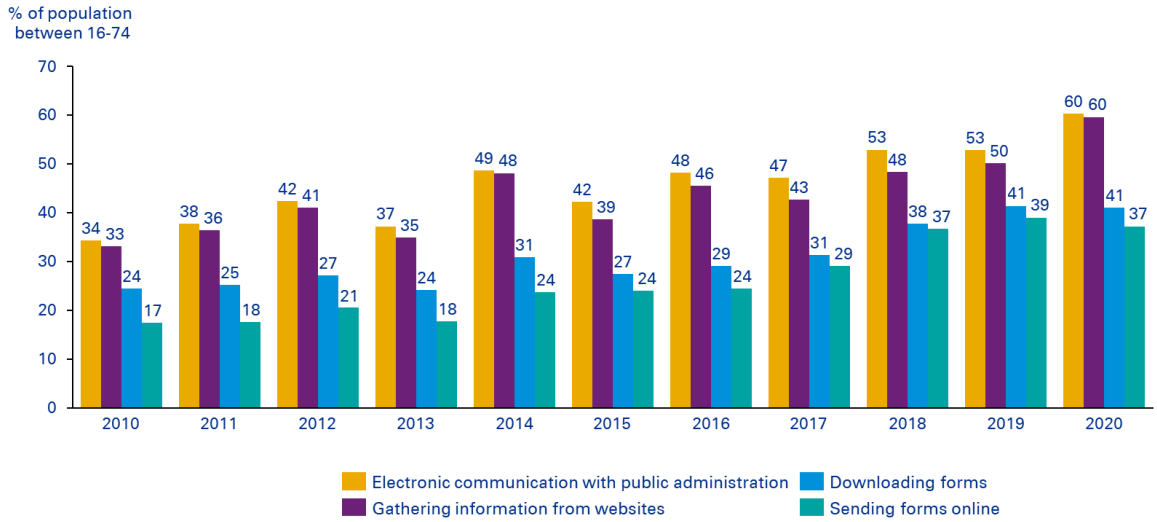
Other services such as *'E-papír'*, makes it available to send direct messages and attachments to authorities, but it is only a one-way communication as replies will not be received on the same platform. Another service is *'ÁNYK'*, which is mainly used by the Hungarian Tax Authority (NAV) and is a software, which has to be downloaded beforehand. The short-term goal of the authorities is to eliminate these services ('E-papír' and 'ÁNYK') and switch to communication

[35] https://e-egeszsegugy.gov.hu/web/eeszt-information-portal/home
[36] https://eszemelyi.hu/gyik/gyik_altalanos_info
[37] Public administration development as a basis for good governance

methods that are more sophisticated. Additionally, both the demand and supply side of e-government applications require a boost to achieve the level of government digitalisation of the EU.

Based on the Hungarian Central Statistics Office, more and more citizens use e-Government services. For example, there was an increase between 2010-2020 in electronic communication.

Figure 8: The usage of e-government portals among the Hungarian citizens between 16-74 years[38]



Source: Hungarian Central Statistics Office (2021)

2.1.3. COVID-19's impact on digitalisation in Hungary

Before COVID-19, in EU-comparison the digitalisation had not been a pivot point on the Hungarian policy agenda. Unexploited potential in digital innovation in both public and private sectors has come to focus. In the recent years, and a slow-pace digital shift along global tendencies has begun. The pandemic brought a quick boost on the area and the release of services in pipelines in both public administration and in the private sector, meaning a leap towards catching up to digital EU-forerunners in lag-behind areas.

Support for Enterprises

Modern Enterprise Program (stared in 2015) provided a range of services to Hungarian SMEs that boost corporate competitiveness via digitalisation. The program comprises of general and thematic information events on the advantages of digitalisation, free comprehensive IT expert help to and audits on enterprise digitalising, through thematic conferences on digitalisation of selected industries (for example Logistics 4.0) or more generic aspects of digitalisation (remote work, digital information security). The program also provided enterprise loans and non-refundable grants for digitalisation objectives.

[38] Hungarian Central Statistics Office

Public sector
Although various health care services and data were available online through EESZT, the pandemic supported its further development and a more widespread use of it. The benefits of e-description became clearer for the patients and EESZT gained new features. From spring 2021, a vaccination booking application was developed with EESZT and the vaccination certificate/immunity pass is also available through its mobile application.

School coped the challenges of COVID-19 differently. Although, an online platform for school (KRÉTA) is used for years now, the main function remained administrative (grades of the students) and communication between the teachers and parents. In 2021, the system was upgraded by a collaborative platform, but teachers often used different platform, such as Teams, Zoom or Google Meet for online education.

2.2 Policy and strategy overview

In 2014, Hungary adopted the National Info-communication Strategy 2014-2020(1). It started implementing it in 2014 and continued with the adoption of the Digital Success Programme ('Digitális Jólét Program–DJP') at the end of 2015 and the Digital Success Programme 2.0 in 2017. The Ministry has managed the Digital Success Programme for Innovation and Technology since 2019. Since 2017, it has developed several specific strategies, such as digital education, digital start-ups, digital exports, 5G deployment, artificial intelligence (AI), and digitalisation in the agriculture sector, FinTech and e-health. It is currently developing a digital strategy for the food and beverage industry and is building aspects of digitalisation for various sectoral strategies such as construction, tourism and logistics.
Three strategies that are currently in effect:

1. National Digitalisation Strategy
2. Digital Success Program 2030
3. The AI Strategy

The Artificial Intelligence Strategy:
Recognising the potential benefits of the technology and simultaneously taking into account the possible related challenges, the Government of Hungary has resolved to have a comprehensive Artificial Intelligence Strategy (hereinafter "Strategy") drawn up. The document sets goals up to 2030 and outlines a related action plan extending up to 2025.
The strategy outlines three main groups of measures:

1. **Foundation pillar**

The so-called foundation pillars of the Strategy prepare society to manage inevitable changes resulting from AI effectively and to fully exploit the advantages of the technology. The foundation pillars aim to establish the internal and external conditions of AI development in Hungary. The AI value chain covers the internal conditions.

Elements of the AI value chain are:

- support for the data economy ensuring access to public and private data;
- building a community of basic and demand-driven researchers and developers;
- building an ecosystem supporting the individual and corporate use of technology.

The AI frameworks provide the "external" conditions necessary for the above processes. These are:

- human skills necessary for the confident use of AI;
- availability of software and hardware resources;

- a clear regulatory environment that supports further development and innovation.

2. Focus Areas

The measures defined within the framework of the sectoral and technological focus areas aim to strengthen the growth potential of the Hungarian economy and to improve its efficiency in a targeted and conscious manner. On one hand, using available AI technologies. On the other hand through the development of future technologies.

The Strategy assigns priority to sectors that can be most effectively improved by AI-based applications: manufacturing, agriculture, healthcare, public administration, logistics, transport and energy. In relation to the above, based on current Hungarian capabilities, the Strategy defines the R&D areas that can contribute the most to the technological support of the above-mentioned sectors and where Hungary can gain advantage at an international level.

3. Transformative Programs

The long-term plans – defined as transformative programmes and setting very ambitious objectives, make it possible that the additional benefits of the implementation produce extra value for citizens even before these programmes are “closed”. This category of measures does not include programmes in a traditional sense, but rather complex means-end schemes provided in a form that is readily comprehensible for society as a whole. The directions outlined here show the ambitious path Hungary is to take for the stakeholders of both the Hungarian and international AI ecosystems.

The transformative programmes provide a long-term point of orientation in relation to matters of national strategic relevance such as:

- energy and agricultural challenges induced by climate change;
- the spread of autonomous systems and the labour market;
- the relationship between citizens and the data-based economy; or
- the need for developing the modern digital service provider state.

Artificial Intelligence in the digitalisation of public services

The government is open to new and innovative ways in AI and automation solutions. They have been working for years on the implementation of some solutions. One of these new solutions that reached the phase, where it is or will be incorporated into everyday usage, is facial recognition. To be introduced in 2021, citizens can use facial recognition to log onto governmental websites. Secondly, a ‘chat robot’ will be introduced this year, which can start and close full cases for citizens without human intervention. Decreasing administrative load and automating monotonous tasks. The latter is the main aim of the government - to enable human resources to be concentrated on more complicated and knowledge-intensive cases. Finally, the installation of self-service kiosks are planned over 2021 to speed up administration and waiting times. In addition, the Ministry of Interior plans to set up so-called ‘virtual clinics’ where under-developed regions will have access to medical consultations.

2.2.21. RRF fund in Hungary

The Hungarian RFF plan is currently under discussion, and final approval is expected in September. As the former communication shows, Hungary is not utilising the loan part of the RRF as of now and the plan is not yet approved by the EU. However, the government indicated that later on it could use it as well. Thus, funds amount up to EUR 7.15 billion which is approx. HUF 2511.27 billion. 37% has to be spent on reaching climate goals while 20% has to cover digital transformation projects. Based on the Hungarian RRF average spending on climate goals can amount up to 41,17% of the RRF fund (see table later). Finally, digitalisation is included in each

pillar, it amounts up to 23,08% of the RRF fund. In addition to the EU's six pillars regarding the RRF fund, Hungary has named nine pillars / components that the funds will be spent on (including country specific suggestions of the EU).

The two main development areas are Healthcare and Green Transportation, together they amount up to 59.26% of the fund. Due to the programs and projects financed by the RRF, the Hungarian government expects an approximately 1.3% GDP increase by 2026. Moreover, in mid/ long term about 25 thousand new workplaces can be created.

Although the final version of the RFF plan is not yet know, the following program points are relevant for digitalisation. Please note, that these are the preliminarily figures, the final resource allocation will be published after the acceptance of the RFF. Regarding education, the following reforms are expected from the RRF funds:

Reform 2:

Creating the prerequisites for digital education for both students and teachers (COFOG 0912, 0921, 0922, 0960, 0980)

Program 1

Equal access to digital education for both teachers and students (procurement of ICT devices)

Budget: HUF 162.07 billion/ EUR 460 million

Program 2

Implementing digital solutions into everyday teaching

Budget: HUF 28.61 billion/ EUR 81 million

While regarding country specific recommendations the following programs are expected:

1. Developing the cooperation systems of public prosecution institutions

   Budget: HUF 3.57 billion / EUR 10 million
2. Introducing AI to governmental decision making and automation

   Budget: HUF 1.63 billion / EUR 4.6 million

   Improving efficiency in public services (IT systems)

   Budget: HUF 15 billion/ EUR 43 million

Worth mentioning the digitalisation, where two major changes are expected:

1. Creating the prerequisites of 21th century healthcare. Setting up central systems for the management of patients and healthcare, improving access to modern devices, developments to infrastructure (40 institutions)

   Budget: HUF 291.83 billion /EUR 830 million
2. Home service for people with limited movement (elder, etc.). Development of digital infrastructure, system, devices.

   Budget: HUF 90 billion/ EUR 260 million

2.3 Stakeholders

ITM – Ministry of Innovation and Technology

In Hungary, on a strategic level the main government body for digitalisation is the Ministry of Innovation and Technology (ITM[39]), more specifically the Deputy Secretary of State for Digitalisation.

[39] kormany.hu/innovacios-es-technologiai-miniszterium

According to a government decree published in 2019[40], the National Infocommunication Service Provider (NISZ) through its affiliate (Idomsoft Kft.) is responsible for the provision of eGovernment services in Hungary.

DJP Digital Success Program[41]

Digitális Jólét Program (DJP), Digital Success Programme in English, launched by the Government of Hungary in 2015 affects the entire digital ecosystem, and the aim is that every Hungarian citizen and business can benefit from digitalisation. Digital Success Programme 2.0., which is a strategy for gaining digital advantage, as its digitalisation-supporting programmes cover almost every field of the digital development of the Hungarian economy, the operation of the state, and the Hungarian society. Within the DJP Programme, Hungary has created separate digitalisation strategies for many fields, such as the agro business, export, entrepreneurship, education, AI, childcare, and potentially more to come.

KIFÜ - Governmental Agency for IT Development[42]

The Governmental Agency for IT Development (KIFÜ) operates under the supervision of the Ministry of Innovation and Technology.

KIFÜ's activities can be divided into three major areas:

- performing the management and quality assurance tasks of national or EU co-funded projects from the preparations through their implementation to their completion
- developing and operating IT infrastructure, and provision of services based on this infrastructure to the national public education, higher education and academia, research institutes, and public collections
- perform tasks related to the Superfast Internet Program

Digital Governmental Agency (DKÜ Zrt.)

The Agency is responsible for central procurement projects within IT and related solutions.[43]

Digital Governmental Development and Project Management Ltd

The management is created in February 2021 under the Digital Governmental Agency in order to support the digital tasks of the Agency and the Minister or IT (684/2020 Gvt Decree). This Project management Ltd will be in charge of digital and info-com developments in the future, including the scope of the digitalisation within the EU's Recovery and Resilience Facility RRF.

Artificial Intelligence Coalition

The aim of the project is to:

- Propel Hungary to the European forefront in the area of AI developments;
- Strengthen the competitiveness of domestic enterprises through extensive dissemination and utilisation AI-based use-cases;
- Facilitate the participation of Hungarian start-ups and SMEs in AI development activities in partnerships with large enterprises, universities or international partners;
- Make sure that the government, as a user of AI-powered solutions, should be actively engaged in developing the local AI ecosystem by systematically utilising the national data asset pool.

[40] 309/2011. (XII. 23.) government decree on centralized IT and electronic communication service provision

[41] Further details: www.digitalisjoletprogram.hu/en

[42] www.kifu.gov.hu/en

[43] https://dkuzrt.hu/

2.4 Conclusion

Based on the above, the main challenges of digital administration are:

1) that the developments of the recent years have focused on the digitalisation of paper-based processes and the processes in general are manual, which require both process improvement and regulatory changes,
2) the lack of automated, proactive, and predictive services which require a unified data structure,
3) that user centricity is still lacking in the administrative processes, services for complex customer-journeys and the principle that data should be provided only once is not part of the eGovernment processes
4) that there are no central "building-block" services, which are interoperable in the non-government sector.

We suggest specific focus and even some further market analysis in the following areas:

- **RRF:** Although the Hungarian plan is not yet accepted by the European Commission, the Hungarian government is dedicated to pre-finance the program from state resources. The latest version of the plan is from 2021 June, new information will be available after the Commission approves the plan.
- **GovTech sector**: the current e-ID is a promising solution, but does not cover the whole spectrum of authentication services and does not allow access to all government services. Digitalization within the sector will rely on RRF funding.
- **Fintech is another area to watch** – e-Identification (though so far completely separate from the Govtech identification system…) and some other solutions are already available, while there is definite room for further development according to international best practices.
- **Healthcare and Education.** As part of government services, these two sectors will receive significant amount of funds allocated to support digitalisation efforts from 2021 onwards: 'Healthcare' will receive 34% (EUR 565 million); 'Demography and public education' will receive 33% (EUR 543 million) of the total RRF funding amount allocated for digitalisation efforts. The reforms and investments should be implemented by 2026.
- **Agriculture.** The agricultural sector is an important part of the EU funding sources, however, in Hungary; the supports are typically not devoted to digitalisation. Whereas the Hungarian agricultural industry is technologically underdeveloped, the sector can provide potential prospects for Danish companies.
- **Green economy / climate protection.** The European Commission targets to achieve a minimum of 37% of expenditures of the national RRF plans for climate investments and reforms. Sustainability and green economy are main focus areas of more European strategies for the following decades and large amount of funds are expected to be allocated to sustainability and green measures. It may be worth considering digitalisation solutions connected to green initiatives due to the market growth perspectives.
- **Artificial intelligence**. As part of the Digital Success Programme, a dedicated high-level strategy regarding AI was released for the 2020-2030 period in Hungary. The Hungarian Artificial Intelligence Coalition was established in October 2018 with the aim of

providing community and forum for all actors in the Hungarian AI ecosystem. There is a governmental effort to spread AI in Hungary and to expand the digital solutions based on the technology, providing new opportunities for the affected market actors.

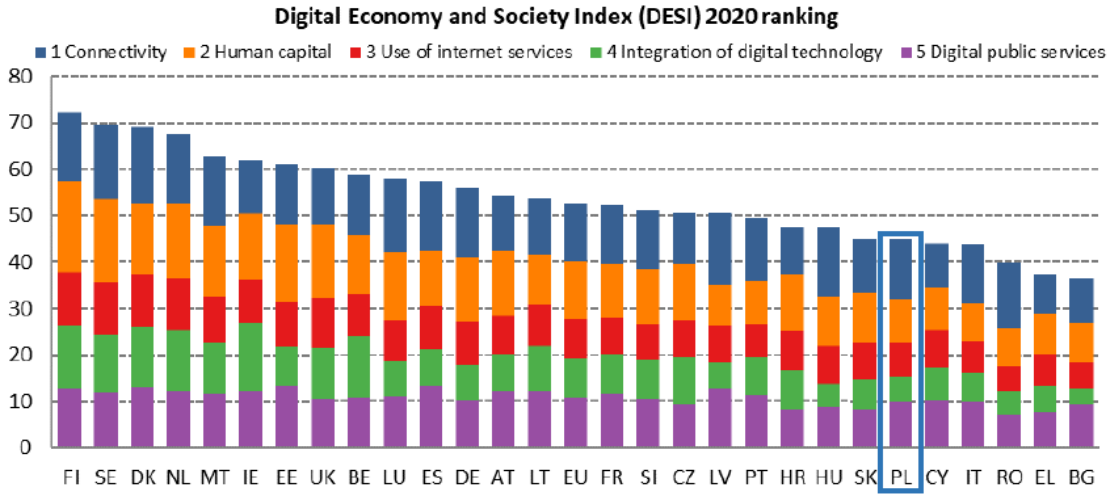
POLAND

3.1 Current state of digitalisation in the public sector in Poland

3.1.1 DESI Index

The European Commission monitors the digital progress of the member states through the Digital Economy and Society index (DESI)[44]. Poland takes 23rd place out of the 28 EU member states.

Figure 7: European Commission DESI Index 2020



Source: DESI ranking 2020.

As for connectivity, Poland ranks 15th. Poland has achieved better results than the EU average in both take-up of fixed broadband with speeds of at least 100 Mbps and mobile broadband take-up. With 176 mobile broadband subscriptions per 100 people, Poland ranks first in the EU. Poland is the market with the lowest retail prices in the EU and scores 81 on the broadband price index (EU average of 64). In terms of 4G coverage, Poland remains above the EU average (99%). In terms of the next generation access (NGA) broadband coverage, Poland is below the EU average (76%).

The connectivity score was negatively influenced by the 5G readiness factor, which amounts to 0%. This is due to a delay in freeing the spectrum utilisation in the 470 – 694 MHz band. The Russian Federation confirmed the mutual technical coordination concerning the utilisation of the spectrum; however, the formal agreement is still pending. Moreover, Russia, Belarus and Ukraine have not indicated the date for releasing the 700 MHz band from TV transmission, which is necessary for assigning the 700 MHz spectrum band for 5G purposes in Poland. The 5G network is of significant importance for further development of the Polish economy, which will be reflected the distribution of the RRF funds.

[44] https://digital-strategy.ec.europa.eu/en/policies/desi-poland

As for the human capital, Poland ranks 22th. This is due to the fact that only 44% of individuals between the age of 16 and 74 possess at least a basic level of digital skills (EU average: 58%). Moreover, this dimension considers the supply of ICT specialists, which is growing in Poland but still remains below the EU average.

Poland ranks 23rd in the dimension of the use of internet services. The number of persons who have never used the Internet continues to drop, and more and more citizens engage in online activities. 75% of Polish internet users read news online (EU average: 72%). Poles use the internet extensively for shopping (66%) and banking (59%).

Concerning the integration of digital technology in businesses' activities, Poland ranks 25th. Polish enterprises still have a lot of room for improvement in domestic and cross-border online sales (13% of Polish SMEs sell online in Poland compared to the EU average of 18%; only 5% sell cross-border). Only 14% of Polish companies use social media (EU average: 25%), 7% use cloud services and 8% analyse big data. Cloud services and big data scores are below the EU average.

Last but not least, Poland ranks 20th on digital public services, which is below the EU average. Poland is quite mature in open data, but the level of online interaction between public authorities and the public remains low. On a positive note, the number of users of existing e-services is growing. Moreover, Poland scores below the EU average on the availability of e-government services for companies, which is 75% (EU average: 88%).

Another measure to assess the digitalisation level in a country is the EDGI index (**the United Nations E-Government Development Index**)[45]. The EGDI measures the readiness and capacity of national institutions to use the newest technologies to deliver public services. The EDGI includes three indices: Telecommunications Infrastructure Index (TII), Human Capital Index (HCI), and Online Service Index (OSI). Poland ranks 24th in this survey with a very high EDGI result (Denmark ranks 1st).

The Telecommunication Infrastructure Index (TII) is an arithmetic average of four indicators: an estimated number of Internet users per 100 inhabitants, a number of mobile subscribers per 100 inhabitants, active mobile-broadband subscriptions, and a number of fixed broadband subscriptions per 100 inhabitants. The Human Capital Index (HCI) includes four components: adult literacy rate, the combined primary, secondary and tertiary gross enrolment ratio, expected years of schooling, and an average number of years of completed education. The Online Service Index (OSI) is a result of an online service questionnaire consisting of 148 questions. The total number of points is normalised to the range of 0 to 1.

Table 3. The E-Government Development Index results for Poland and Denmark

Country	EDGI rank	TII	HCI	OSI
Poland	24	0.8588	0.9001	0.8005
Denmark	1	0.9706	0.9588	0.9979

Source: UN E-government Survey 2020.

[45] https://publicadministration.un.org/egovkb/en-us/Data/Country-Information/id/135-Poland

3.1.2 Overview of existing systems in Poland

Basic registers[46]

Poland has the following registers: PESEL Register (personal number register), Register of ID Cards, Civil Status Register, Central Register of Issued and Invalidated Passport Documents, Central Register of Drivers, Central Register of Vehicles, Central Register of Parking Card Holders. The data from these registers can be extracted on request based on a specific legal basis.

Digital identity

There are several ways to verify one's identity in Poland. Citizens can log in using their trusted profile, e-ID card, or mojeID.

1. A trusted profile[47] is a confirmed set of data that uniquely identifies its owner in the services of public entities on the Internet. These data include first name or names, surname, date of birth, and the PESEL number. With the help of the trusted profile, citizens can effectively confirm their identity on the Internet and sign applications. To create the trusted profile online, one can use a bank account, a qualified electronic signature, or an e-ID card. The bank account is used to quickly and securely set up and confirm a trusted profile. Currently, nine banks offer such a possibility. Another way is to create a profile directly at the office or after registering on the trusted profile page and completing the application form. In the first case, the profile will be activated immediately because a clerk can immediately confirm the identity of the person. In the second case, despite filling in the application online, a citizen will be obliged to visit one of the confirmation points within 14 days of submitting the application (offices or banks). There is also a possibility of confirming one's identity during a video call with a clerk.
   According to the official instruction[48], the two-factor verification is possible. The user needs to activate this function on their own trusted profile. Every time the user logs in (excluding the bank account method), the system will ask for a one-time code sent to the user's mobile phone. Such a verification is also required by banks.
2. e-ID card[49] is a regular identity card with an electronic layer. It looks similar to the ID cards which have been issued so far. The only new information on the first page of the document is the CAN number. It is also written in the barcode on the other side. This number is needed if one wants to use the electronic functions. It also protects the e-ID against reading the data stored in the electronic layer by unauthorized persons. e-ID cards have an embedded chip which makes the e-ID card work contactless. The existing functions of the ID card remain the same despite the electronic functions. Thanks to the electronic layer, interested persons can use the e-ID to communicate with public administration and other entities. The use of the identification and authentication certificate and the personal signature certificate in the e-ID card is possible after the ID card owner has previously determined the PIN codes for each of these certificates (4-digit PIN1 and 6-digit PIN2 respectively). One can set the codes at the municipality office when collecting the ID card. In order to be able to use the electronic functions of the e-

[46] https://www.gov.pl/web/cyfryzacja/rejestry-ewidencje-panstwowe
[47] https://www.gov.pl/web/cyfryzacja/profil-zaufany
[48] https://pz.gov.pl/Instrukcja_Uzytkownika_PZ.pdf
[49] https://www.gov.pl/web/e-dowod

ID, one needs to have an e-ID reader and install e-ID software manager and e-ID electronic signature or a smartphone with an NFC antenna and install a special app.

3. mojeID[50] is another secure tool confirming identity online. It was developed by the National Clearing House. In order to use it, one selects the login option mojeID on the website of the service provider or authority that provides this method of confirming identity. After clicking the appropriate button or link, icons of identity providers will be displayed (banks). The user selects the bank with which they would like to confirm their identity or transfer data with. Later on, they are redirected to the bank's website and enter their login and password there. After logging in, they will be asked to consent to the transfer of his data. After confirming the transfer of data, the user will be automatically transferred to the company's website or office, whose services they wish to use.

Contact with citizens and businesses

1. Citizen's portal - www.obywatel.gov.pl
   Polish citizens can use the portal www.obywatel.gov.pl for e-services. Every service is described in a simple and accessible way, and citizens learn what they need to do, what to prepare, where to go and what they can do without leaving their home. Currently, citizens can find several hundred of the most popular services provided by public administration. The portal is being updated, and more services are being added to the website. Some services have just a description and step-by-step guidelines. In total, there are 185 services available, but only 51 are fully online.[51] The available online services include:
   - checking drivers' penalty points
   - checking vehicle's record online
   - register a purchase or a sale of a car
   - sending a general letter to Polish authorities
   - obtaining a copy of the civil status certificate
   - reporting the loss of one's ID card
   - registering for a permanent or temporary stay longer than three months
   - checking details of a public bus or private company's bus e.g. insurance, technical checks etc.
2. E-services for businesses - www.biznes.gov.pl
   The purpose of the portal is to help with matters related to setting up and running a business. The main three pillars of the portal are services helping entrepreneurs handle cases online; current content on applicable law, required procedures and formalities related to establishing and running a business in Poland and the European Union; and the Business Support Centre where experts answer questions about running a business. On this portal, entrepreneurs can submit applications to institutions online. Information on the biznes.gov.pl website is available in Polish and English. One can log in to the portal via the trusted profile or using e-ID. It is also possible to register on the portal via an e-mail address.
3. Portal www.gov.pl – in progress (estimated to be finished in 2022)

[50] https://www.mojeid.pl/
[51] https://obywatel.gov.pl/o-serwisie

The purpose of this project is to build a coherent information system for the entire administration - a digital gateway that provides all types of information and e-services offered by public administration. As part of the work carried out in the project, the websites of the central, regional and local government offices will be migrated. The content management system will be developed, which will allow different offices conveniently manage and update their content. This portal will be an enhanced version of the existing portals including more functionalities, such as the upcoming digital post (e-delivery service).

Digital Post (e-delivery - e-doręczenia) – in progress

e-Delivery[52] is a tool for receiving and sending correspondence online between citizens and public administration. Each office, citizen, and entrepreneur will have one contact address and an appropriately secured e-mail box. e-Delivery will be used in administrative, court, and civil proceedings. Citizens who do not use or cannot use digital technologies will be able to use the so-called public hybrid service. The public hybrid service will rely on the processing electronically sent correspondence into a paper form. This service is in progress and cannot be accessed yet, but the works are advanced. The law enabling digital post solutions will come into force in October 2021. The address to the service: https://eskrzynka.poczta-polska.pl/#/

E-health solutions

All e-health solutions are based on one platform called P1 established and administered by the E-health Centre[53]. The E-health Centre is the governmental agency responsible for digitalisation of the health sector. The E-health Centre is subordinated to the Ministry of Health, Department of Innovation[54].

The P1 platform includes the following services:

1. Internet Patient Account[55] (IKP) www.pacjent.gov.pl
   It is the main health portal for individual patients where one can log in using the trusted profile or mojeID (please check the digital identity section). The IKP is divided into sections where patient can check prescribed medicines, previous visits as well as vaccinations taken. The IKP is available on smartphones (mojeIKP app).
2. E-prescriptions
   Doctors can enter the patient's account on the P1 platform using the dedicated portal www.gabinet.gov.pl, which is the same platform as the IKP but with many more functionalities. An electronic prescription is issued there, and patients receive an e-mail with an electronic prescription marked with a barcode to be scanned at a pharmacy. At the same time, a text message is sent to a mobile phone. The code from the text message and the national identification number PESEL gives access to prescribed medicines. Additionally digital version of prescription is available on the smartphone in mCitizen app.
3. COVID-19 digital solutions

[52] https://www.gov.pl/web/e-doreczenia/e-doreczenia
[53] https://www.cez.gov.pl/
[54] https://www.gov.pl/web/zdrowie/departament-innowacji
[55] https://pacjent.gov.pl/internetowe-konto-pacjenta

The COVID-19 pandemic boosted the development of additional functionalities on the internet patient account (IKP), such as COVID-19 vaccination e-referrals, COVID-19 vaccinations registering or checking of coronavirus tests results.

- Coronavirus testing patient flow
  Each patient can register for official testing using automated internet application. Confirmation of personality is done using the so-called trusted profile. If a person does not use the trusted profile, a consultant calls back to verify personality. After the registration, a patient receives a text message with a date and place where testing can be done in a certified lab. If there are no free slots in the nearest lab, the patient receives a text message with a link to enter e-queue system (official digital waiting line system) to register for testing.
- COVID-19 vaccinations patient flow
  The central registration is done on the P1 internet patient platform under the patient portal www.pacjent.gov.pl using an electronic referral. E-referrals are issued automatically to age groups beginning from the oldest ones. Each Polish citizen has now such an e-referral issued. Patient can choose IKP vaccination points as well as a date of vaccination and a dedicated 15-minute time slot. Registering on the hotline 989 and SMS registrations are also available. After the vaccination, the medical staff puts information about vaccination including serial number of vaccine administered into the system. These items are all inserted to the same digital platform but use the dedicated www.gabinet.gov.pl website. Data both from the IKP patient portal as well as from the medical facility webpage land on one P1 platform administered by the E-Health Centre.

4. E-referrals[56]
   This project encompassed experiences gained during the implementation of COVID-19 vaccinations tools. The e–referral is issued as an e-mail with a barcode or a text message with an individual code for these who do not use smartphones.

Digitalisation of the Social Insurance Institution

The Social Insurance Institution (Zakład Ubezpieczeń Społecznych, ZUS) is a state organisational unit performing tasks in the field of social insurance in Poland. ZUS is recognised as a digitalisation leader in the Polish public sector. Within the last years, ZUS has introduced:

1. E-contribution[57] – introduction of one account where entrepreneurs transfer social contributions. This means a departure from the previous model, in which the entrepreneur had to worry about the exact division of contributions into three and sometimes even four different funds. In the new model, it is ZUS that takes care of the distribution of contributions. Thanks to the e-contribution, entrepreneurs avoid committing tens of thousands mistakes per month. After the introduction of the system, the number of mistakes dropped to over 30 per month.
2. Electronic Services Platform ZUS[58] – contribution payers can check the amount of contributions they have paid. They can also check if they have a debt or an overpayment.

[56] https://pacjent.gov.pl/internetowe-konto-pacjenta/eskierowanie
[57] https://www.zus.pl/eskladka
[58] https://www.zus.pl/baza-wiedzy/o-platformie-uslug-elektronicznych-pue-

3. e-ZLA[59] (electronic sick leave certificate) – doctors issue a sick leave certificate in the system and it is automatically transferred to ZUS and, later on, to the employer. This change was introduced in 2018.
4. E-Files (e-Akta)[60] – this project facilitated the storage of employee files concerning employees and employers. Companies gained the ability to store this documentation in an electronic form. Based on this change, employers will be able to keep employee files for 10, not 50 years as it used to be, because ZUS will have all the data needed to obtain benefits and determine their amount.

Systems supporting digital education

1. Integrated Educational Platform[61] - www.epodreczniki.pl
   The www.epodreczniki.pl platform is an educational platform offering e-materials free of charge. These are general and vocational education materials and materials for students with diverse educational needs. In total, there are over 6,800 interactive e-materials. Logged-in users also have access to the content editor for teachers and students allowing them to modify existing e-materials or create their own. The platform is not a mandatory tool.
2. Nationwide Educational Network[62]
   The project of the Nationwide Education Network assumes the creation of the Internet access network connecting all schools in Poland (approx. 30,500). The nationwide Educational Network is a virtual network based on the existing broadband infrastructure (built entirely from commercial funds and with the participation of public funds, in particular the Operational Program Digital Poland).

Other projects

1. The Electronic Invoicing Platform[63] – www.efaktura.gov.pl
   This is a central platform for receiving and sending electronic invoices and other documents between procurers and public procurement contractors.
2. E-procurement[64]
   The project involved the implementation of the e-procurement platform, which ensures completeness and consistency of information on the functioning of the public procurement market in Poland.
3. Public Administration Directories[65] – in progress
   Public Administration Directories will accelerate the implementation and improve the quality of services provided by the public administration in Poland. Civil servants will be equipped with a tool enabling them to obtain information on services and public entities in a direct, fast, and user-friendly way. The directory will contribute to the unification of document templates used in the public administration. With this system, citizens and entrepreneurs will be able to deal with official matters more efficiently based on clear procedures. The catalogue will include the information on public entities and

[59] https://www.zus.pl/ezla
[60] https://www.zus.pl/firmy/przedsiebiorco-przeczytaj-wazne/e-akta
[61] https://www.gov.pl/web/zdalnelekcje
[62] https://ose.gov.pl/
[63] https://efaktura.gov.pl/
[64] https://www.uzp.gov.pl/
[65] https://www.gov.pl/web/cyfryzacja/kap--katalogi-administracji-publicznej

public registers, matters which the public administration can help with, a list of e-services, templates of documents.

4. Open data initiative – www.dane.gov.pl
   Poland is currently implementing the Data Opening Program for 2021-2027. It covers key issues of data sharing and management. It is addressed to government administration bodies, their subordinate or supervised units, and the President of the Central Statistical Office. In addition, it can also be implemented by other entities that create or store data, in particular local government units or private entities. The aim of the programme is to increase the supply and improve the quality of data available on the dane.gov.pl portal, necessary to build innovative services and applications.
5. Electronic Document Management System[66]
   The Electronic Document Management System is a freeware system for electronic documentation and information management. It will enable comprehensive management of electronic documentation and the performance of auxiliary activities supporting the management of paper documentation. The system will handle the following tasks: handling of parcels, distribution and assignment of correspondence, classification and qualification of documentation, completion of case files, or archiving the documentation. Moreover, the system will enable users to access the state's information resources (including registers), provide tools for managing processes, reports and registers, and ensure integration with the existing systems. The main goal of this project is to monitor the functioning of the Polish administration, for example testing the effectiveness of procedures created in various entities to proceed the same matters), and to optimise workflow in offices. Thanks to this system, one will introduce verification and monitoring tools for the implementation of administrative procedures, for instance citizens' satisfaction surveys. The system is being tested and should be fully operating in 2022 in public administration. The development of the system is supervised by the Chancellery of the Prime Minister and conducted by the Research and Academic Computer Network (NASK).
6. SZPoN[67] – remote work and education system
   According to the Chancellery of the Prime Minister, SZPoN will replace the commercial solutions available on the market enabling video chats, file exchange, messages, e-learning. Each institution will be able to use this solution free of charge. The construction and implementation of SZPoN are financed from European Funds (budget: PLN 9.5 m). SZPoN will include two modules - for remote work and remote education. Both modules can be used by officials and citizens. The first SZPoN module related to remote work / virtual office includes a teleconference tool with a video module; a tool for sharing documents, building lists of tasks and assigning them to other people, and integrating them with the calendar; a module for a citizen that allows arranging meetings with a public office. The remote learning module will make it possible to publish and take courses addressed to individual groups of office employees as well as to all employees of a specific office. SZPoN can be integrated with other planned systems as well as with the existing digital services of the Polish administration.

[66] https://www.gov.pl/web/cyfryzacja/ezd-rp-w-administracji-publicznej
[67] https://www.gov.pl/web/cyfryzacja/wirtualny-urzad-i-nie-tylko---oto-szpon

3.1.3 Initiatives supporting the strengthening of digital competences

Poland has started a number of initiatives to improve digital competences of the Polish society. Moreover, digital skills are covered by the Operational Programme Digital Poland for 2014-2020 funded by the European Regional Development Fund. The programme supports the improvement of skills of the most digitally excluded, the ability to use public and commercial e-services and high-level competences of the most talented students and programmers.

At the end of 2020, the Council of Ministers adopted the Integrated Skills Strategy 2030[68]. The document takes into consideration recommendations from the OECD Skill Strategy for Poland report and the New Skills Agenda for Europe. The aim of the strategy is to support life-long learning on all stages of life. The priority is, among others, to strengthen the development of digital competences and digital education. The programme aims at providing all citizens with the opportunity to acquire digital competences. The strategy underlines the importance of e-readiness among civil servants and teachers. Furthermore, the document assumes that local digital development centres will be created to deliver special training to everyone who needs it. Another objective is to improve the digital competences of employees and, in this way, contribute to an increase in productivity in Poland.

An example of initiatives supporting digital competences among teachers is a project "Lesson: Enter" developed by a non-profit organisation, Orange Foundation[69]. The project is run by a consortium of three non-profit organisations – Orange Foundation, Information Society Development Foundation, and Institute of Public Affairs. "Lesson: Enter" provides free training for teachers and school managers. The objective is to change the way teachers conduct their lessons by presenting them the benefits of using digital tools. The project has been financed by the Operational Program Digital Poland for 2014-2020.

The Chancellery of the Prime Minister launched several promotional and educational campaigns in 2019. The topics ranged from promoting security online, increasing the use of e-government services, encouraging citizens to online activities, such as banking, shopping, purchasing tickets, communication. The project is also financed by the Operational Program Digital Poland for 2014-2020.

3.1.4 COVID-19's impact on digitalisation in Poland

The COVID-19 pandemic has accelerated the adoption of digital solutions. The government launched a platform with online materials for teachers and children to be used during remote classes. Moreover, the interest in online services increased and more and more Poles created a trusted profile (over 11 m)[70].

Other solutions include an application for the home quarantine and STOP COVID app. The quarantine app allows a person to confirm the place of quarantine, basic health assessment, and modification of basic data. The STOP COVID app monitors other users around our device and sends notifications about contact with a sick person.

[68] https://www.gov.pl/web/edukacja-i-nauka/zintegrowana-strategia-umiejetnosci-2030-czesc-szczegolowa--dokument-przyjety-przez-rade-ministrow
[69] https://fundacja.orange.pl/en/
[70] https://www.coi.gov.pl/pz

Quarantine app: https://www.gov.pl/web/koronawirus/kwarantanna-domowa
STOP COVID app: https://www.gov.pl/web/protegosafe

Furthermore, the COVID-19 pandemic accelerated the development of additional functionalities on the internet patient account, such as COVID-19 vaccination e-referrals, registration for COVID-19 vaccination, registration for a coronavirus test, and checking coronavirus test results.

3.2 Policy and strategy overview

Poland has a number of different strategies and frameworks. The strategies very often supplement each other and present similar directions. The most recent documents stating Polish priorities in the field of digitalisation are:

a) The Policy Framework for the Development of Artificial Intelligence in Poland
The document describes activities that Poland should implement and goals that it should achieve in the short-term (by 2023), medium-term (by 2027) and long-term (after 2027) perspective aimed at the development of Polish society, the Polish economy and Polish science in the field of artificial intelligence. The activities include support of companies developing AI, improvement of digital competences, strengthening research in the field of AI, promoting AI companies internationally, AI education, and data trust and open data initiatives.

More information: https://monitorpolski.gov.pl/M2021000002301.pdf

b) Healthy Future – Policy for the Development of the Healthcare System in the years 2021-2027
The document is a strategic policy paper for public health services for the years 2021-2027. The project is under consultation at the moment and is required by the European Commission to allocate funds from the multiannual financial framework for the years 2021-2027. As for digitalisation, Poland will continue building health-related e-services, for example e-registrations, electronic documentation and e-documentation exchange. The ambition is to use big data and analytics to predict a future state of a patient, and remote health monitoring.

More information: https://legislacja.rcl.gov.pl/docs//3/12348352/12798638/12798639/dokument509773.pdf

c) Integrated State Digitalisation Programme
The Integrated State Digitalisation Programme is a strategic document of the Council of Ministers. It is aimed at the development of the Polish public administration and creating conditions facilitating communication with the public administration for citizens. The implementation of the programme is planned for the years 2019–2022. The document promotes user-centred approach, horizontal solutions, and e-competences.

More information: https://www.gov.pl/web/cyfryzacja/program-zintegrowanej-informatyzacji-panstwa

d) The Polish Deal (Polski Ład)
It is a strategic policy paper made by the current ruling coalition. Currently, the document is being discussed and there is no final proposal yet. However, the document is a very good overview of strategic directions in the field of digitalisation. One of the

biggest investments will be digital infrastructure and further development of the telecommunications network for mobile devices. According to the document, the whole Poland will gain access to a signal that allows the use of the 5G network. As for e-health solutions, there are plans to establish the Patient Service Centre (patient.gov.pl). This will be the next step of digitalisation of the health system, which will help schedule appointments with GPs and specialists online or via phone.

Moreover, the Polish Deal underlines the need to digitalise investment and construction procedures. Together with the Main Construction Supervision Office, the government has prepared a package of solutions introducing improvement to the Construction Law including the possibility of submitting specific documents in the investment and construction process in an electronic form. Services for farmers will also be subject to digitalisation. The new portal will be a one-stop shop for farmers and handle applications for direct payments or land taxes.

As for digital competences, selected school teachers will receive appropriate training in digital competences and will coordinate the development of such competences among students. They will teach how to stay safe online and educate about fake news. In the school year 2021/2022, an electronic journal for all Polish schools will be introduced. It will be a platform for students and parents to communicate with the school and create virtual classes. Schools will also use more of new technologies and a repository of electronic materials in the form of recordings and films will be implemented. The materials will especially support the learning process of students who, for various reasons, cannot participate in school activities (for example due to illness).

Big part of the Polish Deal is the Cyber Poland 2025 programme, which includes, among others, the following projects:

- Satellite Earth Observation System - this system will make it possible to provide the state administration with essential information of key importance to national security. It will be an important step towards the development of digitalisation and an increase in information and technological sovereignty. The implementation of the system will also expand possibilities in environmental protection, spatial planning, and crop management.
- Digital services – the services will be digital as default. Services will be designed with the assumption that the paper form, although available to those who want it, will be the exception and not the rule. Communication with public offices will be supplemented by tools as queuing systems for offices, tele- and video-visits, chatbots and voicebots. The plan is that the percentage of Poles using the Internet in contact with the administration will increase to 60 percent by 2023 as a result of promoting e-services, and every second Pole will have a trusted profile.
- Digital identity – the current identity systems (trusted profile, mCitizen, and electronic identity card) will be integrated. The widespread use of digital identity in everyday life - both in contacts with the administration and in businesses will be enabled.
- mCitizen (mObywatel) - the list of personal documents in a virtual wallet, the mObywatel application, will be extended by, for example, city cards.
- e-delivery (digital communication)

- Cloud Poland project - financial support for small and medium enterprises and public institutions, which wish to implement cloud technologies.
- Digitalisation of the judiciary - investments in the efficient communication between the parties to the proceedings and a modern infrastructure
- Local centres for the development of digital competences - local places (e.g. libraries) will become centres of basic digital support. Residents will be able to receive assistance in, for example, searching for information, using e-services.
- Cybersecurity education - increasing public awareness of cyber threats. Cybersecurity will be part of the curriculum in schools and universities so that every pupil and student (according to profile and field of study) can familiarise themselves with the safe use of the Internet.
- High Performance Computing & Quantum Computing - Poland will soon include supercomputers in its strategic resources. They will serve as tools for advanced engineering simulations and calculations of large amounts of data. The Polish state will also use them for artificial intelligence solutions, including those for business and industry, space technologies, meteorology or crisis modelling (e.g. for epidemics).
- Digital municipality - local authorities will receive funding for the purchase of hardware and software, the acquisition of cloud services, introducing measures to improve cybersecurity or support for the digitally excluded. This programme will also provide municipalities with a free cloud-based system for running and managing their offices. The system will include tools for collaborative work, portals, chatbots, tools for collecting opinions and interaction with citizens. Local governments will also gain the opportunity to transfer their services to the samorzad.gov.pl portal free-of-charge. All Polish municipalities and districts will be able to publish their services on this portal.
- Fight against cybercrimes - penalties for cybercrimes will be tightened. The programme will identify new types of crimes and update their catalogue
- E-participation – implementation of IT tools to support participation of citizens in making decisions important for the community.

More information on http://polskilad.pis.org.pl/files/Polski_Lad.pdf

e) The National Recovery Plan (based on the Next Generation EU and RRF)
The Next Generation EU is the EU response to the new threats and challenges caused by the COVID-19 pandemic. It has two main goals - restoring the resilience of EU economies to possible crises and preparation for future circumstances. The largest part of the fund is the Recovery and Resilience Facility (RRF). The fund also consists of smaller programs. **The National Recovery Plan for Poland is awaiting the EU Commission's approval.** Poland will have at its disposal approximately EUR 58.1 billion (in current prices) including:
- EUR 23.9 billion (in current prices) in the form of subsidies
- EUR 34.2 billion (in current prices) in loans

As for the loan part, Poland will initially apply for about EUR 12 bn.

The investments will be made in five main areas: digital transformation, resilience and competitiveness of the economy, energy and reduction of energy intensity, availability

and quality of the healthcare system, and green and intelligent mobility. This chapter presents activities stated in the Polish Recovery Plan related to digital transformation.

In the structure of the five proposed areas, most funds are allocated to green energy and energy intensity reduction - EUR 5.7 billion from the grant part and EUR 8.6 billion from the loan part (a total of EUR 14.3 billion) and green smart mobility - EUR 6.8 billion from the grant part and EUR 0.7 billion from the loan part (a total of EUR 7.5 billion). They constitute 39.8% and 20.9% of all funds.

As for resilience and competitiveness of the economy, EUR 4.5 billion from the grant part and EUR 245 million from the loan part (a total of EUR 4.7 billion) were allocated. This constitutes 13.1% of the total funding. Efficiency, availability and quality of the healthcare system will receive EUR 4.1 billion from the grant part and EUR 450 million from the loan part (a total of EUR 4.5 billion, which equals 12.6% of the total funding). Digital transformation will dispose of EUR 2.797 billion from the grant part and EUR 2,100 billion from the loan part (EUR 4.897 billion in total), which constitutes 13.6% of all funds. However, it should be remembered that activities (reforms and investments) related to digitalisation are included not only in the digital transformation component but also within green mobility, the health sector, and the competitiveness of the economy. Therefore, **the total expenditures on digitalisation will amount to 21.5% (20.6% RRF grant share, 23.2% RRF loan share)**, and climate expenditure will reach 48.3% (18.2% RRF grant share, 68.3% of the loan portion of RRF). In this way, Poland will meet the requirements of the RRF for digital and climate spending (20% and 37% respectively).

	Grants (EUR)	Loans (EUR)
Digital transformation	**2.797 bn**	**2.100 bn**
Resilience and competitiveness of the economy	4.5 bn	0.245 bn
Energy and reduction of energy intensity	5.7 bn	8.6 bn
Availability and quality of the healthcare system	4.1 bn	0.450 bn
Green and intelligent mobility	6.8 bn	0.7 bn

More information can be found on the government's webpage.[71]

The plan will introduce the following reforms and investments:

- Access to the high-speed Internet

[71] https://www.gov.pl/web/planodbudowy

Amount: 1,200 m EUR (grants) 1,400 m EUR (loans)

The plan will support projects related to the construction of broadband networks providing access to the very fast Internet in the so-called white spots. The implementation of the investment will involve additional 931,000 households, which will be covered by the broadband Internet access with a capacity of at least 100 Mb/s with the possibility of its modernisation to speeds measured in Gb/s. In addition to households, the range of supported investments will also include, among others, public institutions or businesses.

It is expected that thanks to the planned investment, the number of households covered by the network with a capacity of at least:

- 1) 30 Mb/s - will be at least 95%
- 2) 100 Mb/s - it will amount to at least 80% (with the possibility of increasing it to gigabit capacity)

- Public e-services, IT solutions improving the functioning of administration and the economy as well as breakthrough technologies in the public sector, economy and society

Amount: 420 m EUR (grants)

The aim is to increase a number of e-services available online. Moreover, the focus will be put on interoperability and connecting the applications with digital identity verification systems. As for the local government administration, there are plans to build a central platform of regional and local services enabling the publication and sharing of e-services for use by other units. Other investments include:

- digitalisation of the investment and construction process and digitalisation of the area of spatial development
- digitalisation of services and processes of the National Revenue Administration including the implementation of electronic circulation of invoices (national e-invoice system)
- digitalisation of agriculture including implementation of geomatic solutions and satellite monitoring in agriculture, implementation of the agricultural area verification system, veterinary supervision system

As for breakthrough technologies, such as blockchain, Internet of Things, and artificial intelligence, three cooperation mechanisms will be implemented including the possibility of conducting tests and experiments by involving local government units, local entrepreneurs and start-ups, scientific communities and citizens to co-create solutions. The plan is to create:

- a mechanism of sharing model solutions / libraries of universal digital solutions with the IoT / AI component. The central government will finance pilot implementations, which will then be made available for re-use by other local government units
- platforms for communication with the market to support the development of blockchain technology
- exemplary models for sharing data in a trusted environment, providing AI solutions developers with permanent access to high-quality data. Pilot implementations contributing to the promotion of data sharing, building virtual data stores and network connections will be financed, based on the policy for the development of artificial intelligence in Poland

- Edtech investments – purchase of mobile IT equipment

Amount: 550 m EUR (grants), 700 m EUR (loans)

The aim of the investment is to support the digitalisation of the education process by equipping schools with modern multimedia equipment for individual use (laptops etc.) made available to teachers and students for their ongoing educational work. This goal will be implemented in parallel with further activities in the area of the development of digital competences of teachers and the development of the public database and proven e-educational materials and tools (educational platform) that will be implemented with the use of other financial instruments (state budget, ESF+).

- E-competences

Amount: 184 m EUR (grants)

This investment will aim at increasing the level of digital skills among Polish citizens. One of the measures will be the establishment of the Digital Competence Development Centre composed of experts, advisors, specialists in the field of digital competences and digitalisation. The Centre will be a network of experts that will be part of the Chancellery of the Prime Minister.

The investment will include training of civil servants who will learn how to work with e-services, how to use cloud solutions, the trusted profile, and means of electronic identification. Training in the use of digital competences (e-government, e-health, e-finance, e-security, e-services) will also be directed to citizens.

Furthermore, a network of regional / local digital development leaders will be created. They will support local government units and the institutions indicated by them as well as individual groups of citizens in terms of improving digital competences and providing them with IT equipment. Local leaders will be trained to support the local community, in particular the digitally excluded.

- Cybersecurity, infrastructure for data processing, delivery of digital services

Amount: 443 m EUR (grants)

The goal of this investment is to obtain an extended situational awareness and systemic operational support in responding to incidents through connecting entities of the national cybersecurity system to the integrated central cyberspace security management system and strengthening the potential and modernisation of infrastructure of national cybersecurity system entities and other key entities, especially operators of key services, critical infrastructure operators, digital service providers, entities from the healthcare sector, local government units. Moreover, seven regional cybersecurity centres will be established.

As for data processing, the investment's objective is to provide a highly efficient, energy-efficient and scalable infrastructure. It will be implemented through an investment project concerning the construction of three standardised and energy-efficient data processing centres and the support of digital service-oriented solutions. The overarching goal is to ensure efficiency that goes with energy saving and greater use of renewable energy sources in the construction of computing centres. The planned activities will be the foundation for building efficient, secure, and available digital services and securing critical infrastructure for ICT and telecommunications systems. The above elements are to ensure the continuity of the provision of services even in the event of interruptions in electricity supply or attempts to disrupt the operation of the telecommunications infrastructure.

- Digital transformation in health - amount: 1,000 m EUR (grants)

The e-health investments include:

- tools supporting the analysis of the patient's health condition. They aim at aggregating data from various devices performing medical measurements or measurements related to the patient's lifestyle, which will then be transferred to the Internet Patient's Account. The assumed stages of the service development include: creation of data exchange interfaces from applications collecting data from wearables, a data collection and processing system, preparation of an interface for a patient presenting data from wearables with the first interpretation of results and preventive recommendations and patient scoring, system development, development patient and physician data presentation interfaces.
- development of artificial intelligence algorithms - support for the doctor's decision-making process - collection and processing by the central system of documentation of laboratory tests and patient imaging tests for the purpose of intelligent search, e.g. neoplastic changes, indications for diabetes testing or changes in cells. The assumed result of the analysis will be the preparation of a report and notification of medical personnel (general practitioner, other indicated personnel) about changes in the patient's health condition in order to support the decision on additional examinations, initiation / change of treatment or patient rehabilitation. The assumed stages of the service development include: creation of data exchange interfaces for laboratory and diagnostic tests (in the context of imaging diagnostics), publication of a set of interface specifications for external systems along with integration documentation to support the doctor's decision, launch of a unit dealing with research on the results of laboratory and diagnostic tests (imaging), implementation of AI solutions supporting research and analysis of large data sets, feeding the medical personnel support system with applications, development of data presentation interfaces for the doctor.
- building a central repository of medical data - creating and providing an electronic bank (repository) of medical data (medical documentation). This bank will become the central location for storing medical data (e-medical records) in the country. The assumed stages of the service development include: development of the data exchange architecture concept, justification for the use of selected solutions, determination of purchasing needs, construction of the solution, configuration of the technical layer, integration with key systems in the field of health protection.

2. Digitalisation of medical records and further development of the service of its exchange - a key element of support in terms of the quality and effectiveness of the healthcare system is the implementation of e-medical records, both at the level of central solutions, and the adaptation of medical entities to the implementation of electronic medical records in practice. The current level of digitalisation of medical records is approx. 10% of the total number of types of documents. Ultimately, it is planned to reach the level of 60% within five years of the implementation of the National Recovery Plan, which means that on average up to five types of medical documents will be digitalised annually during the implementation of the reform.

3. Strengthening cybersecurity in health care - an important element of strengthening the resilience of the health care sector, especially in the context of the increased number of security incidents recorded during the COVID-19 pandemic. The action under the reform will be aimed at preparing IT resources of the e-Health Centre to perform the role of the Computer Security Incident Response Team in the healthcare sector by implementing an Integrated Management System, expanding security systems, implementing a security program for design and development in the area IT systems, construction of the Security Operations Centre.

- Digitalisation in transport

Amount: 341 m EUR (grant)

The aim of this investment is to modernise the transport system and implement digital solutions that improve the efficiency of using the transport infrastructure. Investments include the implementation of modern transport management systems. In particular, the investments will include:

- implementation of a comprehensive ticket purchase system in the rail transport
- implementation of remote control systems at 35 railway traffic stations
- modernisation of railroad crossing systems in 45 locations
- construction and renovation of local train control centres and investments in traffic management
- development of dynamic passenger information systems in 27 locations

3.3 Stakeholders

In 2020, the Ministry of Digitalisation was liquidated and the responsibilities related to digitalisation were shifted to the Chancellery of the Prime Minister. There are 10 departments at the Chancellery tackling digitalisation issues. Moreover, the Chancellery has a unit "GovTech Polska" disposing of three departments working in the area of e-society and e-services. The report presents two main digitalisation units: Digitalisation - the Chancellery of the Prime Minister and the GovTech Centre.

The management dealing with digitalisation at the Chancellery of the Prime Minister and respective departments are presented below. Later on, the report will list the departments responsible for digitalisation and the GovTech Centre.

a) Digitalisation – The Chancellery of the Prime Minister (Cyfryzacja KPRM)[72]

Mateusz Morawiecki	**Prime Minister, Minister of Digitalisation**	

[72] https://www.gov.pl/web/cyfryzacja/kierownictwo

Janusz Cieszyński	Secretary of State, Plenipotentiary of the Government for Cybersecurity	
Plenipotentiaries of the Minister		
Robert Kroplewski	Plenipotentiary of the Minister of Digitalisation for the Information Society	
Anna Gos	Plenipotentiary of the Minister of Digitalisation for Open Data	
Krzysztof Głomb	Plenipotentiary of the Minister of Digitalisation for Cooperation with the Local Government	
Maciej Świderski	Plenipotentiary of the Minister of Digitalisation for the maintenance of critical infrastructure and security management	

	systems for data processing centres	
Krzysztof Szubert	Plenipotentiary of the Minister of Digitalisation for the global conference of the United Nations "Internet Governance Forum"	

b) Departments responsible for digitalisation at the Chancellery of the Prime Minister.[73]

Name of the department	Tasks
Cybersecurity Department	Developing and implementing strategic documents and legal acts in the field of cybersecurity, developing guidelines for establishing appropriate measures to protect ICT systems, developing central plans for training, exercises and tests in the field of cybersecurity.
Department for Digital Regulation	Drafting normative acts and other government documents in the field of digitalisation and provide legislative services to the Minister responsible for digitalisation. Coordinating the process of concluding international agreements in the field of digitalisation.
Department for Development of E-services – GovTech Centre	Responsible for easier access for citizens to information and public e-services. Creating and maintaining the public e-services portal (gov.pl) as a central gateway to information and public e-services. Implementing IT projects for dealing with official matters online and reducing the costs of administration.
Department for Telecommunications	Responsible for issues related to legal regulations regarding the electronic communications services market, the development of telecommunications services and networks, and online services. Preparing and issuing opinions on draft legal acts as well as strategic plans and programmes. Cooperating with the EU and international organisations in the field of telecommunication.
Department for Data Management	Responsible for opening public data, especially for re-use in innovative products, goods and services. Creating the legal basis for the use of public sector information, implementing projects ensuring their digital accessibility and usability, and developing the dane.gov.pl portal.
Department for System Management	Maintaining and developing registers, records and systems, as well as providing access to data from registers. The registers are as follows: PESEL register (Polish personal numbers), register of ID cards, register of civil status, register of contact data, central register of issued

[73] https://www.gov.pl/web/cyfryzacja/biura-i-departamenty

	and invalidated passport documents, central register of drivers, central register of vehicles, central register of parking card holders etc.
Department for Information Society – GovTech Centre	Initiating, coordinating and implementing activities in the field of the development of information society, in particular in the area of improving digital competences.
Department for Innovative Solutions	Responsible for the development of new technologies (distributed ledgers, including blockchain, artificial intelligence, internet of things and big data), as well as communication policy in this area.
Department for State Information Architecture	Shaping the information architecture of the state and dealing with matters of ensuring the interoperability of the state's ICT systems, managing the portfolio of projects and creating a policy in the area of building and developing e-administration.
Department for Digital Policy	Shaping and promoting digital policy, carrying out tasks in the field of European and international digital regulations, coordinating activities related to the implementation of digital policy resulting from Poland's membership in the European Union, organising the Digital Summit 2020 – Internet Governance Forum Poland.

c) GovTech Centre[74]

The GovTech Centre is an inter-ministerial team operating at the Chancellery of the Prime Minister. The GovTech Centre was created based on the existing GovTech Department. The team operates across the entire public sector to coordinate strategic digital projects involving entrepreneurs, public administration, citizens, and everyone who can support the transformation of the Polish public sector with their ideas. In its description, the organisation states that it aims to draw on the best international experiences, share knowledge with other countries, and present Poland as a country that is able to contribute as much as the world's largest players in the field of digitalisation. The mission of the GovTech Centre is to coordinate the entire process of creating digital tools by the public administration. It focuses both on the technological aspect and participates in the process of creating digital reality and its popularisation among citizens. The Govtech Centre connects the public sector with innovative solutions by organising hackathons.

[74] https://www.gov.pl/web/govtech/centrum

Justyna Orłowska is the Plenipotentiary of the Prime Minister for GovTech. Justyna is responsible for the coordination of inter-ministerial activities of the state in the field of innovation and new technologies. She is a member of the Committee of the Council of Ministers for Digitalisation and is a representative of the Prime Minister in this field.

The GovTech Centre consists of three departments:

Name of the department	Tasks
GovTech Polska Department	Coordinating the work of the Team for the GovTech Polska Programme establishing and maintaining relations with domestic and foreign entities operating in the area of GovTech, setting directions for the development of the innovation ecosystem in the public sector; increasing the capacity of public administration to cooperate with entities developing modern technical solutions as well as supporting and activating these entities by organising events and providing financial incentives.
Department for Information Society	Mentioned above
Department for Development of E-services	Mentioned above

d) Central Information Technology Centre.[75]

The Central Information Technology Centre is the country's largest company implementing IT projects for the public sector. It performs tasks commissioned by the Chancellery of the Prime Minister. It employs over 500 specialists and provides comprehensive IT services ensuring the development and reliable operation of systems for the needs of public administration. The Centre ensures the correct and uninterrupted functioning of the most important state systems. It conducts their monitoring, maintenance, technical service and development. The Centre was established by the Minister of the Interior and Administration in 2010. The Central Information Technology Centre built, among others, the trusted profile solution, e-ID card, state registers' system, or the login.gov.pl solution integrating different ways of identity verification.

[75] https://www.coi.gov.pl/

e) NASK – National Research Institute.[76]

NASK's mission is to ensure the Internet security. NASK develops solutions increasing the efficiency, reliability and security of ICT networks and other complex network systems. The Institute has been involved in document management system or the electronic identity card.

f) Other units and cross-cutting digitalisation projects

The digitalisation responsibilities are dispersed over different Ministries based on their scope. The Ministry of Health and the E-health Centre lead the digitalisation strategy in the healthcare sector. The Ministry of Education and Science deals with digitalisation of the public education. Regions, counties (poviats), and municipalities ensure the implementation of e-government strategies. Within their respective scope, they can introduce digitalisation solutions and e-services. The GovTech Centre provides local government units with the solutions and frameworks which have been created on the central level. It is a very common practice that local government units and cities learn from each other and share their experiences between themselves. Moreover, there is a new initiative „Technology Map for Cities"[77] made by the Polish Development Fund (state-owned financial group), and companies offering solutions for smart cities in the field of mobility, quality of life, infrastructure management, digitalisation, and energy can join it.

3.4 Conclusions and recommendations for Danish companies

Considering the latest acceleration in adaption of new technologies in the public sector, we recommend looking at the following subsectors and areas:

- **Digitalisation in education** – the Polish education system was not ready for the pandemic, and the solutions made within a short time to satisfy the demand of teachers and pupils were insufficient. The National Recovery Plan focuses on delivering the infrastructure without which using any online platforms or applications will not be possible. Danish companies could contribute with fresh ideas in the area of digitalisation of educational content, creative, and interactive teaching methods and the like.
- **Digitalisation in healthcare** – Danish companies could especially contribute with AI-based solutions enabling predicting the patient's future health conditions. Polish stakeholders would like to know in what other ways they could use the data to promote prevention and well-being of current patients and ex-patients. Moreover, Poland is interested in solutions which support patients after hospitalisations, for example remote monitoring. Another challenge in the Polish healthcare system is integration of the existing telemedicine platforms. Companies offering solutions streamlining this process could be interesting.
- **Consulting services in the area of digital technologies** – one of the challenges described in the Polish National Recovery Plan is to support the implementation of the new technologies e.g. AI, Internet of Things, or blockchain. Danish companies could advise the Polish private and public entities on the best use of these technologies.
- **Consulting services in the area of UX** – the existing strategies underline the importance of the user-centred approach and user friendliness of new solutions. Danish

[76] https://www.nask.pl/
[77] https://pfrdlamiast.pl/technologie-dla-miast.html

companies with competences in the field of user experience could advise Polish institutions and companies cooperating with them on creating products meeting the needs of users. UX skills are currently in demand.

- **Advisory in the field of communication and increasing adaption of e-services** – Poland has much room for improvement in the field of e-competences. Significant part of the National Recovery Plan focuses on increasing adaption of electronic service, and therefore, additional training will be provided for citizens who lack digital skills. Danish companies could contribute with efficient ways of teaching digital skills and effective communication strategies.

Based on our experience, we see the following challenges:

- The National Recovery Plan for Poland has not yet been accepted by the EU Commission
- Price difference between the Polish and Danish companies. Price is usually one of the main criteria in tenders.
- Knowledge and practical experience with the Polish e-government environment and the Polish legislation is recommended.
- Language barrier. Key members of the team working with Polish offices should be fluent in Polish.
- Policy makers have their own development (programming) capacities, and many solutions have been designed in-house by the Central Information Technology Centre (COI).

We strongly recommend that you do the following:

- Map the institutions and stakeholders of your interest with the help of this report or the Trade Council.
- Use Twitter and other social media to follow the institutions in Poland related to your business. It could be the GovTech Centre, e-Health Centre, relevant ministers etc. This will help you understand the dynamics of the market or how many new solutions are being developed. It is the best way to stay updated.
- Check the Polish procurement portal on a regular basis in order not to miss a relevant tender. The platform is available under this link: https://ezamowienia.gov.pl/.
- Engage in a dialog with Polish stakeholders. This can be achieved by attending industry-specific events. The main event promoting digitalisation in Poland is the Digital Festival which takes place every year in October and is organised by Digital Poland. We encourage Danish companies to speak with organisers and participate actively in this event via becoming a sponsor / partner etc. Link to the Digital Festival: https://digitalfestival.pl/. Link to Digital Poland Foundation: https://www.digitalpoland.org/.
- Increase the visibility of your brand on the Polish market. Exposure during conferences is one of the opportunities, but you should also make sure that you appear on all the technology and company maps which are being created for public institutions and local governments. A great initiative of this kind is the Technology Map for Cities[78] made by the Polish Development Fund (state-owned financial group). We encourage Danish companies to look at this initiative.

[78] https://pfrdlamiast.pl/technologie-dla-miast.html

- Make sure that you have enough personnel to assign to the development of a new market. We strongly recommend that companies have a Polish-speaking business development specialist or a public affairs manager. Another way would be to cooperate with a specialised public affairs company or hiring a part-time agent / freelancer.
- Consider a partnership with a Polish IT company or a well-known foreign brand on the Polish market, such as Microsoft or Google.

UKRAINE

4.1 Current state of digitalisation in the public sector in Ukraine

According to the United Nation's 2020 e-Government Survey, Ukraine occupied the 69th position in the world, with an E-Governance Develop Index, or EGDI, of 0.7119. Two years earlier, the country ranked 82nd with an EGDI of 0.6165. For two years of active digital transformation, the state of Ukraine has accomplished a lot to move up on the ranking, however, the global digitalisation agenda has also greatly accelerated.[79]

In 2014, the government of Ukraine announced reforms in all public spheres. The main priorities were defined in the areas of macroeconomic stabilisation, fiscal regulation, banking sector reform, deregulation, privatisation, reform of energy sector, decentralisation and many others. Within the next two years, the Ukrainian GDP dropped by 16% due to a political instability and economic crisis, illegal annexation of Crimea by Russia and a military conflict that was started in the east. Since 2016, the economy has been stabilised with a gradual growth (up to 3.6% in 2019). However, the pandemic situation affected the Ukrainian economy, so currently it is declining again.

Digitalisation of the public sector started in the beginning of 2000s. In 2003, the law on Electronic Documents and Electronic Document Management' was adopted. The law on 'Electronic Signature' was adopted a year later. Afterwards, the Ukrainian Parliament adopted related laws in telecommunications and data protection.

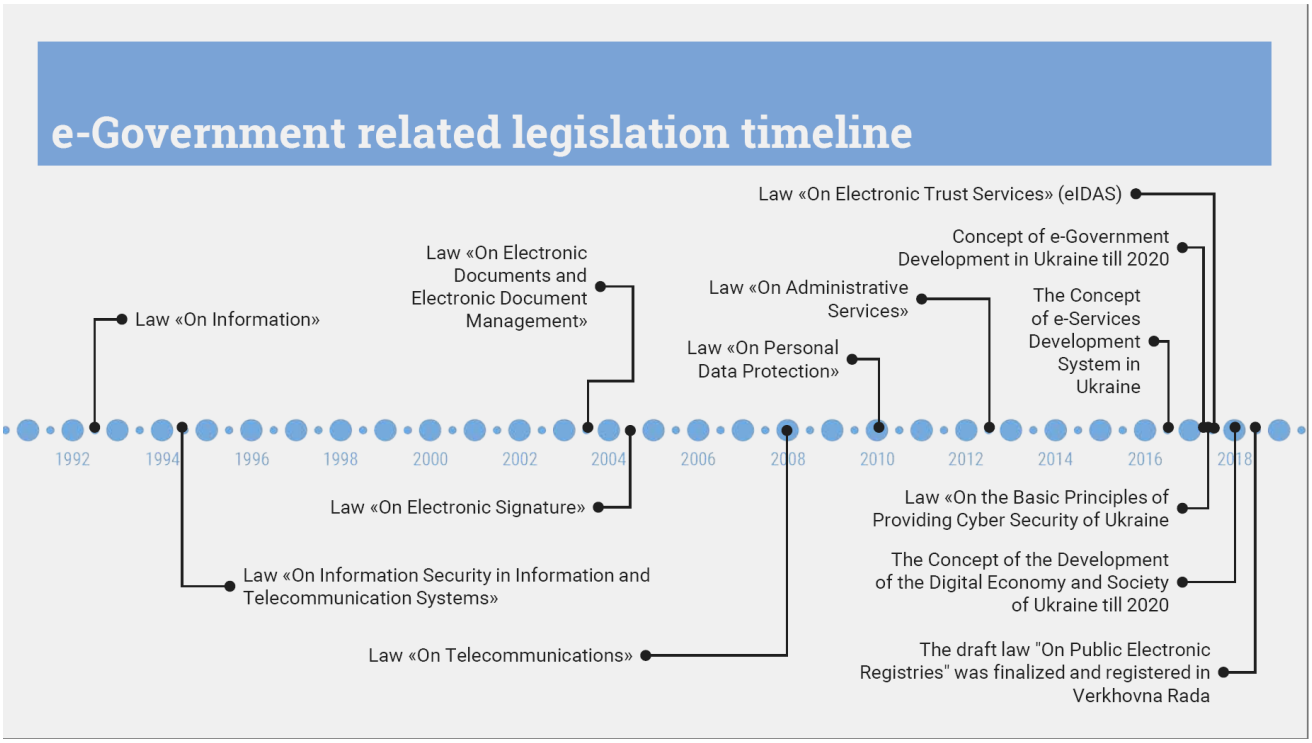
However, the active steps in the sphere of digitalisation were taken only after the Revolution of Dignity in 2014. Two important milestones can be mentioned after this time. Firstly, the dedicated agency for eGovernance, SAEGU, was created. The activity of SAEGU was focused on implementation of the state policies in the domains of information society development and government digitalisation. Secondly, in 2019 a new Ministry of Digital Transformation (MDT) was established, resulting in immediate actions in digitising the public sector of Ukraine.

Today, Ukraine is advancing on the digital path. The state is learning a lot from the EU countries and is developing the framework conditions necessary to establish a fully functioning digital economy and society. MDT has worked out the precise national action plan that will require considerable investments in infrastructure, the digital skills development, research, furthering legal basis and promoting regulatory bodies in electronic communications.

[79] United Nations e-Government Survey 2020

Legislative milestones in the development of digital government in Ukraine

Figure 8. e-Government legislation timeline[80]



Source: National Interoperability Framework Observatory

The digitalisation process of the public sphere was largely influenced by the decentralisation reform initiated right after 2014. As the delegation of authority from the national to the municipal level took place, it led to amalgamation of small municipalities and a redistribution of political, administrative and financial competencies to these unified and enlarged territorial communities that are called hromadas. This is particularly important, since around 15 500 settlements, with total population of 3.5 million people are not connected to optical Internet. This year the MDT announced the Internet Subvention Project under which 18 m USD will be allocated from the state budget still in 2021 to allocate subventions to local communities to provide the internet connection for the social infrastructure facilities located in villages.

4.1.1 Digitalisation - what has been done so far and how it is used. Existing systems in Ukraine

In 2020, the MDT implemented many initiatives laying a solid basis for digital state transformation. Due to active digital transformation, Ukraine became the first country to operate electronic passports and the fourth country in Europe to operate digital driver's licenses. The following projects on e-government have been started in Ukraine.

[80] National Interoperability Framework Observatory. www.joinup.ec.europa.eu

Digital Public Infrastructure of Ukraine

Ukraine's eServices Portal

www.kmu.gov.ua

Currently, a total of 125 eServices are available through the Cabinet of Ministers Portal. These services are accessible both for citizens and for business. They are divided into categories such as healthcare, education, finance and taxation, transportation, entrepreneurship, etc. The portal was designated for an update in 2019 with key improvements in the optimisation of eServices based on life events and business cases principles. More than 50 eServices were launched in 2019 and are now available. The Cabinet of Ministers of Ukraine was the owner and overseer of the portal.

State Portal of Administrative Services

www.my.gov.ua

The State Portal of Administrative Services provides information on more than 1 200 administrative services available in Ukraine. Its key objective is to provide comprehensive information about administrative services that can be received offline, documents needed to obtain these services and centres where these services can be obtained. It also contains the map of administrative services centres to simplify the access.

National Open Data Portal

www.Data.gov.ua

Launched on 7 September 2018, the Open Data Portal was designed to provide access to open data for purposes such as innovation, business projects, accountability, public oversight and research. For the latest version, a new platform using Comprehensive Knowledge Archive Network (CKAN) was developed. CKAN replaced the previous DKAN platform for the Unified Open Data Portal. Currently, 7142 datasets are available. Starting from 15 October 2018, the European Open Data Portal began harvesting open data sets from the Ukrainian open data portal. The owner of the portal is the State Agency for eGovernance of Ukraine.

Diia. Digital State

www.diia.gov.ua

Diia.Digital State is today the largest-scale digital project in Ukraine and was launched by the MDT. Its goal is to make it easy and transparent for individuals and business to deal with their government. This initiative led to the launch of the Diia government services portal. Diia, meaning "action" in Ukrainian, as the access point to all public services that the government provides to individuals and businesses. The services have been completely streamlined, the language is simple, and the interface is based on UX/UI design. The MDT plans for 100% of government services to be accessible online by 2024. As of May 2020, over 2.3 million users have already visited the Diia system. The system was developed with the support of UNDP in Ukraine through the Swedish-funded "Digital, Inclusive, Accessible: Support to Digitalisation of State Services in Ukraine (DIA Support)" Project.

eData

www.spending.gov.ua

eData is a national portal that reveals information about spending from the public budget and implementing the idea of a transparent budget. The project's objective is to create an open resource that ensures complete transparency of public finances and the public's right for access to information. Open Budget Portal Openbudget.gov.ua is an initiative of the Ministry of Finance that tracks spending from the state budget on central and local levels. As of now, data from 9683 local budgets has been published on the portal. Currently, the portal is functioning in the test mode. The portal's owner is the Ministry of Finance.

Inspections Portal

www.inspections.gov.ua
The Inspections Portal is an online service, which helps small and medium Ukrainian entrepreneurs to navigate business inspection rules and procedures. It also serves as a risk-management tool that promotes and improves interaction between businesses and state inspection authorities, improving the-environment for real economic growth in Ukraine. The portal publicly demonstrates the plans for inspections conducted by the controlling authorities regarding small and medium entrepreneurs. In 2018, planned inspections were registered in the system. All inspections results are publicly available.

Electronic petitions

www.petition.kmu.gov.ua
The electronic petition portal allows the citizens of Ukraine to submit petitions to the Cabinet of Ministers of Ukraine[81], to the President of Ukraine[82] and to the Verkhovna Rada of Ukraine (Ukrainian parliament)[83].

National Telecommunications Network

As a part of its cyber security strategy implementation, the Government of Ukraine is planning to develop the national telecommunication network and protected data centres for state entities. This is supposed to be a single telecommunication network securely protected from cyberattacks. The objective is to protect the processing and security of state information resources. Protected data centres were first developed for security, defence, finance, energy and transport sectors.

Data Exchange Electronic Court

Electronic Court is one of the services of the Single Court Information and Telecommunication System used for the exchange of electronic documents between participants engaged in the legal process. It enables citizens to electronically submit statements of claim and other procedural documents and receive court decisions. Registration and authentication for users are available via an electronic digital signature.

TREMBITA National Interaction system

In 2018, the National Interaction system TREMBITA was finalised. It was based on the Estonian interaction system X-Road and aimed at the exchange of data between state information resources in order to ensure the highest quality level of eServices delivery system. In 2018, TREMBITA received certification for its data protection mechanisms in compliance with the legislatively mandated requirements for technical and cryptographic data protection. Currently, experts are developing a comprehensive data protection system for its central part. The owner of the system is the State Agency for eGovernance of Ukraine. This interaction system guarantees state authorities and service centres access to the information contained in national registers, and thereby will enable fast and high-quality access to public services.

Vulyk

Vulyk is a subsystem of the Electronic Interaction System of Executive Bodies (EIS EB). It is an information system aimed for administrative service centres (ASCs), which automates centre administrator's activities. For instance, it processes applications for administrative services, generates reports and monitors deadlines. Vulyk also provides the opportunity to send appli-

[81] https://petition.kmu.gov.ua/
[82] https://petition.president.gov.ua/
[83] https://itd.rada.gov.ua/services/Petitions/

cants' documents electronically to the necessary authorities. Vulyk is connected to the Trembita data exchange system in order to access State Electronic Information Resources (DES SEIR). In the future, ASCs will be able to interact with state registries and information systems of administrative services providers through the Vulyk and Trembita systems. Currently, there are roughly 800 administrative service centres In Ukraine. The vast majority of them do not have information systems that would optimise their work to provide public services more efficiently. This was the main reason for initiating a general system to ensure uniform high standards for the work of centres across the country. The Vulyk system is developed and implemented within the framework of the EGOV4UKRAINE project under the U-LEAD with Europe support programme, running from 2016 to 2020. It is financed by the European Union and its Member States: Denmark, Estonia, Germany, Poland and Sweden.

The Electronic Interoperability System for Public Agencies
The Electronic Interoperability System for Public Agencies (EISPA version 2) was designed to automate the processes of creating, sending, transferring, processing, using, and storing electronic documents, and/or copies of paper-based documents electronically using the electronic digital signature and to track the execution of Cabinet of Ministers' orders, resolutions and other documents. The system's objective is to create the single information space to register, analyse and process the organisational documents of state authorities in the electronic format with the use of electronic digital signature; to improve the quality and efficiency of management decisions; to decrease the expenses from the state budget due to transfer to electronic document management. The owner of the system is the State Agency for eGovernance of Ukraine. In 2018, 193 state entities were connected to the system. The system has already been implemented by 673 organisations. Central government agencies send more than 5 000 electronic documents daily.

Customs Single Window
As a part of the State Fiscal Service Reform, the electronic system Customs Single Window was launched. This database allows Customs to exchange information about goods transferred across the state border of Ukraine. It decreases the number of customs procedures. Thanks to this system, customs offices can conduct customs control, sanitary and epidemiological, ecological, and other types of control. The results are uploaded into the single database. The Ministry of Finance performs regular monitoring of the Customs Single Window functionality and works on the system's improvement, so that it could be more accessible and convenient for businesses.

National Identification System
National Identification System id.gov.ua is the national identification system that ensures the procedures of personal identification for users of different online services. It combines all the existing electronic identification tools: electronic digital signature, bank ID, and Mobile ID. The three biggest mobile operators in Ukraine have already launched Mobile ID.

eProcurement ProZorro
www.prozorro.gov.ua
ProZorro is an online public procurement platform and collaboration environment that ensures open access to public procurement (tenders). Fully implemented in 2016 as a hybrid (containing both centralised public and decentralised private marketplaces) system, it has since been globally recognised as one of the most innovative public procurement systems delivering government services in a stakeholder-focused, transparent, effective, fair and low-cost way. It was rated #1 by World Procurement Awards 2016 in the public sector nomination and #1 by Open Government Awards 2016. The system is managed by the Ministry of Economic Development and Trade of Ukraine. According to the law on Public Procurement, the ProZorro portal is an open resource has been providing access to database information on electronic tenders since

July 2016. This system is mandatory for all state-ordering customers. Public organisations acting as the ordering customers publish bid opportunities via the module of electronic auction having registered themselves on authorised electronic platforms. This module ensures the transfer of information to the central database and simultaneously publishes it on its portal, as well as other platforms. The portal database and the module of electronic auction creates the single system of electronic public procurement ProZorro. More than UAH 55 bn (around EUR 1.82 billion) of state budget was saved thanks to ProZorro.

DOZORRO
Monitoring platform DOZORRO is a national public procurement watchdog portal that allows users to provide feedback on any procurement procedure, tender, etc. In 2018, the Dozorro watchdog community analysed 12370 “red flag” tenders. Each high-risk tender was brought to the attention of the public purchaser, their managing entity and oversight authorities through formal letters. Of the 12370 high-risk tenders that resulted in letters, 1673, or 14%, were deemed ‘successful’, meaning that the tenders were cancelled, or substantially amended by public purchasers or illegal tender decisions were reversed. Also, in July 2018, DOZORRO started implementing the module of artificial intelligence to assess the combination of risk factors on each tender and suggests ‘red flag’ tenders for processing by civil activists. The module is currently under improvement.

ProZorro Sale
Prozorro Sale is a system designed for transparent, fast and effective sales of state and communal property, as well as fighting against corruption through equal access to data, public control and increasing the number of potential buyers.

Knowledge Management: Single State Electronic Database on Education
This information system collects, registers, processes, stores and protects education data. According to the law on education, it contains four registries: the registry of educational institutions, the registry of educational documents, the registry of independent external assessment certificates, and the registry of student ID cards. Via this system, users check the validity of their diplomas and academic credentials and the validity of their ID cards. They can find information about their educational establishment and its license. One more feature of the system is the opportunity for users to find information on admissions, including the ratings of those that submitted the documents to universities and are recommended for enrolment, etc. By the end of 2018, 780 higher educational establishments and 706 separate departments, 1,026 vocational and technical institutions and 53 separate departments, 273 other educational establishments, and 343 education management departments were registered in the system.

eHealth
https://ehealth.gov.ua
Information System eHealth is an information system that allows patients to receive high-quality medical assistance from healthcare centres and monitor the efficiency of the state budget. Patients sign declarations with their doctors, and the doctors register them in the system. The state pays doctors for each patient and ensures patients are guaranteed free of charge medical services. As of end 2018, more than 1 700 medical centres, 24 000 doctors, and 24 million of patients were registered in the system.

State Registry of Registers
In 2018, the State Agency for eGovernance developed and launched the State Registry of Registries (RoR). This information system was designed for the registration, accumulation, processing, analysis and storage of information about state registers and information systems. The RoR contains data on the composition, content, location and conditions giving access to

these electronic information resources. The creation of such a system allows for the efficient and timely analysis of state registers, as well as the information systems in central ministries, their departments and subordinate agencies. Its capability helps to prevent the duplication of data increase while increasing the efficiency of how state information is used. According to the draft law on public electronic registers, the four basic registries include: state demographic registry, business registry, state registry of immovable property rights, and state land cadastre.[84]

4.1.2 Digital competences in Ukraine – are citizens e-ready? General attitude towards digitalisation.

According to the Digital Government Factsheet 2019:

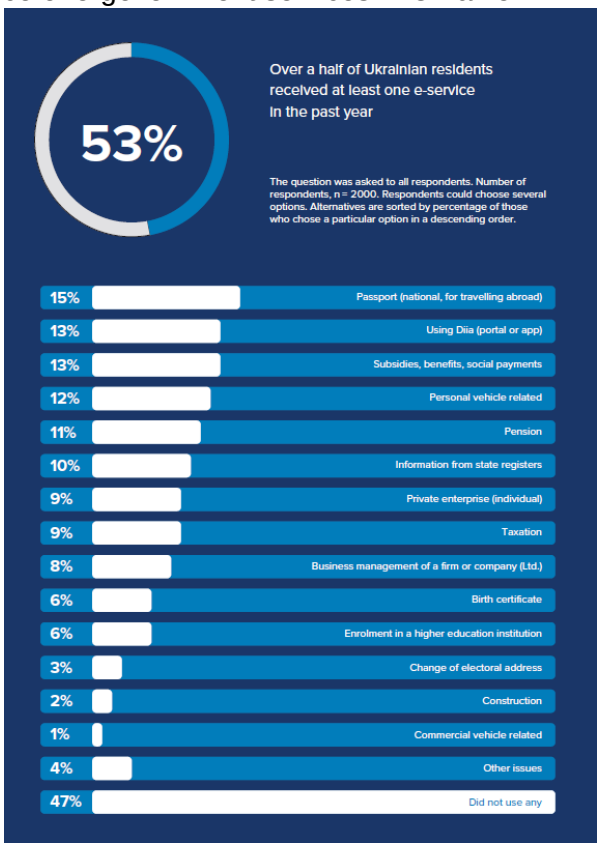
- 93% of Ukrainian citizens use the Internet;
- 71% of population uses the mobile Internet;
- 72% use the Internet on a daily basis;
- 21% use the Internet at least once per week;
- 4% use the Internet at least once per month;
- 2% use the Internet less than once per month.

Today, the Ukrainian state does not have the infrastructural readiness for a high-quality digital leap. Above that, the level of digital skills of the population is very low. There is an obvious infrastructural gap between the big cities and regions, reflected in unequal access to telecommunication services.

As to digital skills, 37.9% of Ukrainians aged 18-70 years have digital skills below average level, 15.1% do not have any digital skills at all. Thus, 53% of Ukraine's population are below the average mark. According to the study *Digital Literacy of the Population of Ukraine,* citizens who have no digital skills are mostly aged 60–70, they reside outside the regional centres (in regional towns and villages) with vocational secondary employment education, unemployed and with no access to the Internet.[85]

[84] the Digital Government Factsheets by Wavestone for the European Commission
[85] Digital Literacy of the Population of Ukraine Survey 2019

Figure 9. User experience of e-government services in Ukraine[86].



Source: Kyiv International Institute of Sociology

To summarise, the main reasons for not-using e-services in Ukraine are the absence of necessity to do so, the lack of digital skills, and the lack of devices with the Internet access. Additionally, a general distrust of the Ukrainian people to electronic documents or services can be alongside with a low user awareness as to where to search for a specific service. It should be mentioned that the total share of elderly people in Ukraine will reach 25% of its population before 2025, which may affect the rates of digitalisation of the Ukrainian society.

4.1.3 COVID-19's impact on digitalisation in Ukraine

The pandemic situation has affected not only the Ukrainian society, but also the rest of the world. Ukraine was one of the first countries to introduce the national lockdown. In general, four strict lockdowns in 2020 and 2021 have largely influenced the business activity in Ukraine, since the schools, beauty salons, cafes and restaurants, small businesses, shopping centres, public gatherings, entertainment events and many other related businesses had to seize their operations for a period of a lockdown. As a result, 29% of Ukrainian companies stopped functioning and 6% have fully closed down their businesses.

According to the inflation report by the National Bank of Ukraine[87], 35% of Ukrainians continued to work in mixed forms, 29% worked from home or distantly and 4% lost their jobs. For the

[86] Kyiv International Institute of Sociology. Findings of an adult population survey and group discussion – 2020
[87] Inflation Report of the National Bank of Ukraine, Oct 2020 https://bank.gov.ua/en/news/all/inflyatsiyniy-zvit-jovten-2020-roku

rest of the businesses, that format of work did not change. As pandemic became devastating in many aspects, it had a tremendous impact on everyday life of people in Ukraine – from distant learning in schools to the way people pay the bills and interact with the health system. These trends conditioned a forthcoming of the fast and efficient digital solutions offered by the Ukrainian state and business.

4.2 Policy and strategy overview

Digital transformation is seen as the priority in the development of the Ukrainian state that is supported by the vision "Your State in Your Smartphone". The ambitious aim of the state is to digitalise most government services by 2024, thus raising the overall efficiency of the state institutions and decrease the level of the corruption in Ukraine.

In 2020, the MDT appointed Chief Digital Transformation Officers across all ministries aiming to conduct the centralised approach of the necessary digital transformations throughout the entire public sector. Currently, each Ukrainian ministry has a Deputy Minister who is in charge of digitalisation of the internal and external processes within that ministry. The MDT that is in charge of approving strategic decisions on selection and implementation of e-solutions by ministries coordinates the activity of the Chief Digital Transformation Officers.

The first visible steps towards digital transformation of the public sector included a successful implementation of e-procurement system ProZorro and e-health system, the launch of 4G mobile coverage and functioning of some e-services in the public and business sectors. By setting up digitalisation as a priority policy, the Ukrainian government adopted the Action Plan for the Development of the Digital Economy and Society of Ukraine for 2021-2023. The action plan includes developing legislation on the digital economy and telecommunications, digital infrastructure including broadband strategy, the Cashless Economy Programme in the areas of eTrade, eTrust and Cybersecurity, and the 'Smart Cities – Smart Regions' initiative focused on decentralisation and implementation of eSkills, eHealth, and eTrade across the regions of Ukraine.[88]

In February 2021, Ukraine's Cabinet of Ministers approved a list of 94 digital transformation projects, which were worked out and submitted by the MDT. The projects are focused on the digitalisation of the Ukrainian public sector and transition to transparent and paperless economy. The projects of digital transformation for the next three years include e-notary, e-property, e-urban planning, e-school, e-social protection, e-migration, e-hospital, e-permit, e-democracy, e-governance and others. The key goals of the MDT by 2024 are to digitalise 100% of all public services for citizens and businesses, provide 95% of transport infrastructure, settlements and the social facilities with access to high-speed Internet, to provide digital teaching of 6 million Ukrainians and increase the share of IT sector in the country's GDP to 10%.

4.2.1 National Recovery Plan

In 2020, the Cabinet of Ministers of Ukraine, in close consultations with experts, scientists and business associations, presented a national program to stimulate the economy in order to overcome the effects of the COVID-19 epidemic. The main emphasis of the recovery strategy is the principle of priority of Ukrainian producers who pay taxes and create jobs in Ukraine. The national recovery plan foresees that Ukraine will use the full range of WTO and General Agreement on Tariffs and Trade instruments to protect its enterprises. According to the programme, the mandatory support to the core industries will be provided in the following areas: the access to finance and external markets, modernisation and efficient state regulation. The government plans to reduce the tax burden and to ease the regulatory framework conditions

[88] The European Union's EU4Digital Initiative. https://eufordigital.eu/countries/ukraine/

for SMEs. The government of Ukraine has put an ambitious goal to enter the list of TOP-30 countries of the world in terms of ease of tax administration.
In November 2020, the Cabinet of Ministers of Ukraine has adopted the National Economic Strategy 2030 with a high emphasis on the following digital transformation tasks[89]:

Tasks	Estimated funds, $ m
Development of a fixed broadband Internet infrastructure	3500
Coverage - 99.9% of Ukrainian households. Broadband Internet connection is a standard for new buildings, apartments and physical infrastructure	
Development of mobile Internet infrastructure (4G, 5G)	2000
Coverage - 100% of the country (4G-5G). 99% of all highways and railways and 95% of rural areas are covered by mobile Internet.	
Development of radio infrastructure (LoRaWan, etc.) for Internet of Things projects	500
Coverage - 100% of the country. Provision of 5 billion sensors.	
Development of public access infrastructure for Wi-Fi	1000
100% of key nodes of transport infrastructure, tourist routes, nature reserves, cultural and historical sites, leisure and recreation are covered by Wi-Fi networks	
5. Development of computing infrastructure (cloud, or virtualised, infrastructure, local data centres)	500
Creation of 5 national data centres with infrastructure (of DC TIER3 level)	
6. Provision of a cybersecurity infrastructure	3000
Building up to 10 industry cybersecurity management centres.	
Full operation of the "Clean Internet" program (cleaning network traffic at the operators level)	
7. Creating infrastructure of identification and trust (citizens ID, mobile ID, bank ID)	300
Unified State Electronic Demographic Register (citizen ID)	
99.9% of citizens have digital identification (citizen-card, Mobile ID) by 2024	
8. Creation of infrastructure of Open Data	100
99% of public information resources and databases have open access	

[89] Ukrainian Institute for Future. National Economic Strategy 2030. https://strategy.uifuture.org/kraina-z-rozvinutoyu-cifrovoyu-ekonomikoyu.html#6-2-12

9. E-governance infrastructure	500
Paperless interaction based on the "single window" principle and automation of all processes of the back office of government institutions and agencies.	
10. Interoperability infrastructure	20
100% of state resources and systems interact via Trembita inter-operability platform	
11. E-commerce and e-business infrastructure	100
+ 300% growth of the domestic e-commerce market by 2024; + 1000% - until 2030	
99% of business operations are e-commerce	
12. Creation of infrastructure for transaction and processing	500
100% of trade establishments, services, etc. work in cashless mode (non-cash payments)	
13. Creation of life support infrastructure	3000
Top positions in the rankings: quality of life index (safe and comfortable life), international happiness index	
14. Geographic information infrastructure	500
Digitalisation of 100% of physical infrastructures (including critical ones) according to sectors of the economy (transport, energy, urban environment, housing and communal services, real estate)	
15. Development of blockchain infrastructure (as a support for the implementation of many soft infrastructures)	100
100% of businesses processes: registration of civil acts, keeping registers, cadastres and directories protected in accordance with cybersecurity standards (ISO 27001)	

[90]

4.3 Stakeholders

Ministry of Digital Transformation of Ukraine

This is a relatively new ministry that since 2019 has been actively implementing the digitalisation strategy in Ukraine. The ministry coordinates all projects on digitalisation, supervises the team of Chief Digital Transformation Officers assigned to other ministries. The ministry's most important projects include the so-called "state in a smartphone" project that is aiming to convert 100% of all government services to online by 2024 with 20% of services provided automatically, without the intervention of an official. A three-year project entitled “Digital, Inclusive, Accessible: Supporting the Digitalisation of Public Services in Ukraine" (DIA Support) with a total

[90] Vectors of Economic Development of Ukraine 2030 https://nes2030.org.ua/docs/doc-vector.pdf

budget of UAH 128 million (approximately US$ 4.5 million) is to help the ministry implement joint goals and initiatives in digital formats. The Ministry of Digital Transformation and the United Nations Development Programme (UNDP) in Ukraine launched the project, which aims to improve the quality of citizens' access to electronic administrative and social services with support from the Swedish Embassy.[91]

UNDP

Within the DIA Support Project, UNDP assist its government counterparts, first and foremost the Ministry of Digital Transformation (MDT) to select a comprehensive set of services that representatives of vulnerable groups require in their everyday life, and ensure that these services can be delivered in a digitalised or digitally-enhanced, mobile-based form. UNDP conveys the Human Rights Based Approach in crafting public services for citizen-clients and continues to bring the best practices of Ombudsperson Offices in Europe to the Ukrainian environment. Additionally, the project provides teaching of digital skills for citizen-clients.[92]

ULEAD

U-LEAD with Europe Program is a multi-donor action of the European Union and its member states, such as Germany, Sweden, Poland, Denmark, Estonia and Slovenia. Since 2016, U-LEAD with Europe: Ukraine – Local Empowerment, Accountability and Development Programme (in short "U-LEAD") has helped to take the Ukrainian reforms forward through policy advice and practical support to implementation at all governmental levels. During Phase I of the programme, U-LEAD has been divided into two distinct components: Until 30 June 2020 component 1 was to enhance the capacities of key actors to implement the decentralisation and regional policy reform at all levels of governance. Component 2 (ongoing) directly supports municipalities in establishing effective administrative service centres. U-LEAD's second phase started in July 2020 and will last until June 2024, including a six-month closing period, currently with a total contribution of €50.3 million.[93]

Eurasia Foundation (EF)

Eurasia Foundation (EF) started its operation in Ukraine in 1993. Since then, EF has invested more than USD 44 m in grants, loans, and technical assistance in Ukraine to develop private entrepreneurship, public policy and civil society. Currently, the East Europe Foundation in partnership with InnovaBridge Foundation is expanding assistance to Ukraine under the "E-governance for Accountability and Participation (EGAP)" programme. An agreement was signed between the MDT and the Swiss Agency for Development and Cooperation that foresee 6,313,640 Swiss Francs (UAH 193.7 million) for the development of e-services in the areas of social protection, pensions, the introduction of new e-democracy services and improving the digital literacy of Ukrainians.[94]

IT Ukraine Association

IT Ukraine Association is the largest professional association of Ukrainian service and product companies. The Association's mission is to provide favourable conditions for sustainable development of information technology in the country. Being the largest IT association in Ukraine, it currently represents the interests of 50,000+ IT specialists.[95]

[91] https://thedigital.gov.ua/
[92] www.ua.undp.org
[93] https://tsnap.ulead.org.ua/en/team/
[94] http://eef.org.ua/en/
[95] https://itukraine.org.ua/en/

4.4 Specific sub-sectors

Currently, the MDT is implementing 94 projects announced at https://plan2.diia.gov.ua/projects. The projects below are grouped in thematic categories.

Project 1. Digital transformation of public spheres and sectors:

- Justice, International Affairs and Migration (e-business, e-property, e-Migration, e-Civil Registry Office, e-Police, e-Notary). Estimated budget is 36.5 m USD per year allocated from the state budget.
- Economics and Trade, Finance, Tax and Customs Services, Culture, Youth and Sports (e-excise Tax, e-Entrepreneur, e-License, e-Customs, e-Tourism). Estimated budget 36.5 m USD per year from the state budget.
- Infrastructure, Communities and Territories development, Strategic Industry sectors (e-construction, e-transport). Estimated budget is 36.5 m USD per year from the state budget.
- Environmental protection and natural resources, Agriculture and Land, Energy (e-waste, e-land, e-energy). Estimated budget is 36.5 m USD per year from the state budget.
- Foreign affairs, defence and reintegration (e-military commissariat, e-TOT, e-visa). Estimated budget is 36.5 m USD per year allocated from the state budget.

Project 2. e-Social Care

- Unified Social registry creation. Estimated budget is 34.7 m USD from the state budget.
- Automation and centralisation for all processes related to social care payments and social services. Estimated budget is 34.7 m USD from the state budget.
- Social service care automation and centralisation. Estimated budget is 34.7 m USD UAH from the state budget.

Project 3. e-Health (Healthcare)

- Medical Services development and medical information management. Creation of electronic healthcare system. Estimated budget is 43.8 m USD from the state budget.
- Medicines and medical devices quality and safety control (e-Liky).
- Promotion of healthy lifestyles, society protection from infectious diseases.

Project 4. E-School (Education)

- Electronic school books for primary schools students. Estimated budget is 32.8 m USD from the state budget.
- Secondary schools work automation. 100% e-document flow between educational institutions, local educational administrations and responsible public executive bodies

Project 5. E-Access (internet, digital literacy)

- High-speed mobile broadband Internet coverage. Commercial funding.
- International traffic highways coverage and railroads coverage with high-speed mobile broadband Internet. Estimated budget is 47.5 m USD from the state budget and commercial funding.
- Residential areas coverage. Estimated budget is 120.5 m USD from the state budget.

- High-speed fixed broadband internet for people with disabilities. Estimated budget is 237.5 m USD from the state budget.
- Broadband.goc.ua web portal development, contact provision and maintenance. Estimated budget is 171 thousand USD allocated from the state budget.
- Digital Literacy National Platform. Estimated budget is 657 thousand USD allocated from the state budget.

Project 6. Innovation-driven economics
- Virtual economic zone Diia.City. Estimated budget is 362 thousand USD from the state budget.
- e-Residency. Donor funding.
- Virtual assets

Project 7. National Cyber Resilience System
- State centre for Data Processing. Estimated budget is 54.8 m USD from the state budget.
- Single State Registries Platform. Estimated budget is 7.8 m USD from the state budget.
- Centralised cyber security services (protected Interned, cloud cyber services sensors). Estimated budget is 35.2 m USD from the state budget.

Project 8. E-Democracy
- E-Democracy instruments (petitions, polling, public budget, consulting). Donor funding.
- E-elections and referendums. Estimated budget is 18.2 m USD from the state budget.

Project 9. Open Data
- Single State Open Data web-portal modernisation. Donor funding
- Open Data development at regional and local levels. Donor funding.
- National Open Data Competence centre “Diia.Open Data” creation. Donor funding.
- Open data datasets publications (lists of almost 1000 unique data sets to be published by Central public authorities). Donor funding.[96]

4.5 Challenges in digitalisation in Ukraine.

The main focus of the Ukrainian government in digital transformation process is to develop the digital infrastructure and general e-governance. However, there is no sufficient attention paid to the issues of e-democracy at the regional and local level. Currently, the development of broadband Internet coverage is the main focus of the MDT that will allow all citizens to have access to e-services.

Besides insufficient Internet coverage, there are other challenges that are accompanying the digitalization process in Ukraine.

- Quality of implementation. The Ukrainian state has started the process of digital transformation very fast having basically no previous experience in this area. Therefore, part of the implemented solutions were selected without proper consultations with experts, which directly affect the quality of the realised projects.

[96] Digital Transformation Action Plan_MDT_Feb 12.2021

- Transparency. There is a relatively low level of trust shown by the public and business circles that were not involved into formation of the working group and decision-making processes.
- State registers data. The digital transformation foresees the decision-making process to be based on the data analysis from the state registers. The quality and accuracy of the latter have always been an issue in Ukraine due to non-interoperability. High-quality and accessible statistics, open data from state registers will facilitate the transition to decision-making based on data analysis assisted by modern IT technologies. Non-interoperable and non-synchronised central government and LSGB data cause duplication of data, reduce their quality, and as a result, paid databases appear at all levels. There are no open data standards for many CEB sets. There is no direct communication with data users (for example, informing about changes in meta-information, data set structure, etc.). Insignificant responsibility for non-disclosure of public information in the form of open data.
- Insufficient digital skills. The largest part of Ukrainian public institutions employees lack digital literacy skills, which enable them to use the modern IT solutions and analytical systems. There are task-oriented trainings available to reduce the digital illiteracy. However, higher education institutions do not provide programs of digital education that would improve the digital skills of the Ukrainian citizens and civil servants.
- Regional digital transformation. As the decentralisation reform has brought more power to the local self-governments, they are still facing the challenge of understanding their real digitalisation needs and applying the authority of decision-making. Moreover, the digitalisation projects worth more than 20,000 USD are to be approved by the Ministry for Finance that implies certain dependency upon the central authorities.[97]

4.6 Business opportunities for the Danish companies

As Denmark is one of the highest ranking countries in the world when it comes to the digitisation of the public sector, the Danish companies may bring their best practices and solutions to the Ukrainian public sector in the following areas:

- automation and centralisation of all processes related to all social care payments and social services;

- medical service development and medical information management, automation in healthcare facilities for medicines and medical devices purchase, planning and distribution; integrated systems for infectious diseases monitoring;

- automation systems for primary and high schools with the access to high quality content and instruments for distant and combined forms of education;

- technologies allowing high-speed broadband access;

- systems and solutions for the development of digital literacy of citizens;

- solutions for big data processing and state registries;

[97] Sectoral brief "E- Democracy and E-Governance", Centre for Innovation Development, 2020

- systems for cyber security and data protection;

- e-democracy instruments and systems for citizens' engagement into the state governance.