Ukraine

Ministry of Digital Transformation

Ministry of Health

Data Collection Survey on E-Government For Improvement of Public Service In Ukraine: Final Report

October 2021

Japan International Cooperation Agency (JICA)

Mitsubishi UFJ Research and Consulting Co., Ltd.

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Abbreviations

API	application programming interface
CDB	central database
CMS	Center for Medical Statistics
COVID-19	Coronavirus disease 2019
DFID	Department for International Development (the United Kingdom)
DICOM	Digital Imaging and Communications in Medicine
DRG	diagnositc-related group
eGA	e-Governance Academy
EHIS	Electronic Healthcare Information System
EU	European Union
Gavi	Gavi, the Vaccine Alliance
GDP	gross domestic product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
Global Fund	Global Fund to Fight AIDS, Tuberculosis, and Malaria
HCV	hepatitis C virus
HIV	human immunodeficiency virus
HL7	Health Level 7
ICD	International Classification of Diseases
ICPC	International Classification of Primary Care
ICT	Information and Communication Technology
IHD	ischemic heart disease
MIS	medical information system
MODT	Ministry of Digital Transformation
MOH	Ministry of Health of Ukraine
NAS	National Academy of Science
NCDs	non-communicable diseases
NHSU	National Health Service of Ukraine
ODA	Official Development Assistance
OOP	out-of-pocket
PACS	Picture Archiving and Communication System
PHC	primary health care
PHCs	primary health centers
QES	qualified electronic signature
SADC	Swiss Agency for Development and Cooperation

SE Electronic Health	state-owned enterprise Electronic Health
TB	tuberculosis
UNDP	United Nations Development Programme
UNFPA	United Nations Population Fund
UNICEF	United Nations Childrens and Education Fund
USAID	United States Agency for International Development
VHI	voluntary health insurance
WHO	World Health Organization

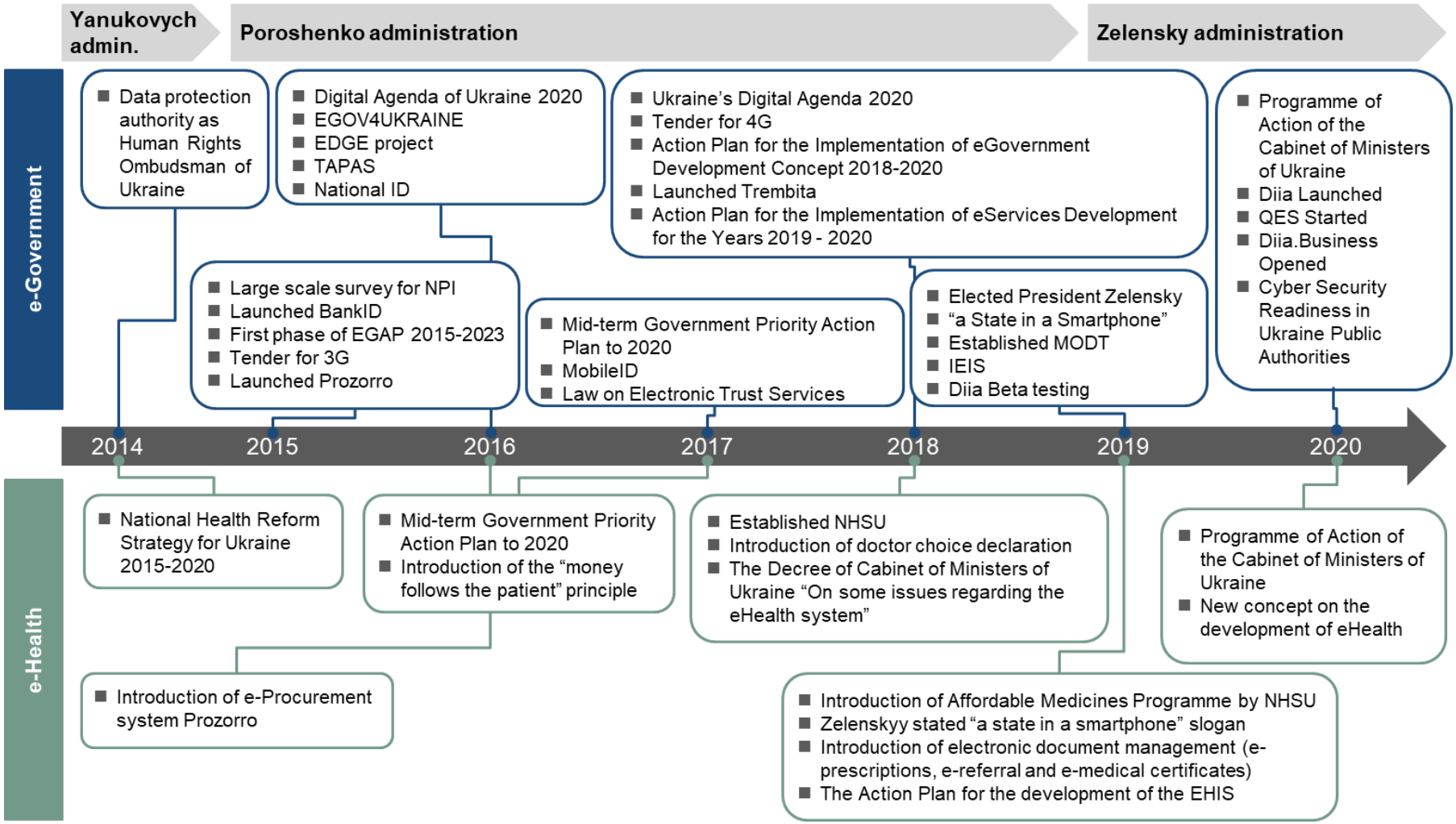

Figure: Timeline of the actions in e-Government and e-Health spheres from 2014

1 Overview of the survey

This survey aims at identifying the challenges and needs for improving the efficiency, transparency, and convenience of the Ukrainian government's administrative services, and analyzing the possibility of using ICT to advance e-Government in Ukraine, particularly focusing on ICT in medical and health services ("eHealth"). Through this survey, it is expected that measures contributing to the resolution of challenges in the country will be examined, and that successful examples of overseas expansion of innovation through industry-university-government collaboration will be created for digitalization of administration.

1.1 Background of the survey

Since the Revolution of Dignity in 2014, the Ukrainian government has made efforts for reform to Ukraine's economy, politics, and society. As a result, some progress has achieved and the business environment has been improving with economic recovery. On the other hand, it is recognized that there is room for improvement in the efficiency and transparency of administrative functions, considering social resource management, provision of services to the public, and administrative functions to develop business environments and rules that support private sector activities.

The Ukrainian government identified the quality of administrative services as one of the priority challenges in its National Strategy "Ukraine 2020" (Presidential Decree 2015). In the "Public Administration Reform Strategy of Ukraine through 2021" and the "Medium-Term Government Priority Action Plan to 2020" approved by the Cabinet of Ministers in 2017, the Ukrainian government positioned introducing e-Government tools as the solution to improve the efficiency, transparency, and accessibility of administrative services. President Zelensky advocated "A state in a smartphone" in his presidential campaign, and the Ukrainian government accelerates the policies to implement e-Government.

The medical and healthcare sectors are placed as one of the priority areas for e-Government among all the administrative services in Ukraine. The draft "Programme of Action of the Cabinet of Ministers of Ukraine" approved in September 2020 identifies health care reform as one of the priory actions of the Ministry of Health, which includes the development of e-health and implementation of electronic medical records.[1] Also, the Ministry of Health has been promoting a reform called "eHealth" as part of their reform efforts.

Moreover, Ukraine is now facing an important turning point due to the ongoing COVID-19 pandemic that started at the beginning of 2020. This pandemic reached almost every country leading to a health and economic crisis. To overcome this crisis, digital transformation is increasingly important, because the outbreak is driving people to shift from "offline" to "online" in all sectors including public services. At this turning point, a country can realize a more fruitful society "after the COVID-19 era", if the country

[1] Government portal (2020), https://www.kmu.gov.ua/npas/pro-zatverdzhennya-planu-prioritetni-a1133r (accessed on 30 November 2020)

commits itself to digital transformation. As such, Ukraine has the potential to benefit from digital transformation, as the country has many skilled ICT engineers.

In Japan, the Japanese government adopted the “Declaration to be the World’s Most Advanced IT Nation” in June 2013, and the Ministry of Internal Affairs and Communications has been promoting the utilization of ICT in government to realize “more convenient administrative services with fewer burdens of on users” and “efficient administrative management through cost-cutting”. Particularly, in the “Infrastructure System Export Strategy” of June 2019, medical technologies and services were positioned as a new field for achieving the SDGs, and overseas expansion is expected in the future.

There are increasing opportunities for collaboration between Japan and Ukraine in the field of ICT. When President Zelensky visited Japan in October 2019, the then Prime Minister Abe met with him and proposed sending a survey mission from Japan to research the situation of the field of ICT in Ukraine, which led to this project. President Zelensky also met with the president of the Japan Association of New Economy (JANE), and he expressed potential cooperation with Japan in the field of ICT. Also, at the Japan-Ukraine Business Council held in December 2019, the Ukrainian senior government officials and Keidanren (Japan Business Federation) discussed challenges of the business environment in Ukraine to promote collaboration in digital businesses in Ukraine.

1.2 Purpose of the survey

Against this background, in order to improve the efficiency, transparency, and convenience of administrative services for Ukrainian people, this survey aims at the following three points.

- To grasp the current status, challenges, and needs for improving the efficiency, transparency, and convenience of administrative services, especially e-Government and eHealth, in Ukraine.
- To identify the challenges and needs that could be addressed by private companies, and specify potential cooperation program(s) by the development partners, taking into account the international assistance programs in the field of e-Government.
- To promote the business relationship between Ukraine and Japan by holding seminars and business delegation programs for Japanese companies and visualizing business opportunities in Ukraine.

1.3 Methodology of the survey

This survey consists of three parts: 1) desktop research and field surveys, 2) business seminars in Japan, and 3) Ukraine business delegation program.

Target sectors are ICT, e-Government, and eHealth.

1.3.1 Desktop research and field surveys

The Survey Team collected basic information on the background and the whole structure of the above-mentioned sectors in Ukraine in accordance with support and guidance from the Ukrainian government. In addition, the Survey Team gathered in-depth information by face-to-face and/or online interviews with the networks of the stakeholders such as Ministry of Digital Transformation (MODT), Ministry of Health (MOH), other relevant ministries, development partners, ICT private companies, and hospitals. Due to the ongoing global pandemic of COVID-19, most of the field survey was conducted in the form of questionnaires and online meeting.

1.3.2 Business seminars in Japan

The study team organized two online business seminars to publicize the current situation, issues, and support needs of Ukraine investigated in this project to Japanese companies. The first is about the contents of the investigation by the investigation team itself. The second seminar was a series of lectures by gathering Ukrainian stakeholders, including government officials.

1.3.3 Ukraine-Japan business networking program

The Survey Team organized a business delegation to Ukraine for Japanese companies to communicate with

stakeholders in Ukraine and to drive themselves to the development challenge with Ukraine and Japanese governments. Possible stakeholders in Ukraine are the same as the presenters of the above webinar.

2 Basic information on Ukraine

2.1 General information

Ukraine is a country located in eastern Europe, extending north of the Black Sea. It is bordered by Belarus to the north, Russia to the east, Moldova and Romania to the southwest, and Hungary, Slovakia, and Poland to the west.

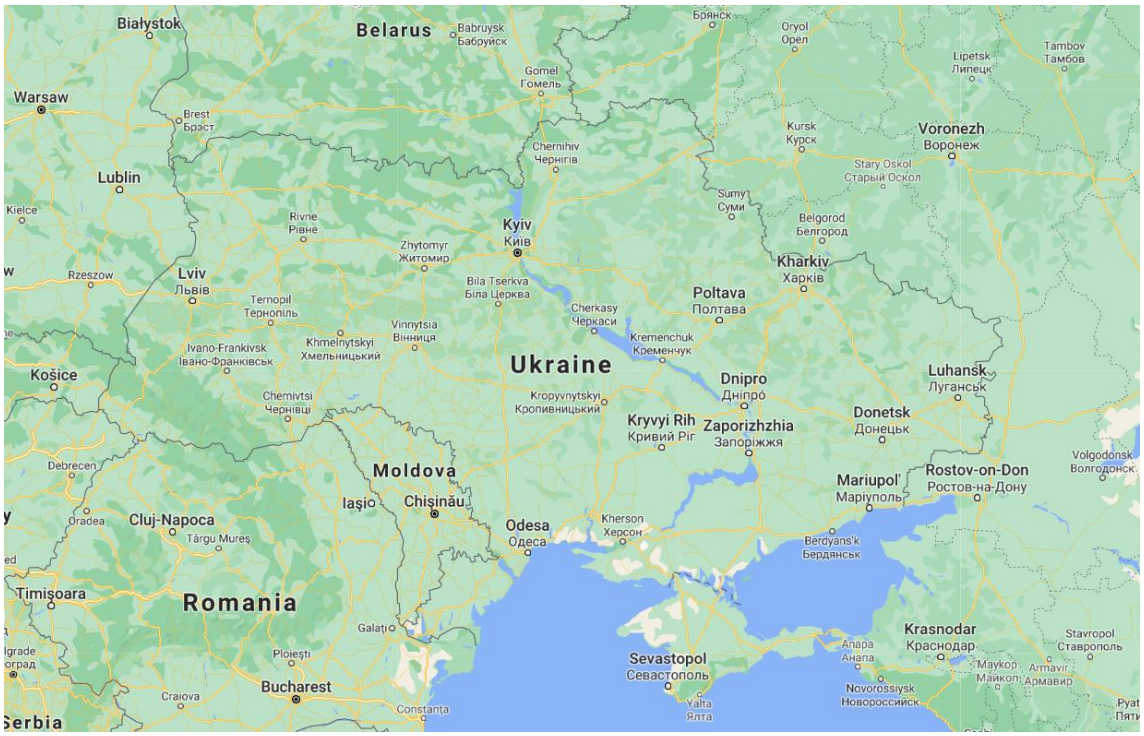

Figure 2-1 Map of Ukraine

Source: Google map.

Historically, Ukraine was a buffer zone for the neighboring countries and has a history of constant conflicts due to its multi-ethnic and multi-lingual nature. Since its independence from the Soviet Union in 1991, Ukraine has pursued a policy to leave Russia and enter Europe, but it has faced a series of domestic conflicts, and reforms have been slow due to epidemic government corruptions and the influence of newly emerged economic players *oligarch*. Nevertheless, Ukraine has been making progress in rebuilding economic and social stability and democracy with support from the international community.

Ukraine's population is 41.9 million (excluding Crimea) as of January 2020[2]. It has been gradually decreasing for the past two decades (Figure 2-2), due to a high emigration rate, high death rates, and low

[2] State Statistics Service of Ukraine (2020), "Demographic and social statistics/Population and migration", https://ukrstat.org/en/operativ/menu/menu_e/ds.htm (accessed 1 November 2020).

birth rates. It is projected to further decrease to 35.5 million by 2050[3]. The total fertility is rather low at 1.44 in 2019, although it recovered from the lowest level reached in 2001 (Figure 2-3). This means that the population is gradually aging, as is the case in other European countries (Figure 2-4).

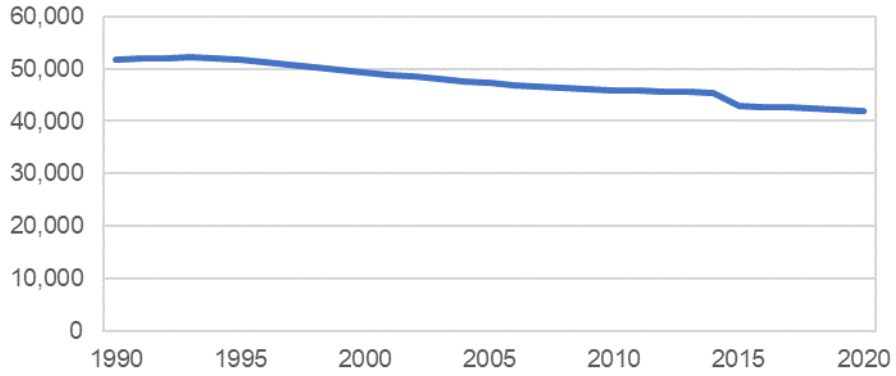

Figure 2-2 Population of Ukraine (in thousand)

Note: The temporarily occupied territories of the Autonomous Republic of Crimea, and the city of Sevastopol are excluded for 2015-2020.

Source: State Statistics Service of Ukraine[4]

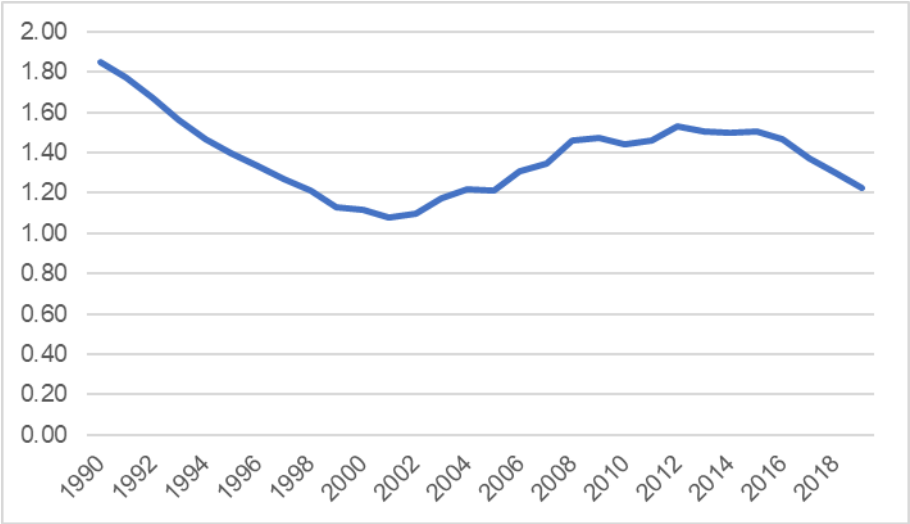

Figure 2-3 Total fertility rate (1990-2019)

Source: State Statistics Service of Ukraine[5]

[3] World Bank DataBank (2020), "Population estimates and projections".

[4] State Statistics Service of Ukraine, "Population (1990-2020)" https://ukrstat.org/en/operativ/menu/menu_e/ds.htm (accessed on 30 November 2020).

[5] State Statistics Service of Ukraine, "Population (1990-2020)" https://ukrstat.org/en/operativ/menu/menu_e/ds.htm (accessed on 30 November 2020).

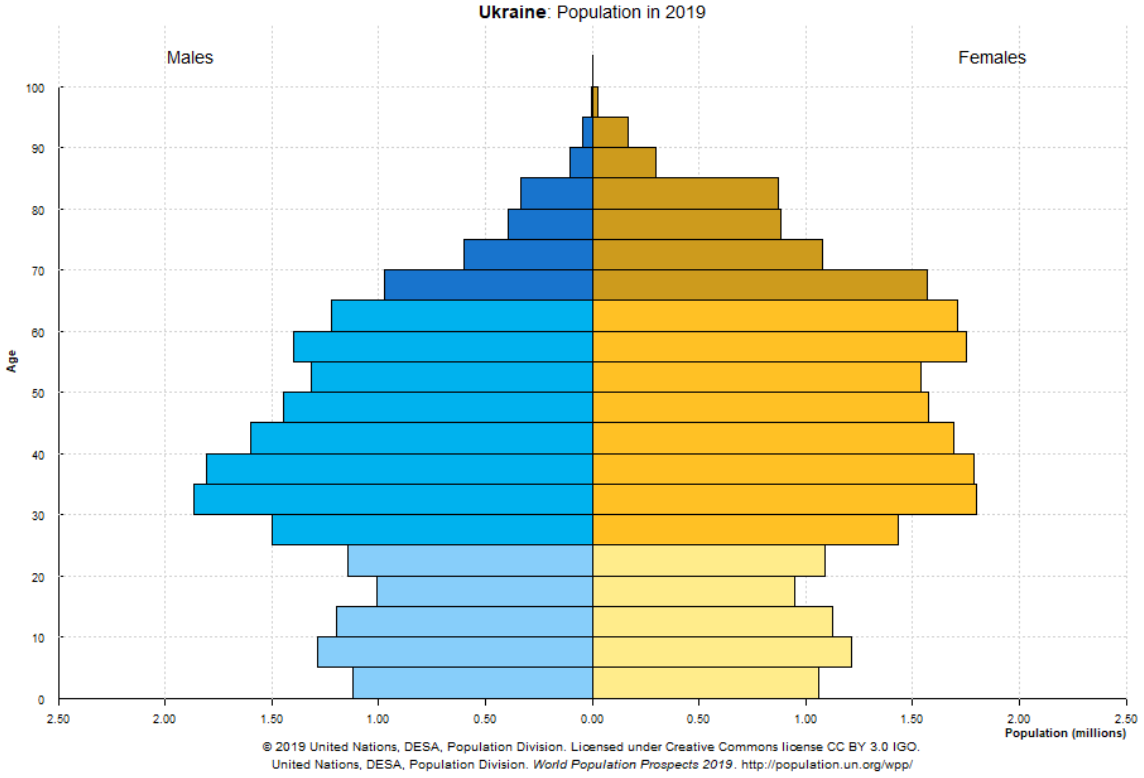

Figure 2-4 Population by age in 2019

Source: United Nations, Department of Economic and Social Affairs[6]

Box 1. Basic data on Ukraine

1. Area: 603,700 square kilometers (about 1.6 times that of Japan)
2. Population: 42.05 million (excluding Crimea) (2019: State Statistics Bureau of Ukraine)
3. Capital: Kyiv
4. Ethnic: Ukrainian (77.8%), Russian (17.3%), Belarus (0.6%), Moldovan, Crimea Tartar, Jew, etc. (2001 census)
5. Language: Ukrainian (national language) and other Russian languages
6. Religion: Orthodox and Eastern Catholics in Ukraine. Others include Roman Catholics, Muslims, and Jews

Source: Ministry of Foreign Affairs of Japan (2020)[7]

[6] United Nations, Department of Economic and Social Affairs, Population Division, "World Population Prospects: The 2020 Revision (Medium variant)".

[7] Ministry of Foreign Affairs of Japan https://www.mofa.go.jp/mofaj/area/ukraine/ (accessed on 30 November 2020).

Ukraine has three branches of state power: 1) the legislative branch, represented by the Verkhovna Rada; 2) the executive branch, represented by the Cabinet of Ministers and headed by the Prime Minister; and 3) the judicial branch, represented by a multilevel system of courts.

- The Verkhovna Rada is the highest legislative body in Ukraine. It consists of 450 deputies who are elected for a five-year term. It has the power to adopt laws and resolutions and to approve the state budget. In Ukraine, a bill becomes a law once it gains a majority (226 deputies) of the votes in the Verkhovna Rada.
- The Cabinet of Ministers is the highest executive body and implements laws. The ministries, state committees, and other bodies of the executive branch are responsible for implementing the resolutions passed by the Cabinet of Ministers.
- The Ukrainian court system consists of courts of general jurisdiction and the Constitutional Court of Ukraine. The courts of general jurisdiction have the following three-tier structure: 1) the Supreme Court of Ukraine; 2) appellate courts; and 3) local courts. There are also standalone specialized courts: the Highest Intellectual Property Court and the Highest Anticorruption Court.

Table 2-1 List of ministries in Ukraine (as of February 2021)

Ministry	Subordinate bodies
Ministry of Strategic Industries	• State Space Agency
Ministry of Agrarian Policy and Food	
Ministry of Energy	• State Inspectorate for Energy Supervision • State Agency for Energy Efficiency and Energy Saving
Ministry of Reintegration of the Temporarily Occupied Territories	
Ministry of Youth and Sports	
Ministry of Digital Transformation	• Administration of the State Service for Special Communications and Information Protection
Ministry of Economic Development, Trade and Agriculture	• State Service for Geodesy, Cartography and Cadastre • State Export Control Service • State Reserve Agency • State Service for Food Safety and Consumer Protection • State Service for Labor
Ministry of Internal Affairs	• National Police • Administration of the State Border Guard Service • State Migration Service • State Service for Emergencies
Ministry of Environmental Protection and Natural Resources	• State Agency of Forest Resources • State Agency of Fisheries • State Ecological Inspectorate

	• State Agency for Exclusion Zone Management • State Service of Geology and Subsoil • State Agency of Water Resources
Ministry of Foreign Affairs	
Ministry of Infrastructure	• State Aviation Service • State Service of Maritime and River Transport • State Service for Transport Safety • State Agency of Motor Roads • State Agency for Infrastructure Projects
Ministry of Culture and Information Policy	• State Committee for Television and Radio Broadcasting • State Agency for Arts and Art Education • State Inspectorate for Cultural Heritage • State Service for the Protection of Cultural Heritage • State Service for Ethnopolitics and Freedom of Conscience • State Agency for Tourism Development • State Agency for Cinema • Ukrainian Institute of National Memory UINP
Ministry of Defence	
Ministry of Education and Science	• National Commission for State Language Standards • State Service for the Quality of Education
Ministry of Health	• National Health Service • State Service for Medicines and Drug Control
Ministry of Development of Communities and Territories	• State Inspectorate for Architecture and Urban Planning
Ministry of Social Policy	• National Social Service • Pension Fund
Ministry of Veterans Affairs	•
Ministry of Finance	• State Customs Service • State Tax Service • State Audit Office • Public Debt Management Agency • State Treasury Service • State Fiscal Service • State Financial Monitoring Service
Ministry of Justice	• State Archival Service

Source: Government Portal website, https://www.kmu.gov.ua/catalog (accessed on 3 February 2021).

2.2 Economy and industry

During the Soviet era, Ukraine specialized in the defense industry and grain production, including the steel, shipbuilding, and aerospace industries. These industrial stocks continue to play an important role in promoting Ukrainian economic growth after independence.

After its independence in 1991, Ukraine transitioned its economy to a more western-oriented one. Some

of the reforms include the end of the centrally planned economy and the beginning of price and trade liberalization, leading to the hyperinflation in the early 1990s.[8] The country was plagued by an economic crisis caused by a shortage of raw materials and an increase in international energy prices. Due to such economic turmoil, GDP growth in the 1990s was consistently negative (Figure 2-5).

The economic growth rate turned positive in the 2000s with robust steel exports and expansion of domestic demand, but the global economic and financial crisis in 2008 impacted Ukraine's fiscal situation. The economy recovered steadily from 2010 to 2011, with economic reforms supported by the IMF, including tax reform, pension reform, and land system reform. However, in 2014, due to the situation in the eastern region, the economic growth rate turned negative, with trade and industrial production falling sharply. During 2014-15, Ukraine received support from international financial institutions, including the IMF, the World Bank, and the EU, as well as other countries. In 2016, the economic growth rate turned positive again, and the country's GDP has been steadily growing since then.

Figure 2-5 GDP growth rate

Source: World Bank[9]

Ukraine's Gross Domestic Product (GDP) was USD 154 billion in 2019, with real GDP growth rate at 3.2% and per capita GDP of USD 3,659[10]. The country's Gross National Income per capita was USD 3,370 in 2019, categorizing Ukraine into the group of lower-middle-income countries by the World Bank's classification[11].

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[8] OECF (1999), "ウクライナ経済の現状と課題" https://www.jica.go.jp/jica-ri/IFIC_and_JBICI-Studies/jica-ri/publication/archives/jbic/report/oecf/paper/pdf/35_j.pdf

[9] World Bank DataBank (2021), "GDP growth (annual %)".

[10] World Bank DataBank (2020), "Popular indicators".

[11] World Bank DataBank (2020), "GNI per capita, Atlas method (current US$)".

Table 2-2 Major economic and social indicators

Category	Name of indicator	Year	Ukraine	EU and Central Asia (excluding high income countries)
Economy & growth	GDP (current USD)	2019	USD 153,781 million	USD 3,248,461 million
	GDP growth rate	2019	3.2%	1.7%
	GDP per capita (current USD)	2019	USD 3,659	USD 8,133
	GNI (current USD)	2019	USD 141,637 million	USD 3,209,727 million
	GNI per capita (current USD)	2019	USD 3,370	USD 8,036
Social protection & labor	Labor force participation rate, female	2020	46%	49%
	Labor force participation rate, male	2020	63%	70%
	Unemployment, female	2020	7.9%	7.1%
	Unemployment, male	2020	9.9%	7.6%
	Unemployment, total	2020	8.9%	7.4%

Source: World Bank[12]

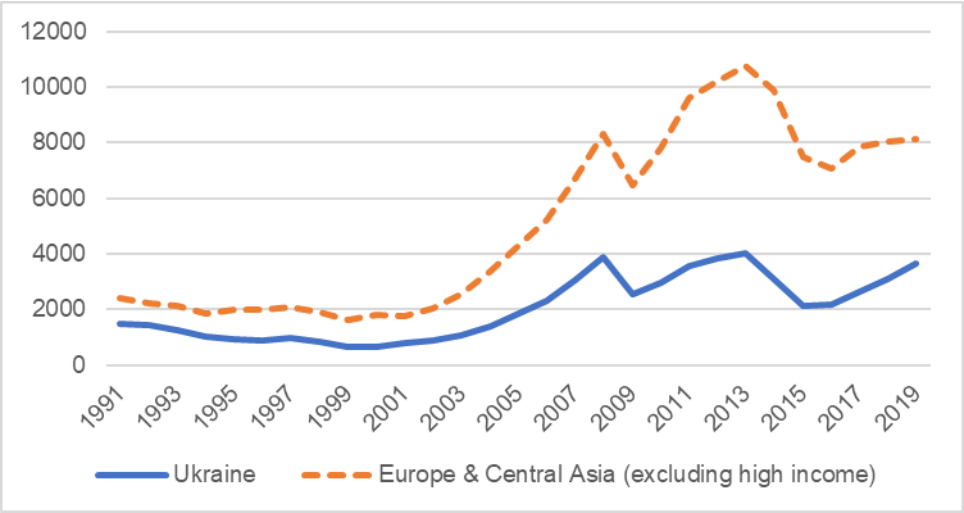

Figure 2-6 GDP per capita (current USD)

Source: World Bank[13]

The country's major industries are mining and manufacturing (24.8%), agriculture, forestry and fisheries (11.9%), construction (2.7%), and wholesale, retail and transportation (23.1%)[14]. Total trade was USD 50.1

[12] World Bank DataBank (2020), "Popular indicators".

[13] World Bank DataBank (2020), "Popular indicators".

[14] Ministry of Foreign Affairs of Japan, https://www.mofa.go.jp/mofaj/area/ukraine/data.html#section1

billion in exports and USD 60.8 billion in imports in 2019[15]. Major exported items are cereals (19.3%), ferrous metals (17.5%), ore (7.2%), and electric machines (5.5%), while major imported items are mineral fuels (20.0%), nuclear reactors, boilers, machines (11.0%), electric machines (10.9%), and ground transport facilities excluding railway (9.5%). Major trading partners are China (7.2%), Poland (6.6%) and Russia (6.5%) for export, and China (15.1%), Russia (11.5%) and Germany (9.8%) for import.

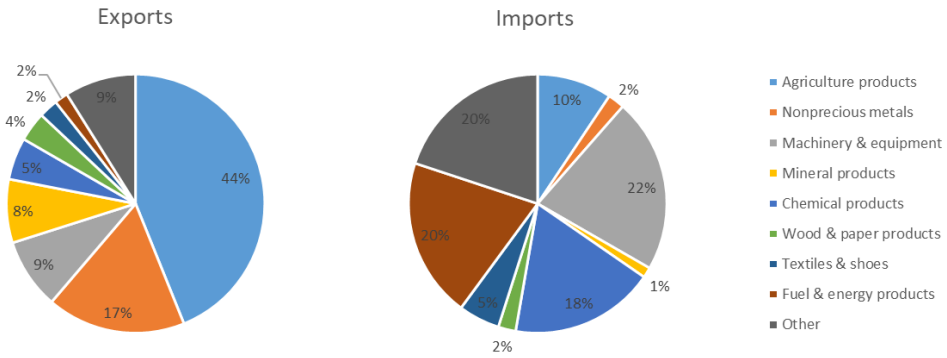

Figure 2-7 Ukraine's foreign trade 2019: breakdown by products

Source: UkraineInvest (2020)[16]

Ukraine's unemployment rate has been around 9% since 2014 and is relatively high, compared to other European countries during the same period (Figure 2-8).

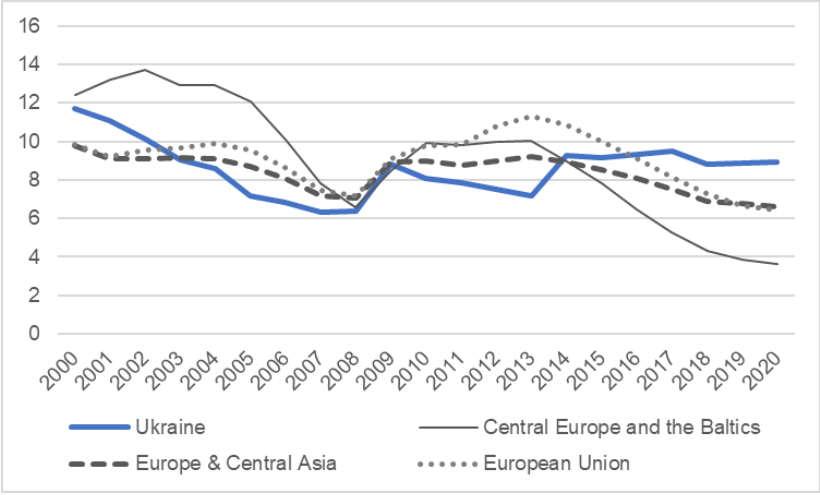

Figure 2-8 Unemployment rate (% of the total labor force) (modeled ILO estimate)

Source: World Bank[17]

[15] State Statistics Service of Ukraine, "Monthly volumes of the commodity structure of foreign trade in 2019", https://ukrstat.org/en/operativ/operativ2017/zd/str_eit/s_eit_e19.htm.

[16] UkraineInvest (2020), "UkraineInvest Guide September-December 2020".

[17] World Bank, Unemployment, total (% of total labor force)

The average monthly wage of regular employees was UAH 11,006 (about USD 385) in the first quarter of 2020[18], while the government set the minimum wage of UAH 4,170 (USD 146) in the National Budget for 2019[19]. Workers in the ICT industry received a particularly higher wage (UAH 19,939 / USD 698), whereas the average wage of the health sector (UAH 7,693 / USD 269) was lower than the average (Table 2-3).

Table 2-3 Average monthly wages by type of economic activity in the first quarter of 2020

	UAH	USD
Average	**11,006**	**385**
Agriculture, forestry, and fishing	8,686	304
Manufacturing	12,424	435
Construction	9,335	327
Wholesale and retail trade; repair of motor vehicles and motorcycles	11,191	392
Transportation and warehousing, postal and courier activities	11,912	417
Accommodation and food service activities	6,853	240
Information and communication	19,939	698
Financial and insurance activities	21,169	741
Real estate activities	8,903	312
Professional, scientific, and technical activities	16,368	573
Administrative and support service activities	9,642	337
Public administration and defense; compulsory social security	14,512	508
Education	8,382	293
Human health and social work activities	7,605	266
of which human health	7,693	269
Arts, sport, entertainment, and recreation	8,601	301
Other service activities	11,754	411

Note: Values in USD were calculated using the exchange rate in November 2020: UAH 1 = USD 0.035.

Source: State Statistics Service of Ukraine[20]

2.3 Political overview

2.3.1 Internal politics

In November 2013, the Yanukovych administration decided to halt the process of negotiating the

https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?end=2019&start=1991&view=chart (accessed on 30 November 2020)

[18] State Statistics Service of Ukraine (2020), "Average monthly wages by type of economic activity over the quarter", https://ukrstat.org/en/operativ/operativ2017/gdn/snzp/snzp_ek/smzp_ek_e.htm (accessed on 30 November 2020).

[19] Ukraine Government Portal, https://www.kmu.gov.ua/en/news/serednya-zarplata-v-ukrayini-u-veresni-perevishchila-9-tis-grn-derzhstat. (accessed on 30 November 2020).

[20] State Statistics Service of Ukraine (2020), "Average monthly wages by type of economic activity over the quarter", https://ukrstat.org/en/operativ/operativ2017/gdn/snzp/snzp_ek/smzp_ek_e.htm (accessed on 30 November 2020).

Association Agreement with the EU, triggering a large-scale anti-government demonstration by supporters of European integration and citizens opposed to corruption in the administration. In 2014, President Yanukovych sought refuge in Russia, and a new cabinet was formed by Prime Minister Yatsenyuk. In March of the same year, in the Autonomous Republic of Crimea, Russia "annexed" Crimea in response to the illegal referendum by the "government of the Republic", though the Ukrainian government did not recognize it. Subsequently, the situation in eastern Ukraine became unstable. The armed forces occupied various facilities in the local government, and fighting between the Ukrainian government forces and the armed forces started.

In June 2014, former Minister of Economic Development and Trade Poroshenko was elected as president, and the second Yatsenyuk Cabinet was formed and in December. However, as the conflicts increased within the ruling party, Prime Minister Yatsenyuk announced his resignation in April 2016, and a new cabinet was inaugurated with the chairman of the Supreme Council as the prime minister.

In April 2019, Zelensky won the presidential election with more than 70% of the vote and became president in May of the same year. In July, the National Service Party, led by President Zelensky, won a single majority, and in August, a new cabinet of Prime Minister Honcharuk was formed. However, in March 2020, Prime Minister Honcharuk submitted his resignation in response to calls for an urgent review of the achievements, and a new cabinet was inaugurated by Deputy Prime Minister Schmygal as the new prime minister.[21]

2.3.2 Foreign policy

Since the inauguration of the new government in February 2014 and the inauguration of President Poroshenko in June 2014, the Ukrainian government has further promoted the line of European integration and signed the Association Agreement with the EU. This agreement entered into force in November 2014, and the Deepened Comprehensive Free Trade Agreement (DCFTA) between the EU and Ukraine commenced a provisional application in January 2016.

On the other hand, relations with Russia have rapidly deteriorated due to the "annexation" of Crimea and the destabilization of the eastern part of Ukraine. Conflict continues over gas supply conditions. In 2014-15, the Trilateral Contact Group consisting of representatives from Ukraine, Russia, and the Organization for Security and Co-operation in Europe signed the Minsk Protocol aimed at a ceasefire and political settlement. However, the Minsk Protocol has not been fully implemented, and the situation in Ukraine remains unstable. The Zelensky administration has stated that it is ready to hold dialogue with Russia while continuing the pro-Europe policy from the previous Poroshenko administration.[22]

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[21] Ministry of Foreign Affairs of Japan, https://www.mofa.go.jp/mofaj/area/ukraine/data.html#section2 (accessed on 30 November 2020)

[22] Ministry of Foreign Affairs of Japan, https://www.mofa.go.jp/mofaj/area/ukraine/data.html#section2 (accessed on 30

2.4 Administrative division

Ukraine has 27 administrative districts: 24 *oblasts* (provinces), the Autonomous Republic of Crimea, and two special cities (Kyiv and Sevastopol). Each oblast and both Kyiv and Sevastopol have a governor who is appointed by the President. The second level of the administrative division below the *oblast* is *raion* (district), and the third level is *hromada* (territorial community) consisting of multiple communities (cities, settlements and villages).

Decentralization reform has been going on in Ukraine since 2014. In the course of decentralization, local budget revenues grew by more than 4 times between 2014 and 2019, from UAH 69 billion (about USD 2.5 billion) to UAH 295 billlion (USD 10.6 billion).[23] At the same time, financial resources have been transferred from *raions* to *hromadas*.

2020 was a key year in the formation of a basic level of local self-government. In July 2020, the Verkhovna Rada adopted Resolution No. 3650 "On the formation and liquidation of districts", with which old 490 *raions* were merged into 136 new *raions*. Hromadas have been also amalgamated. In June 2020, the Cabinet of Ministers of Ukraine adopted 24 orders on the designation of administrative centers and approval of the territories of communities in the regions, with which 1,469 *hromadas* have been created in the country.[24]

2.5 National development policy

"The Program of Action of the Cabinet of Ministers" is a strategic document that sets out the goals and priorities in activities of the Cabinet of Ministers. In September 2020, the Cabinet of Ministers approved a draft decree on the Government Priority Action Plan for the next five years, which specifies the framework of action plans, each ministry's responsibilities, timeline, and performance indicators[25]. According to the draft submitted in June 2020, the underpinning approach of the action plan focuses on the following areas:

- The European and Euro-Atlantic integration of Ukraine;
- Digitalization of the economy;
- Reintegration of the temporarily occupied territories;
- External policy to protect citizens;
- Economic development through smart regulation of economic activity, better investment climate,

November 2020)

[23] Decentralization portal, "Monitoring of the process of power decentralization and local governance reform", https://decentralization.gov.ua/en/mainmonitoring#main_info (accessed on 3 March 2021).

[24] Decentralization portal, "General information", https://decentralization.gov.ua/about (accessed on 3 March 2021).

[25] Government Portal (2020), "Cabinet of Ministers of Ukraine unveils the Government's Action Program", https://www.kmu.gov.ua/en/news/uryad-oprilyudniv-programu-dij (accessed on 30 November 2020).

development of innovation, and energizing of international trade;

- Education, healthcare, cultural services, and other social areas; and
- Improvement of public governance for quality public services.

2.6 Political and economic relations with Japan

Japan's trade with Ukraine in 2017 was JPY 50.93 billion for exports and JPY 70.77 billion for imports[26]. Major items exported from Japan to Ukraine were vehicles, machinery and equipment, electrical and electronic equipment, and optical equipment, while items exported from Ukraine to Japan were tobacco, ores, grains, and aluminum[27]. Direct investment from Japan to Ukraine was USD 139 million (cumulative total as of the end of 2018)[28]. As of 2019, 36 Japanese companies are based in Ukraine[29].

Japan is one of Ukraine's major development partners (Figure 2-9). Japan provided cooperation to Ukraine since the establishment of diplomatic relations in 1992 that amounts to over USD 3 billion (cumulative total as of February 2018), of which the majority was provided in the form of loan aid (Table 2-4).[30]

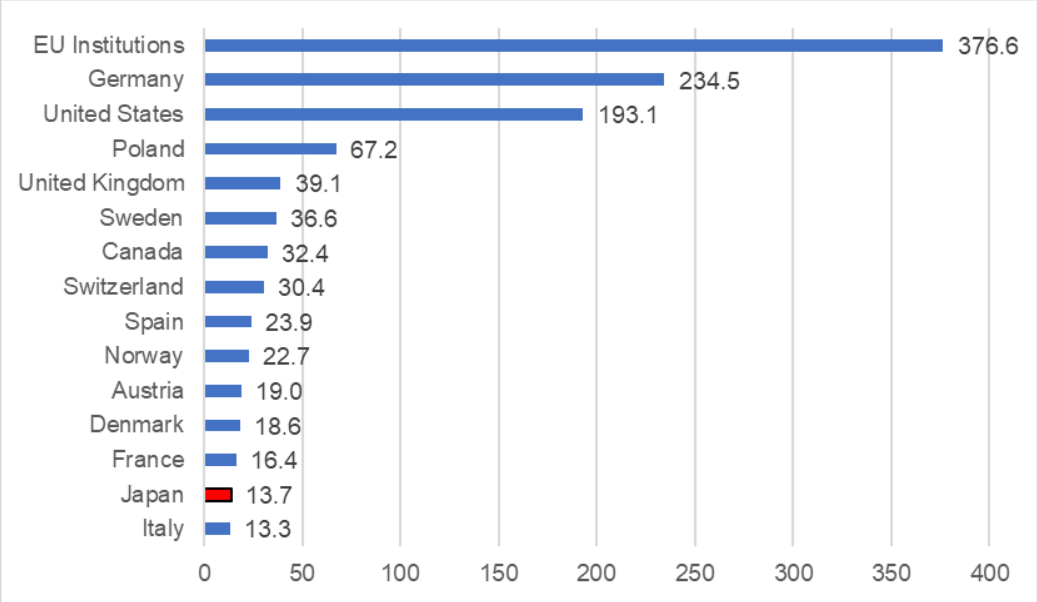

Figure 2-9 Gross ODA for Ukraine, 2018 (USD million)

Source: OECD[31]

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[26] Ministry of Finance, Trade Statistics

[27] State Statistics Bureau of Ukraine (2018)

[28] Ukrainian State Statistics Office

[29] Ministry of Foreign Affairs of Japan, https://www.mofa.go.jp/mofaj/toko/page22_000043.html. (accessed on 30 November 2020)

[30] Embassy of Japan in Ukraine (2018), "Japan's assistance to Ukraine" https://www.ua.emb-japan.go.jp/files/000336611.pdf (accessed on 30 November 2020).

[31] OECD, Aid at a Glance charts, https://www.oecd.org/dac/financing-sustainable-development/development-finance-data/aid-

Table 2-4 Japan's assistance to Ukraine up to 2018

Loan aid	USD 1.69 billion
Grant aid	USD 98 million
Financial assistance	USD 580 million
Support for Chernobyl and nuclear non-proliferation	USD 219 million
Technical cooperation	USD 79 million

Source: Embassy of Japan in Ukraine[32]

2.7 Investment laws and regulations

In Ukraine, foreign investment is guaranteed under the Law "On the Regime of Foreign Investment" revised in 2016. Foreign investors are authorized to carry out their investment activities on the same basis as domestic investors, except for a few industries exclusively carried out by state-owned enterprises, such as the rocket industry, banknote printing, and defense. Article 8 of the Law stipulates that foreign investments should be protected against changes in legislation concerning foreign investment within a period of ten years from the date of such legislation coming into force.

Moreover, the Law of Ukraine "On State Support for Investment Projects with Significant Investments" was adopted in December 2020, which defines the organizational, legal and financial principles of state support for investment projects with significant investments. The so-called "investment nanny" law stipulates that state support may be provided to investors in the form of tax benefits (exemption from corporate income tax and duties on import of new equipment into the customs territory of Ukraine), granting the right to use a land plot to implement an investment project with rent to be paid under special conditions, as well as providing adjacent infrastructure facilities (highways, communication lines, heat, gas, water and electricity supply facilities, utilities, etc.) through the construction/reconstruction of such infrastructure at the expense of the state.[33]

Despite this principle of non-discrimination of foreign investment and enhancing general provisions to protect it, there are certain restrictions on foreign investment. For example, foreign investors are not allowed to invest in agricultural lands. According to the OECD's Foreign Direct Investment Restrictiveness Index (a measure of statutory restrictions on foreign direct investment), particularly restrictive sectors include real estate, media, transport, and agriculture, although such restriction by sector is commonly

at-a-glance.htm (accessed on 30 November 2020).

[32] Embassy of Japan in Ukraine (2018), "Japan's assistance to Ukraine" https://www.ua.emb-japan.go.jp/files/000336611.pdf (accessed on 30 November 2020).

[33] Verkhovna Rada of Ukraine (2020), "Adopted the Law of Ukraine "On State Support for Investment Projects with Significant Investments", https://iportal.rada.gov.ua/en/news/News/201157.html (accessed on 3 March 2021).

observed in many other countries[34].

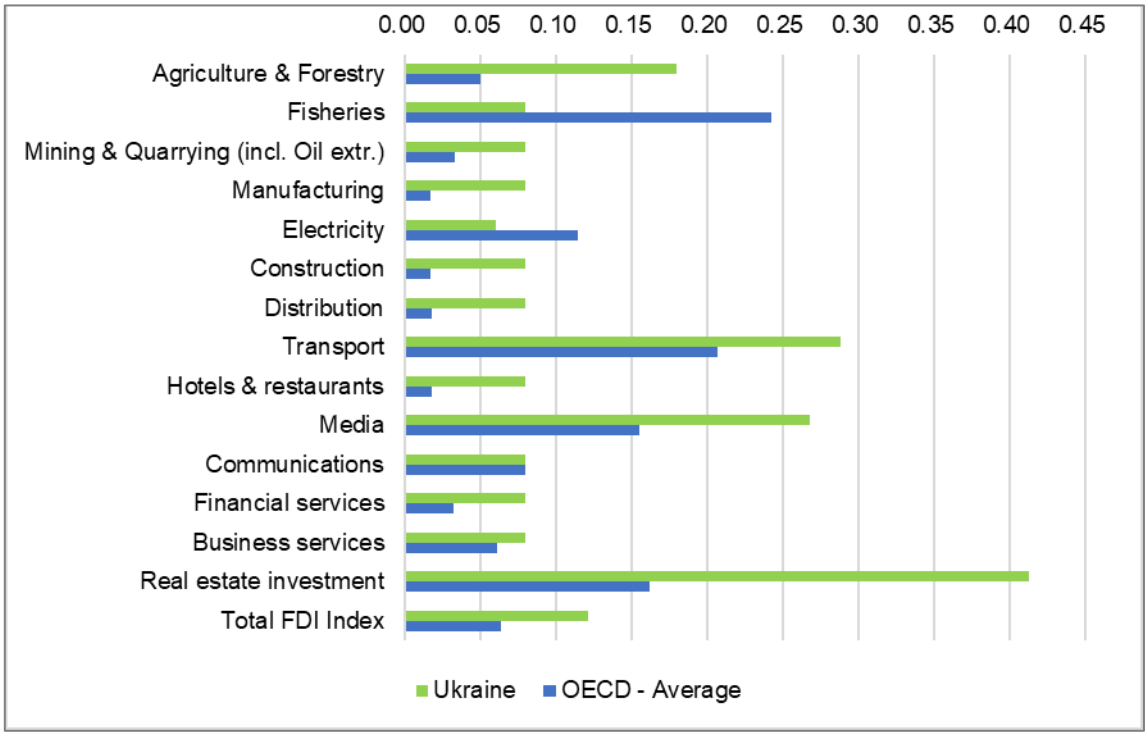

Figure 2-10 OECD FDI Restrictiveness Index by Sector (2019)

Source: OECD[35]

As Russian investors have withdrawn their assets partly in response to the diplomatic conflicts, the Ukrainian government has been making efforts to improve the investment climate. For example, the effectiveness of the intellectual property rights protection system improved by implementing the EU best practices in the protection of rights to inventions and utility models.

Ukraine also has UkraineInvest, an independent government agency responsible for investment promotion and facilitation. UkraineInvest is mandated to provide one-stop support for foreign investors, by providing information and advice on doing business in Ukraine, identifying optimal investment opportunities, guiding investors through government agencies, and helping to resolve systemic challenges investors may face.

Foreign direct investment stocks in Ukraine declined after 2013 (Figure 2-11), as Russian investors withdrew their assets partly in response to the diplomatic conflicts (Figure 2-12). However, the Ukrainian government has been making efforts to improve the investment climate. For example, the effectiveness of the intellectual property rights protection system improved by implementing the EU best practices in the

[34] OECD (2020), "Investment Perspectives in Eastern Partner Countries".

[35] OECD (2020), OECD Stat. "OECD FDI Regulatory Restrictiveness Index".

protection of rights to inventions and utility models.

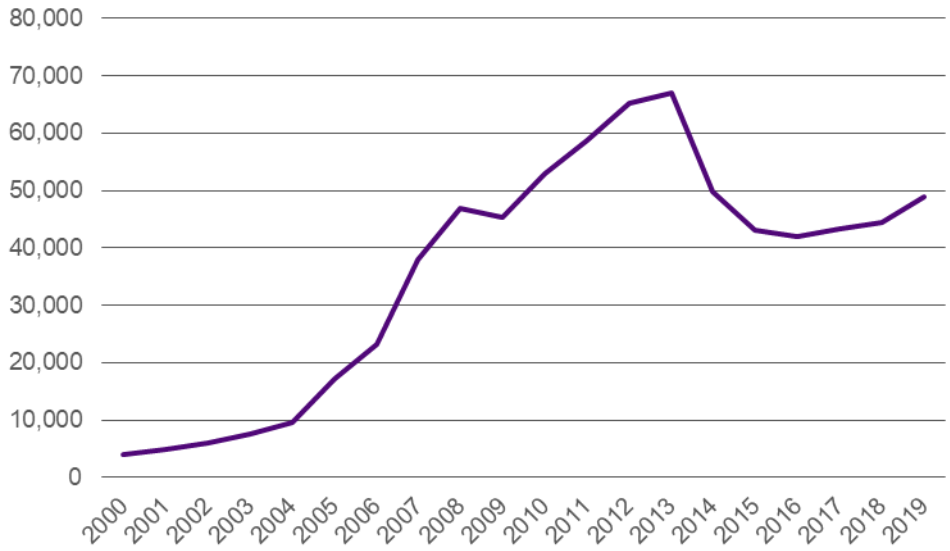

Figure 2-11 Foreign direct investment inward stock (in millions of USD)

Source: UNCTAD (2020), World Investment Report.[36]

Table 2-5 Direct investment in Ukraine: Positions by countries, as of 31 December 2019

(million USD)

Total	**51,386.6**
Cyprus	16,043.7
Netherlands	11,693.3
Switzerland	3,190.1
Germany	2,496.8
United Kingdom	2,159.3
Austria	1,483.2
Russian Federation	1,155.0
France	1,149.9
Japan	**144.9**

Source: National Bank of Ukraine (2020)[37]

[36] UNCTAD (2020), "Annex table 3. FDI inward stock, by region and economy, 1990-2019", *World Investment Report 2020*, https://unctad.org/topic/investment/world-investment-report (accessed on 12 February 2021).

[37] National Bank of Ukraine (2020), "Positions: direct investment's Instruments by Regions, Countries, Types of Economic Activity", https://bank.gov.ua/en/statistic/sector-external/data-sector-external.

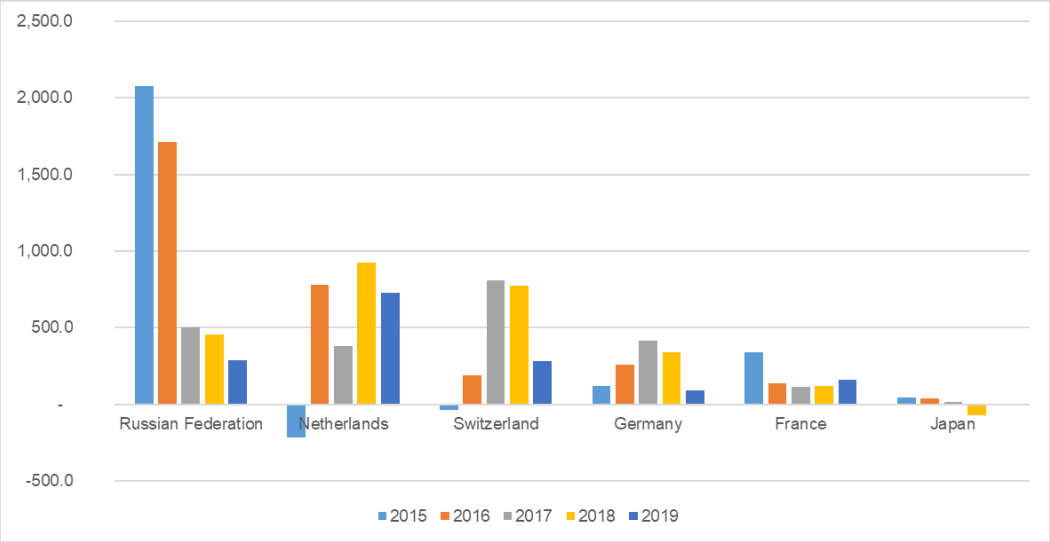

Figure 2-12 Direct investment in Ukraine: Flows by countries

Source: National Bank of Ukraine[38]

As a result, Ukraine's ranking has been improving in the World Bank's Ease of Doing Business, although it is still relatively low (64th in 2020)[39]. Recently, Ukraine has made progress in "Dealing with construction permits", "Getting electricity", "Registering property", "Getting credit", "Protecting minority investors", and "Trading across borders". Yet, the rankings in "Getting electricity" and "Resolving insolvency" are still very low (Table 2-6).

Table 2-6 The World Bank "Ease of Doing Business rankings" in 2020

	Ukraine	Belarus	Russian Federation	Latvia	Estonia
Ease of doing business rank	**64**	**49**	**28**	**19**	**18**
Starting a business	61	30	40	26	14
Dealing with construction permits	20	48	26	56	19
Getting electricity	128	20	7	61	53
Registering property	61	14	12	25	6
Getting credit	37	104	25	15	48
Protecting minority investors	45	79	72	45	79
Paying taxes	65	99	58	16	12
Trading across borders	74	24	99	28	17
Enforcing contracts	63	40	21	15	8
Resolving insolvency	146	74	57	55	54

Source: World Bank[40]

[38] National Bank of Ukraine (2020), "Direct investment Instrument in Ukraine (inward direct investment): Flows (by years)", https://bank.gov.ua/en/statistic/sector-external/data-sector-external (accessed on 12 February 2021).

[39] World Bank (2020), "Ease of Doing Business rankings", https://www.doingbusiness.org/en/rankings (accessed on 30 November 2020).

[40] World Bank (2020), "Ease of Doing Business rankings", https://www.doingbusiness.org/en/rankings (accessed on 30

2.8 Education in Ukraine

In Ukraine, education is compulsory for 9 years, with 4 years of primary education (age 6/7-10/11) and 5 years of the initial phase of basic secondary education (age 10/11-15/16). The second phase of secondary education lasts up to 2 years. After completing the second phase of secondary education, students must take the "independent external assessment" to gain access to a higher education institution. Higher education is provided at universities, academies, institutes, technical schools, and colleges. These institutions offer both professionally-oriented and academic programs.

Technical and vocational education is offered at 3 levels in Ukraine.[41]

1) Level I: Anyone with an incomplete school certificate can be admitted, and the programs take no longer than 1 year. At the end of a program, the title of Qualified Worker is awarded.

2) Level II: The minimum admission requirement is completion of compulsory education. The length of these programs varies from 1-3 years. Students who combine vocational education with upper general secondary education may take the entrance examinations for admission into university.

3) Level III: Level III professional programs are part of higher education. The distinction between academic programs and professional programs in higher education is often not clear in Ukraine.

November 2020).

[41] NUFFIC (2020), "Education system Ukraine described and compared with the Dutch system", https://www.nuffic.nl/sites/default/files/2020-08/education-system-ukraine.pdf.

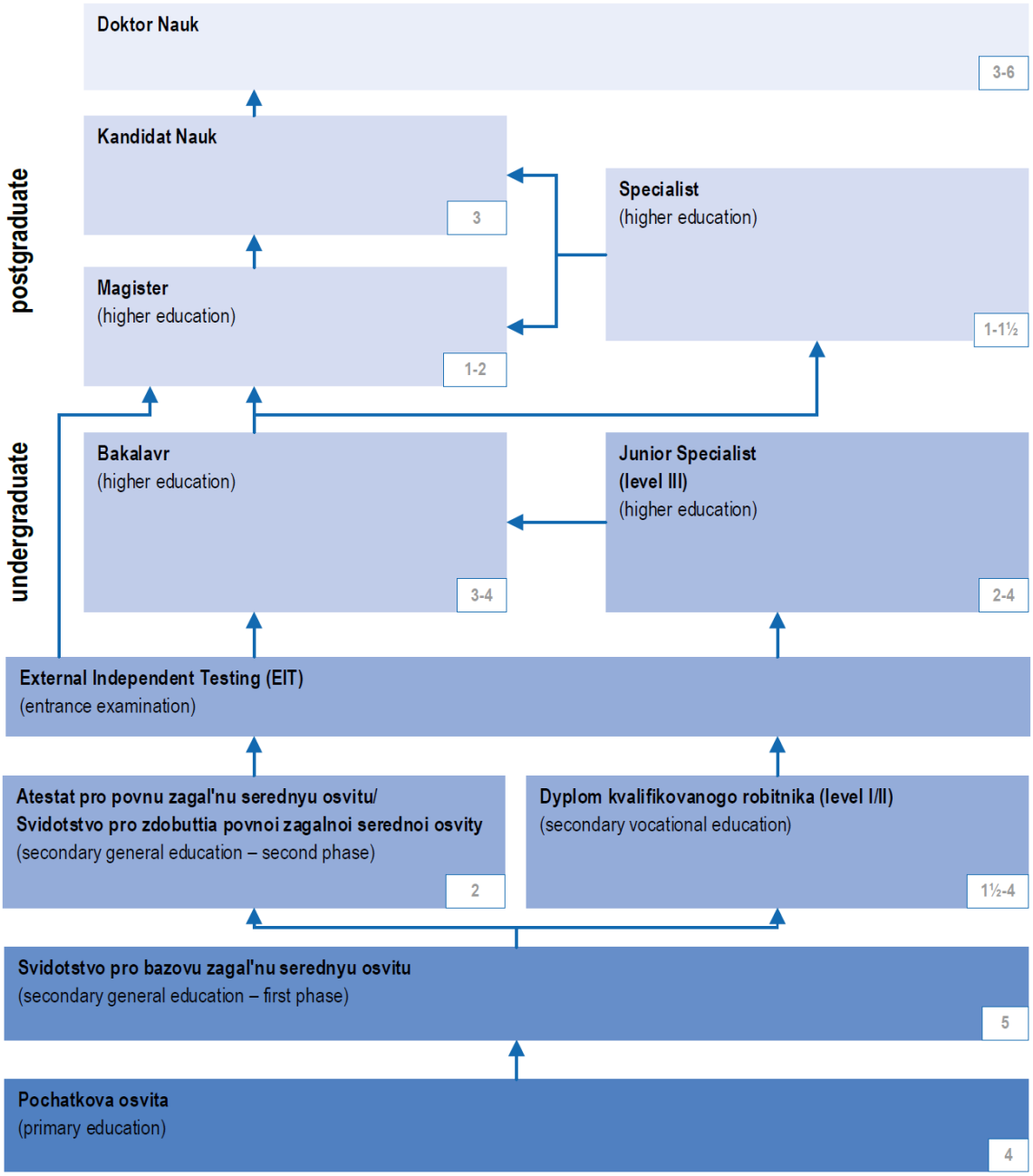

Figure 2-13 Education system in Ukraine

Source: NUFFIC[42]

Ukraine participated in the OECD's Programme for International Student Assessment (PISA) in 2018 that measures student performance near the end of their compulsory education. In PISA 2018, Ukrainian

[42] NUFFIC (2020), "Education system Ukraine described and compared with the Dutch system", https://www.nuffic.nl/sites/default/files/2020-08/education-system-ukraine.pdf.

students' scores in reading, mathematics and science are all below the OECD averages (Table 2-7). This means that, at the age of 15, Ukrainian students demonstrate relatively weak abilities in applying their reading, mathematics and science knowledge in solving everyday problems, compared to their peers in OECD countries. Yet, Ukraine's scores are relatively high among the EU's Eastern Partnership countries.

Table 2-7 Ukraine's performance in PISA 2018

	Reading	Mathematics	Science
Ukraine	466	453	469
OECD average	487	489	489
Baku (Azerbaijan)	389	420	398
Belarus	474	472	471
Georgia	380	398	383
Moldova	424	421	428

Source: OECD[43]

[43] OECD, "PISA data explorer", https://pisadataexplorer.oecd.org/ide/idepisa/.

3 ICT sector

This chapter provides an overview of the ICT sector in Ukraine. It describes the country's vision and strategies, its ICT infrastructure, education and training of ICT talents, and ICT/start-up ecosystems. It also touches on recent issues of security and personal information protection in the country.

3.1 Overview / Vision / Strategy

3.1.1 Current Status of ICT Industry

The ICT sector has been growing rapidly in Ukraine. In 2017, the ICT sector generated 3.5 billion dollars of exports, accounting for more than 3 percent of GDP and 10 percent of foreign direct investment[44]. By 2019, ICT had become a more-than-$4 billion industry.

Among exports of services, services in the sphere of telecommunications, computer and information services accounted for 16.5% in 2019.[45] Among exports of goods, ICT goods accounted for 4.9% in 2019.[46]

Ukraine's ICT sector was accelerated in 2010 after the 2008 global financial crisis. This crisis motivated to eliminate in-house "ICT departments" and to shift from traditional outsourcing countries such as India and Ireland, whose labor costs were increasing, to alternative countries in Central and Eastern Europe, including Ukraine.

Recently, the total amount of investment (both inward and foreign investment) to start-ups in Ukraine is rapidly increasing. Especially, 500 Million USD was invested in 2019. This is because of big start-ups born in Ukraine such as GitLab[47] (268 Million USD), Grammarly[48] (90 Million USD) and people.ai[49] (60 Million USD). The start-up ecosystem in Ukraine was already grown up as much as to foster such great companies.[50]

In terms of the application of ICT, Ukraine has also great potential in agriculture, transport (pipelines,

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[44] World Bank (2019), "Path for Ukraine's Economic Growth: Technology Upgrading", http://documents1.worldbank.org/curated/en/880431575641119051/pdf/Path-for-Ukraines-Economic-Growth-Technology-Upgrading.pdf?fbclid=IwAR0tb0KFlnhy1tP7JpaPJvtT45faT2oUH8lVLV4lQm4QvNi-La1IllgnDEc (accessed on 30 November 2020).

[45] State Statistics Service of Ukraine, "Quarterly volumes of foreign trade by types of services1 in 2019", https://ukrstat.org/en/operativ/operativ2016/zd/str_eip_kv/str_eip_kv_e/str_eip2019_e.htm (accessed on 1 April 2021).

[46] World Bank, World Development Indicators, "ICT goods exports (% of total goods exports)".

[47] Website: https://about.gitlab.com/ (accessed on 30 November 2020)

[48] Website: https://www.grammarly.com/ (accessed on 30 November 2020)

[49] Website: https://people.ai/ (accessed on 30 November 2020)

[50] Deloitte (2020), Ukrainian Venture Capital and Private Equity Overview 2019 https://www2.deloitte.com/ua/en/pages/press-room/press-release/2020/investments-into-startups-2019.html (accessed on 30 November 2020)

railroads), aviation, the financial sector, and healthcare. ICT services and solutions have the potential to open new opportunities for optimizing production and business processes. The application of digital solutions could be piloted in resource-based industries where exports have been growing, such as agriculture. Ukraine has around 20 large agro-holdings, which are financially viable but still lagging in terms of adoption of digital solutions compared to their European and international peers. The partnering of ICT and agro-companies could be one of the key priorities for both industries.[51]

3.1.2 Vision

There have been several policy documents presenting the state government's visions related to the ICT sector. This section discusses three key documents: "Digital Agenda of Ukraine 2020", "Ukraine's Digital Agenda 2020", and "Programme of Action of the Cabinet of Ministers of Ukraine", published in 2016, 2018 and 2020 respectively.

"Digital Agenda of Ukraine 2020"

In 2016, the Ukraine government, domestic ICT experts and world leaders in ICT sectors, such as Cisco, IBM, Intel, Oracle, Deloitte, SAP, Ericsson, MasterCard, Vodafone, and so on, published the concept paper of the ICT sector in Ukraine as "Digital Agenda of Ukraine 2020".[52]

In this paper, they defined the goals as follows:

- Stimulate the economy and attract investment.
- Lay the foundation for the transformation of economic sectors into competitive and efficient ("digital" economy, "digitalization" of business, industry).
- Make "digital" technologies available.
- Create new opportunities for the realization of human capital, the development of innovative, creative, and "digital" industries and businesses.
- Develop and capture world leadership in the export of "digital" products and services.

"Ukraine's Digital Agenda 2020"

In 2018, the former president Poroshenko and his Government publicized "Ukraine's Digital Agenda 2020",

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[51] World Bank (2019), "Path for Ukraine's Economic Growth: Technology Upgrading", http://documents1.worldbank.org/curated/en/880431575641119051/pdf/Path-for-Ukraines-Economic-Growth-Technology-Upgrading.pdf?fbclid=IwAR0tb0KFlnhy1tP7JpaPJvtT45faT2oUH8lVLV4lQm4QvNi-La1IllgnDEc (accessed on 30 November 2020).

[52] Ukraine government (2016), Digital Agenda of Ukraine 2020 (Цифрова адженда України – 2020 https://www.kmu.gov.ua/news/249575382 https://issuu.com/mineconomdev/docs/digital_agenda_ukraine-v2__1_ (accessed on 30 November 2020)

and show the conceptual vision of the ICT development.

The agenda consists of seven main pillars:[53][54]

- Telecommunications and ICT Infrastructure;
- Digital Skills;
- eMarket;
- Digital Governance;
- Innovation and R&D;
- Trust and Cybersecurity; and
- Benefits from ICT for Society and Economy.

The Government also adopted "the Concept of Digital Economy and Society Development" and its action plan for implementation of the Digital Agenda of Ukraine initiative. The concept includes a detailed plan of digital development in such fields as digital infrastructure, Implementing the concept of digital jobs, public security, education, healthcare, tourism, ecology and environmental protection, and cashless payments. This paper is aligned with the Digital Agenda for Europe and Digital Single Market.[55]

"Programme of Action of the Cabinet of Ministers of Ukraine"

In September 2020, President Zeelensky approved the "Programme of Action of the Cabinet of Ministers of Ukraine"[56] (see Annex 1). Prior to this, Ministry of Digital Transformation (MODT) was established in August 2020, to implement state policies in the fields of digitalization, and Mykhailo Fedorov, Deputy Prime Minister of Ukraine, was appointed as the first Minister of Digital Transformation. In the document, MODT showed its agenda and the indicators for evaluation. Among them, the sections related to the development of the ICT sector in Ukraine are the following 3 sections: "Informatization of society", "Promotion of IT business", and "Digital literacy of Ukrainians".

In "Informatization of society", MODT shows the main development targets of the telecommunication

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[53] Ukraine Government (2018), Ukraine's Digital Agenda 2020 (Цифрова адженда України 2020) https://zakon.rada.gov.ua/laws/show/67-2018-%D1%80 https://ucci.org.ua/uploads/files/58e78ee3c3922.pdf (accessed on 30 November 2020)

[54] European Comission (2019), Digital Government Factsheet 2019 https://www.ospi.es/export/sites/ospi/documents/documentos/Administracion-Digital/Digital_Government_Factsheets_Ukraine_2019.pdf (accessed on 30 November 2020)

[55] Ukraine Government (2018), On approval of the Concept of development of the digital economy and society of Ukraine for 2018-2020 and approval of the action plan for its implementation (Про схвалення Концепції розвитку цифрової економіки та суспільства України на 2018-2020 роки та затвердження плану заходів щодо її реалізації) https://zakon.rada.gov.ua/laws/show/67-2018-%D1%80 (accessed on 30 November 2020)

[56] Ukrinform (2020), Cabinet of Ministers approves priority action plan for 2020 https://www.ukrinform.net/rubric-polytics/3096396-cabinet-of-ministers-approves-priority-action-plan-for-2020.html (accessed on 30 November 2020)

infrastructure such as optical fiber network, mobile communication system, and related regulations.; In "Promotion of ICT business", the investment for ICT business and Digital Single Market of EU; In "Digital literacy of Ukrainians", the educational programs for citizens including public servants and doctors, and the definition of digital competencies.

3.2 Infrastructure

3.2.1 Overview

Today, there are the following trends in the development of the ICT infrastructure market in Ukraine[57]:

- Large-scale implementation by operators of various service packages and tariff plans by integrating digital telephony and access services to the Internet and television (one operator provides different telecommunication services, such as hosting, communication channels, IP-telephony, access to the internet, cable TV, digital TV, etc.);
- Widespread introduction of subscriber access technologies, which has created effective conditions to provide all users with modern information and communication services in the fields of security, health, education, agriculture, finance, trade, and utility management;
- Introduction of telecommunication networks for mobile communication of 3G and 4G, based on an open tender. This resulted in telecommunication operators Ltd. Astelit, PJSC MTS Ukraine and PJSC Kyivstar to be licensed to use radio frequency resource of Ukraine for introduction of radio technology "Digital cellular IMT-2000 (UMTS) radio communication" for a period of 15 years; and
- Increasing consumer demand for multimedia converged telecommunication services and increasing number of owners of modern multifunctional communication end devices.

According to the State Statistics Service[58], 95.2% of enterprises in all regions of the country use computers in their activities, and 98.0% of computerized enterprises have access to the Internet. Today the development of the national ICT market is mainly carried out within the framework of this network. Internet connection is used by 94.0% of small enterprises, 98.9% of medium ones, and 99.9% of large ones.

Table 3-1 Number of communication subscribers

	Year	
Mobile cellular subscriptions	2019	54,842,940
Mobile cellular subscriptions (per 100 people)	2019	131
Fixed broadband subscriptions	2019	6,784,185

[57] Tarasova K.I (2018), "The Market of Information and Communication Technologies in the System of National Economy" http://market-infr.od.ua/journals/2018/16_2018_ukr/9.pdf (accessed on 30 November 2020)

[58] State Statistics Service, https://ukrstat.org/en (accessed on 30 November 2020)

Fixed broadband subscriptions (per 100 people)	2019	16.16
Fixed telephone subscriptions	2019	4,182,994
Fixed telephone subscriptions (per 100 people)	2019	10
Secure Internet servers	2020	395,092
Secure Internet servers (per 1 million people)	2020	8,955
Individuals using the Internet (% of population)	2018	63

Source: World Bank[59]

Although the Internet is widely available among enterprises, the availability for ordinary households is much lower. In 2019 only 65.0% of Ukrainian households had access to the Internet[60], whereas the average figure for countries in Europe and Central Asia is much higher at 84%[61]. Moreover, there is still a gap in internet access among large cities and rural areas. In 2019, the regular user of the Internet in large cities with populations of more than 100 thousand is 74% on average while that of villages is 58%. While the gap between the urban and rural areas is decreasing, more than 21,000 villages have no access to the Internet[62].

The ICT market of Ukraine is developing most intensively in the mobile sector, including broadband Internet access. Mobile phone services have moved to the category of the most accessible services for consumers. The number of mobile subscribers amounted to 53.9 million people at the beginning of 2019, equivalent to about 128% of its population.[63] One of the reasons for which people own multiple SIM cards could be the substantial difference between the tariffs for on-net calls and off-net calls. People buy SIM cards from different operators to enjoy free or cheap on-net calls.[64]

Currently, operator base stations operate mostly in the 1800 MHz band. But in July 2020, they began

[59] World Bank, World Bank Open Data, https://data.worldbank.org/.

[60] Ukrainian Internet Association (2019), Проникнення інтернету в Україні https://inau.ua/sites/default/files/file/1910/dani_ustanovchyh_doslidzhen_iii_kvartal_2019_roku.pdf (accessed on 30 November 2020)

[61] World Bank, "Individuals using the Internet (% of population)", https://data.worldbank.org/indicator/IT.NET.USER.ZS (accessed on 1 April 2021).

[62] Synowiec, A. (2021), "Infrastructural and Social Aspects of ICT Dissemination in Rural Areas in Ukraine in Juxtaposition with Other Post-Transition Countries—State of Play and Prospects for Rural Development", Journal of Risk and Financial Management, 14: 16, https://www.mdpi.com/1911-8074/14/1/16.

[63] State Statistics Service of Ukraine (2019), "Communication subscribers as of January 1, 2019", http://www.ukrstat.gov.ua/ (accessed on 30 November 2020); State Statistics Service of Ukraine (2019), "Population (by estimate) as of January 1, 2019", http://www.ukrstat.gov.ua/ (accessed on 30 November 2020).

[64] National Commission for the State Regulation of Communications and Informatization (2013), "Annual report of the National Commission for the State Regulation of Communications and Informatization for 2012", https://nkrzi.gov.ua/images/upload/142/3963/4b2c475b68c147860c36a6e1fc2a3e47.pdf.

deploying 4G networks in the 900 MHz band. This would cover a larger area with one base station. Major operators paid the cost of licenses: Kyivstar paid UAH 2,837 million (USD 106 million), Vodafone Ukraine paid UAH 1,748 million (USD 66 million), and lifecell paid UAH 795 million (USD 30 million).[65]

Table 3-2 Mobile operators in Ukraine and market shares (2019)[66]

Operator	Market share
Kyivstar	48%
Vodafone Ukraine	36%
lifecell	14%
Other operators	3%

The terms of the licenses are the same for all of them - to provide the opportunity to receive services using LTE-900 for 24 months in each locality with a population of over 2,000 people with coverage of at least 90% of the population of Ukraine.

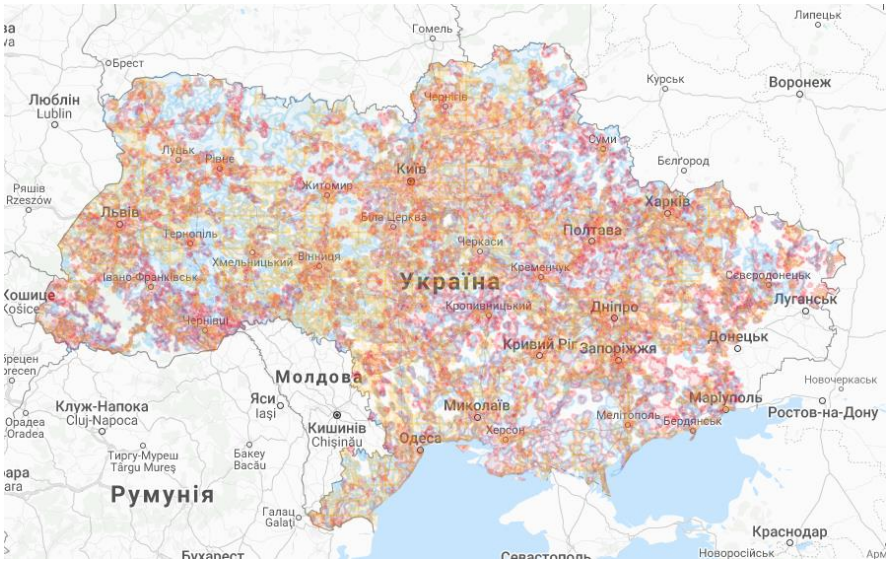

Figure 3-1 The coverage map of 4G network in Ukraine by Kyivstar, Vodafone Ukraine and lifecell

Blue: Kyivstar, Red: Vodafone Ukraine, Yellow: lifecell

Source: MobUA.net[67]

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[65] LB.ua (2018), “lifecell, "Київстар" і Vodafone докупили частоти під 4G за 5,43 млрд гривень” (lifecell, Kyivstar and Vodafone bought frequencies for 4G for UAH 5.43 billion), https://lb.ua/economics/2018/03/06/391968_lifecell_kievstar_vodafone.html,

[66] Better Regulation delivery Office (2020), “З е л е н а книга “Ринок голосових телекомунікаційних послуг (Green book: Market of voice telecommunication services), https://regulation.gov.ua/book/162-zelena-kniga-rinok-golosovih-telekomunikacijnih-poslug.

[67] MobUA.net https://www.mobua.net/maps (accessed on 30 November 2020)

The European Union's EU4Digital program supports efforts to coordinate the frequency distribution of Ukraine in cooperation with the World Bank.[68]

3.2.2 Challenges and Needs

Many legislative barriers and restrictions for operators make it economically unviable to build communication networks in the regions. As a result, there is almost no high-quality mobile communication outside large Ukrainian cities. The government and business representatives discussed ways of tackling these challenges during a round table on "Effective Frequency Spectrum Management: Ensuring Quality Telecommunication Connection in Ukraine" in June 2019.[69]

Experts of the Better Regulation Delivery Office (BRDO) conducted a systematic analysis of the sector and identified the main problems including:[70]

- A lack of frequencies to introduce the latest mobile technologies;
- A lack of technology neutrality: companies are prohibited to use frequencies for other technologies than those specified in the license;
- A lack of public access to reliable information on current frequency use status;
- Unreasonable requirements for the radiation level of base stations;
- No definition of Radio Frequency Resource (RFR) use "effectiveness"; and
- Radiofrequency interference generated by domestic users and illegal businesses.

A key feature of RFR use is that low frequencies provide a larger coverage range, while high frequencies are better suited for the transmission of large volumes of information. Therefore, 800-900 MHz frequencies are used for the countryside, roads, and large open spaces, and 2100-2600 MHz frequencies are used for compact urban development areas.

However, in Ukraine, 800-900 MHz range frequencies are unevenly and inefficiently distributed to users. In contrast, Sweden has used the 800 MHz band for mobile communications since 2011 and the Czech Republic since 2014. In these countries, the frequency allocation auctions for 5G use have already been conducted or are planned for 2019. In Ukraine, a tender for licenses on RFR using 3G and 4G was conducted only in 2015 and 2018 respectively.

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[68] EU4Digital https://eufordigital.eu/discover-eu/eu4digital-supporting-digital-economy-and-society-in-the-eastern-partnership/ (accessed on 30 November 2020)

[69] EU4Ditital https://eufordigital.eu/900-mhz-band-use-would-expand-4g-coverage-throughout-ukraine-within-year-and-a-half/ (accessed on 18 January 2020).

[70] BRDO (2019), https://en.brdo.com.ua/news/900-mhz-band-use-expands-4g-coverage-throughout-ukraine-within-1-5-years/ (accessed on 30 November 2020).

Under the circumstances, MODT is developing the National Plan of Broadband, and declares that 95% of transport infrastructure, populated areas and their social objects should have access to high-speed Internet by 2024.[71]

3.3 Education / Human Resources

3.3.1 Overview

The origin of the rich workforce of the ICT sector in Ukraine can be explained by the country's educational level established during the Soviet-era and the regulation for independent freelance ICT engineers.

During the Soviet-era, research in the fields of nuclear development, nuclear power generation, and aerospace was actively promoted in Ukraine. Thanks to that, the educational level of the science and technology fields is still high in the country. Furthermore, according to the Global Competitiveness Index 2017–2018 rankings by the World Economic Forum, Ukraine ranked high at 27 out of 137 countries in its business community's subjective assessment of math and science education.[72]

Table 3-3 Ukrainian universities in the World University Ranking 2021

Computer Science

Rank	Name
201–250	Lviv Polytechnic National University
301–400	Kharkiv National University of Radio Electronics
601–800	National Technical University of Ukraine – Igor Sikorsky Kyiv Polytechnic Institute
601–800	Taras Shevchenko National University of Kyiv

Engineering

Rank	Name
501–600	Lviv Polytechnic National University
501–600	Sumy State University
601–800	Kharkiv National University of Radio Electronics
801–1000	National Technical University of Ukraine – Igor Sikorsky Kyiv Polytechnic Institute
801–1000	Taras Shevchenko National University of Kyiv
801–1000	V.N. Karazin Kharkiv National University

[71] Ministry of Digital Transformation, https://live.diia.gov.ua/en-stream.html (accessed 6 April 2021).

[72] World Economic Forum (2017), The Global Competitiveness Report 2017–2018 https://www.weforum.org/reports/the-global-competitiveness-report-2017-2018 (accessed on 30 November 2020)

1001+	National Technical University Kharkiv Polytechnic Institute
1001+	Yuriy Fedkovych Chernivtsi National University

Source: Times Higher Education[73]

The cost performance of Ukrainian ICT engineers is also the origin of international competitiveness. Their cost of labor is quite low considering their skills and qualifications. One of the reasons for this is the taxation system favorable for independent entrepreneurs who are called "FOP" (abbreviation of *Fizichna Osoba-Pidpriyemets*, which means "private entrepreneur" in Ukrainian) established in 1994. The FOP taxation system offers a 5 percent income tax rate for independent entrepreneurs.[74] Moreover, the registrations for FOP enable individuals to conduct business without establishing a legal entity. Thanks to these systems, ICT engineers and companies enjoy the simplified taxation system and good tax savings. Foreign companies also take advantage of the FOP tax system, as it enables them to maintain workforce flexibly without hiring full-time employees. As the US and European companies seek to save costs during the financial crisis in the late 2000s, they started outsourcing ICT functions to Ukraine, and ICT engineers in response established small outsourcing startups. According to the World Bank, 44% of the Ukrainian workforce is employed as freelancers, the highest percentage in Europe.[75]

Table 3-4 Average hourly offshore development rates (in USD)

Country	Junior	Mid	Senior
Ukraine	18-25	30-45	50
Poland	20-27	30-50	65+
Romania	15-23	23-30	45+
India	15-20	25-40	50+
Singapore	20-25	35-50	55+
Indonesia	10-18	20-30	35+
Colombia	10-18	20-30	40+
Brazil	17-23	25-35	40+

[73] Times Higher Education, "World University Rankings by Subject", https://www.timeshighereducation.com/world-university-rankings/by-subject (accessed on 7 April 2021).

[74] Contact Ukraine, Tax Guide for Private Entrepreneurs in Ukraine, https://www.contactukraine.com/taxation/private-entrepreneur-taxation (accessed on 30 November 2020).

[75] World Bank (2019), "Path for Ukraine's Economic Growth: Technology Upgrading", http://documents1.worldbank.org/curated/en/880431575641119051/pdf/Path-for-Ukraines-Economic-Growth-Technology-Upgrading.pdf?fbclid=IwAR0tb0KFlnhy1tP7JpaPJvtT45faT2oUH8lVLV4lQm4QvNi-La1IllgnDEc (accessed on 30 November 2020).

Mexico	16-23	23-30	35+

Source: Krivoruchko[76] (Based on information collected from PayScale, Indeed and Glassdoor in 2020-21)

3.3.2 Challenges and Needs

Ukraine has several challenges in terms of ICT education and human resources.

First, higher education in the ICT field is already outdated. Despite the high level of fundamental knowledge in mathematics of Ukrainian students, universities lag behind in teaching practical disciplines, new languages and programming technologies. In Ukraine, universities produce about 4,000 graduates in ICT-related fields every year, but only 25% of them become programmers soon after graduation.[77] There have been some initiatives to tackle this issue in some cities (see Box 1 for the case of Lviv), but they are still limited to major cities and the challenge remains in most of the other parts of the country.

Box 1 Lviv IT Cluster's initiative to update ICT programs in universities

To tackle the challenge of outdated university ICT education, Lviv IT Cluster, a community of ICT companies, authorities, and educational institutions in Lviv, worked with three universities in Lviv to develop new bachelor's programs. Lviv IT Cluster found out the two problems in conventional education: 1) universities give knowledge and technical background, but not soft skills such as teamwork; and 2) some instructors in universities do not have sufficient practical knowledge, and graduates need to upgrade their knowledge and skills on the job. Based on these insights, Lviv IT Cluster developed new ICT courses with universities and launched the first bachelor program at Lviv Polytechnic University in 2016, which took them only one year. Lviv IT Cluster developed 14 new bachelor's programs by the end of 2020.

Source: Interview with Lviv IT Cluster

The tax system, which encourages ICT engineers to be freelancers, has negative aspects. Because many ICT engineers choose to be freelancers to pay only a 5 percent tax on incomes (marginal income tax rates for full-time workers in other industries approach 40 percent), they cannot enjoy some regular social benefits. Further, with the FOP system, companies gather ICT engineers and release them very flexibly. This tax system has also discouraged the development of long-term management and organizational capabilities. This leads to hinder continual upgrading of the industry. Given such conditions, freelancers, small startup, and small and mid-sized enterprises are unable to scale nor seize opportunities in higher

[76] Krivoruchko, George (2021), "Offshore software development rates: comparing by country and skills", Blog on the website of ProCoders (25 May 2021), https://procoders.tech/blog/offshore-developer-rates-comparison/ (accessed on 6 September 2021).

[77] Burdyga, Igor (2017), "І Т -бум в Україні: ринок росте - освіта відстає", https://p.dw.com/p/2nvwY (accessed on 22 April 2021).

value-added ICT markets.

Ukrainian ICT firms are also facing "brain drain" of ICT human capital to the United States and EU countries, especially experts in emerging technology areas such as AI, cyber-security, and blockchain. According to the World Bank Group-LinkedIn Digital Data for Development, Ukraine is experiencing high rates of out-migration among talented software professionals, particularly in comparison to countries such as Poland, Slovakia, and Hungary[78].

The shrinking labor source of ICT engineers combined with increasing demand for labor source is leading to the rise of their wages. As neighboring low-cost competitors such as Romania and Bulgaria emerge, Ukraine is losing its competitiveness in low value-added ICT services, because it has built a reputation as a top outsourcing country based on the relatively low outsourcing rates[79].

3.4 Ecosystem

3.4.1 Overview

More than 1,000 ICT outsourcing companies are located in Ukraine. Some 11 of these are on the 2021 Global Outsourcing 100 list of the International Association of Outsourcing Professionals[80]. The outsourcing sector employed about 75,000 Ukrainian ICT specialists, equal to 44% of total ICT professionals in Ukraine[81]. ICT services companies are located throughout the country, especially in Kyiv, Lviv, Kharkiv, Odessa, and Dnipro.

Box 2 Ukrainian companies listed in the 2021 Global Outsourcing 100

1. Ciklum	7. Miratech
2. Eleks	8. N-iX
3. Infopulse	9. NIX
4. Innovecs	10. Program-Ace
5. Intellias	11. Sigma Software
6. Intetics	Source: IAOP

[78] Aridi, A. et al. (2020), "Windows of opportunities for catching up: an analysis of ICT sector development in Ukraine", The Journal of Technology Transfer, https://doi.org/10.1007/s10961-020-09795-5.

[79] Aridi, A. et al. (2020), "Windows of opportunities for catching up: an analysis of ICT sector development in Ukraine", The Journal of Technology Transfer, https://doi.org/10.1007/s10961-020-09795-5.

[80] IAOP (2021), "The 2021 Global Outsourcing 100", https://www.iaop.org/Content/19/165/5309 (accessed on 7 April 2021).

[81] AVentures (2020), Software Development Report https://software-development-cee-report.com/ (accessed on 30 November 2020)

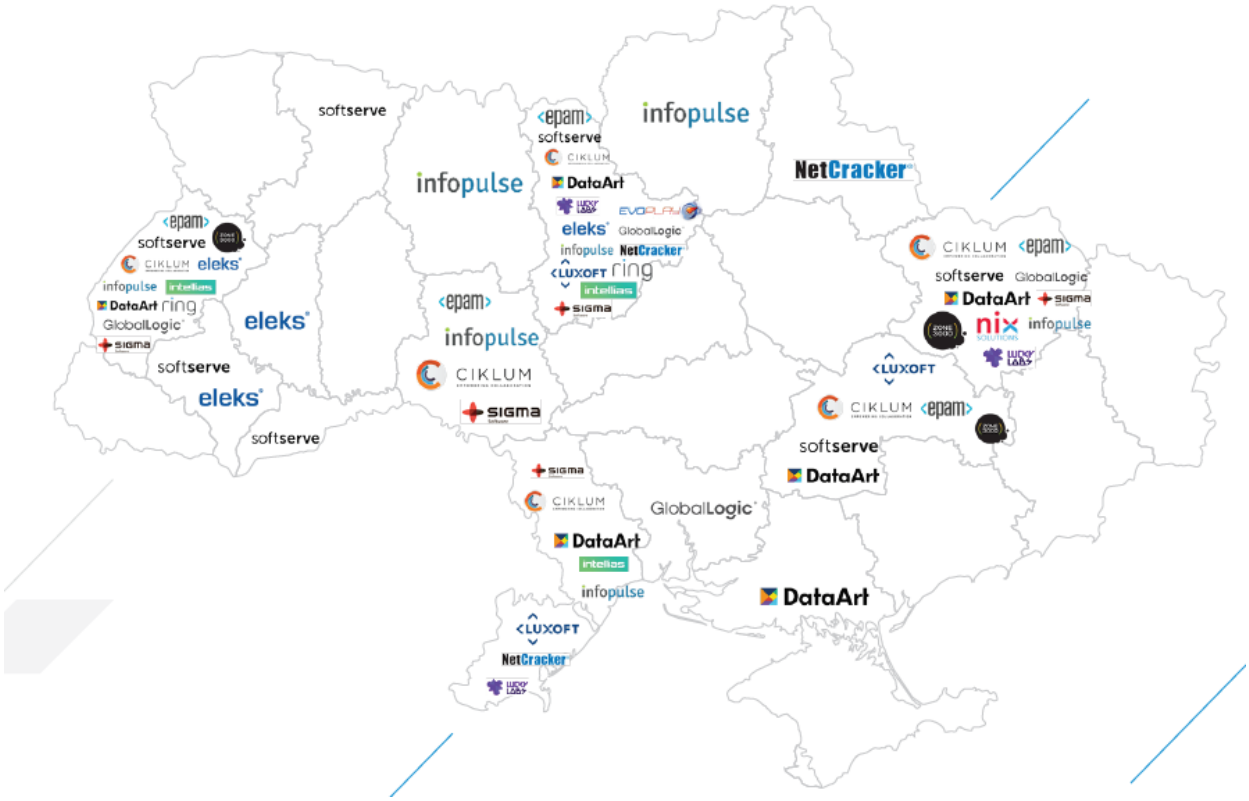

Figure 3-2 IT major players

Source: UkraineInvest[82]

The rapid growth of the Ukrainian ICT sector is attributed to the confluence of several domestic and global factors. Ukraine has a strong science and engineering education system providing a talented ICT workforce. Other major outsourcing countries such as India and Ireland have similar experience.

Ukraine's skilled diaspora has also played a key role in the emergence and global growth of the industry. Outsourcing firms linked Ukrainian software engineers to software companies in Western Europe and the United States. These early outsourcing firms demonstrated to global clients the quality and cost benefits of outsourcing from Ukraine.

From the viewpoint of urban development, real estate developers in Ukraine have promoted physical clustering of ICT firms and startups. The prominent examples are UnitCity, I-Hub in Kyiv, and the Lviv IT Park, involved by private equity capitals. It is estimated that in Kyiv alone there are 12-15 such co-working spaces of different sizes and missions.

These ICT co-working spaces became the platforms of like-minded individuals and companies, and have

[82] UkraineInvest (2020), "UkraineInvest Guide December 2020-February 2021", https://ukraineinvest.gov.ua/guide/ (accessed on 7 April 2021).

the function of ICT training. However, these spaces usually do not yet offer sector-specific shared services.[83]

In terms of the placement of the R&D center, Ukraine is also attracting much interest from foreign mega ICT companies, such as Google, Samsung Electronics, NetCracker, and Aricent. The constant reform of the economy and the adoption of new laws encourages foreign investors, making the opening of R&D centers in Ukraine profitable. Moreover, the simplified visa application process makes it easy for investors to visit R&D centers at a convenient time, and for specialists from overseas to give corporate training and conferences in Ukraine.

3.4.2 Startup ecosystem

In the ICT sector of Ukraine, startup ecosystems play an important role, with stakeholders such as entrepreneurs, startups, venture capitals, and platformers. This section describes representative stakeholders in Ukraine's ICT startup ecosystem.

Total venture capital investments amounted to USD 510 million in 2019, of which USD 439 million was investments in growth-stage companies (Figure 3-3). The largest total investment was in software development area, in which companies raised USD 272.4 million in 18 deals (Figure 3-5). The most active investors in terms of the number of deals and exits include: AVentures, Horizon Capital, SMRK, ICU, Fison, Overkill, Genesis, Startup Wise Guys, and TA Ventures.[84]

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[83] World Bank (2019), "Path for Ukraine's Economic Growth: Technology Upgrading", http://documents1.worldbank.org/curated/en/880431575641119051/pdf/Path-for-Ukraines-Economic-Growth-Technology-Upgrading.pdf?fbclid=IwAR0tb0KFlnhy1tP7JpaPJvtT45faT2oUH8lVLV4lQm4QvNi-La1IllgnDEc (accessed on 30 November 2020).

[84] UVCA, "Ukrainian venture capital and private equity overview 2019", https://www.slideshare.net/UVCA/ukrainian-venture-capital-and-private-equity-overview-2019-232427411 (accessed on 6 April 2021).

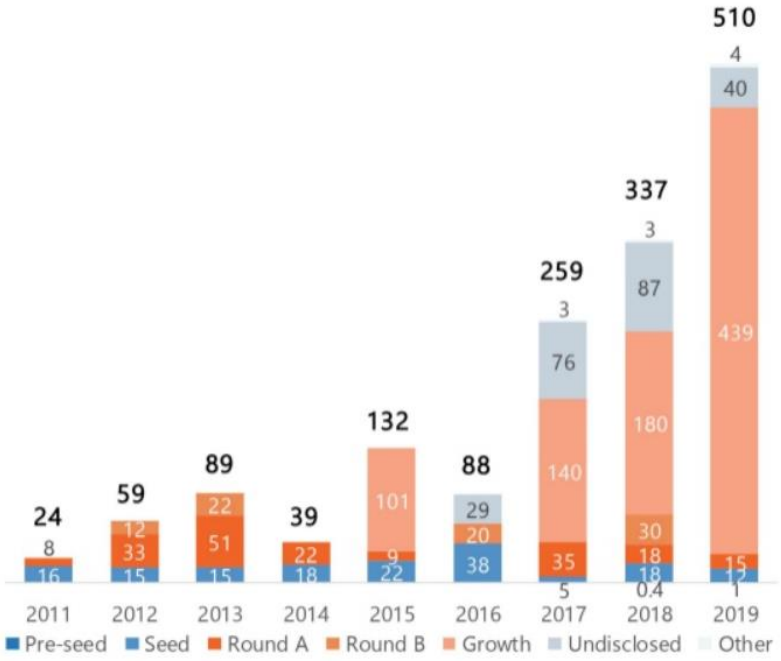

Figure 3-3 Total venture capital investments (2011-19) (in million USD)

Source: UVCA[85]

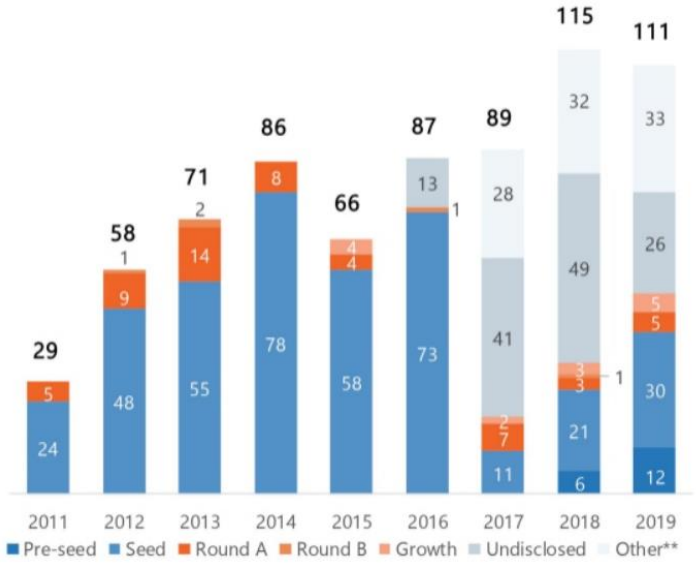

Figure 3-4 Number of deals (2011-19)

Note: "Other" consists of grants, convertible notes, safe and crowdfunding financing.

Source: UVCA[86]

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[85] UVCA, "Ukrainian venture capital and private equity overview 2019", https://www.slideshare.net/UVCA/ukrainian-venture-capital-and-private-equity-overview-2019-232427411 (accessed on 6 April 2021).

[86] UVCA, "Ukrainian venture capital and private equity overview 2019", https://www.slideshare.net/UVCA/ukrainian-venture-

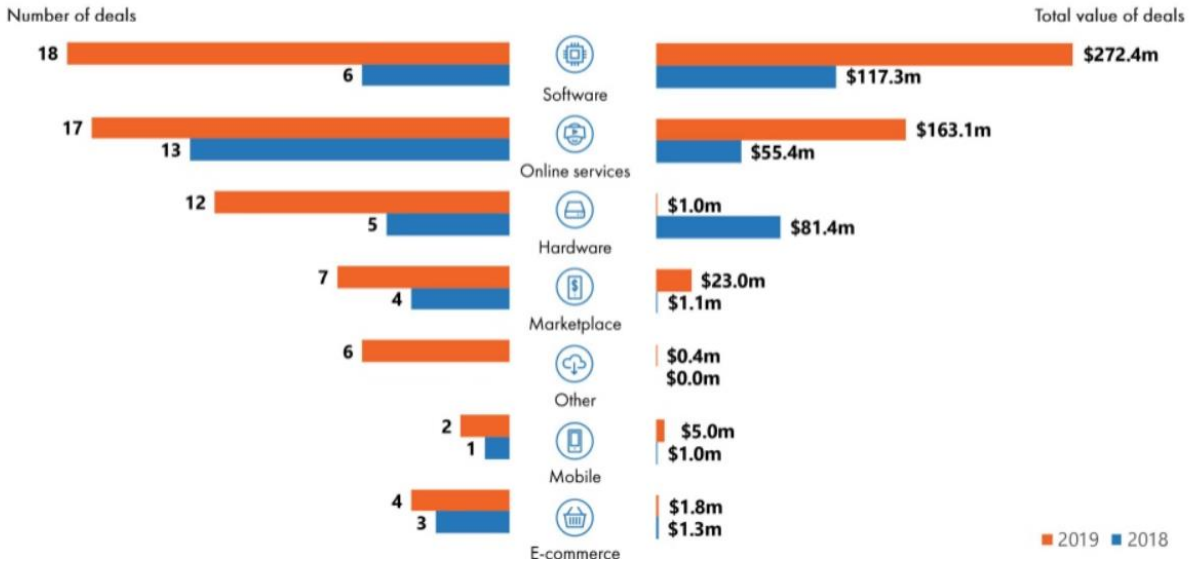

Figure 3-5 The number of deals and deal value by sector

Source: UVCA[87]

Table 3-5 Top 10 deals in 2019

Stage	Name	Description	Investment (in USD M)
Growth	GitLab	Cloud service for programmers	268
	Grammarly	Digital writing assistance tool based on AI	90
	People.ai	Platform for sales based on AI	60
	Jiji.ng	Online marketplace	21
Series A	allset	Restaurant reservation platform	5
	Unstoppable domains	Domain secured by blockchain	4
	Mycredit	Loan online service	3
	All Right	Online school of English	1.5
Seed	Promo Republic	Service for creative social media content	2.3
	RetargetApp	Web app for AI-powered ads	1.5

Source: UVCA[88]

capital-and-private-equity-overview-2019-232427411 (accessed on 6 April 2021).

[87] UVCA, "Ukrainian venture capital and private equity overview 2019", https://www.slideshare.net/UVCA/ukrainian-venture-capital-and-private-equity-overview-2019-232427411 (accessed on 6 April 2021).

[88] UVCA, "Ukrainian venture capital and private equity overview 2019", https://www.slideshare.net/UVCA/ukrainian-venture-

3.4.2.1 Funds

Ukrainian Startup Fund[89]

Ukrainian Startup Fund (USF) is a state-owned fund launched by the initiative of the Cabinet of Ministers in 2019, in order to give impetus to the development of Ukrainian startups. The fund's resources allocated by the state treasury amounted to UAH 440 million (about USD 16 million).[90] Its mission is to promote the creation and development in Ukraine of technology startups in the early stages of development to increase their global competitiveness.

The USF supports startups in the early stages of development in the form of grants without participation in capital. It has 2 types of grants: a pre-seed stage grant of USD 25,000 and a seed stage grant of USD 50,000. As of April 2021, more than 2,700 applications have been received, and 86 startups have been funded.

The USF also finances the training of startups provided by national and international accredited accelerators, such as Demium, Seed Forum Global, and 1991 Open Data Incubator.[91] Each startup is given up to USD 10,000 for participation in the accelerator program.

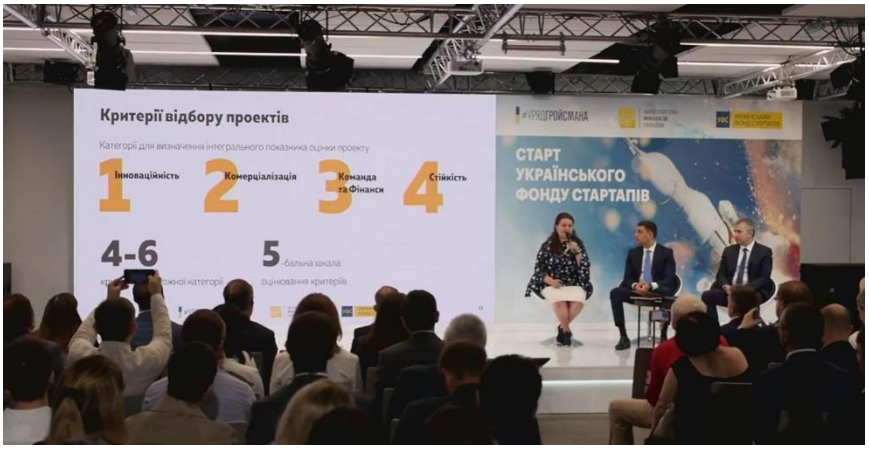

Figure 3-6 Presentation of the launch of the USF

Source: Bi Ukraine[92]

capital-and-private-equity-overview-2019-232427411 (accessed on 6 April 2021).

89 USF Website https://usf.com.ua/en/ (accessed on 30 November 2020)

90 Communications Department of the Secretariat of the CMU (2019), "Oleksiy Honcharuk: UAH 440 mn financing is envisaged for Ukrainian startups", https://www.kmu.gov.ua/en/news/na-finansuvannya-ukrayinskih-startapiv-peredbacheno-440-mln-grn-oleksij-goncharuk (accessed on 6 April 2021).

91 USF, "Acceleration Program of the Ukrainian Startup Fund", https://usf.com.ua/en/akseleracijna-programma/ (accessed on 7 April 2021).

92 Bi Ukraine, https://bioukraine.org/news/ukrainian-government-launches-national-startup-fund/ (accessed on 30 November 2020)

3.4.2.2 Platformers / Association

Platformers play important roles in the technology startup ecosystem in Ukraine. Their functions include sharing knowledge, gathering funds, arranging hackathons and pitch events for startups.

Lift99 Kyiv[93]

Lift99 is a co-working hub and network of start-up founders in Estonia and Ukraine. Lift99 Kyiv is one of the branch offices.

It provides a co-working space and community only for start-ups because it believes co-working space makes them help and communicate with each other. It has 3 types of programs: Finance, Bootstrapping, and Developing the products. Also, it gives start-ups with mentors, environment, and investors. Investors give not only fund-raising but feedback to start-ups. Moreover, Lift99 Kyiv has office hours (20 minutes) and makes a chance for start-ups to communicate with and raise questions to investors. Thanks to that, Ukrainian start-ups were able to outreach national investors. Moreover, Lift99 Kyiv hold the office with Son Taizo and Atomico (European VC funds). The mentors of Lift 99 are international, including ones from Estonia. On the other hand, it also has national mentors (Ukrainian mentors), who advise about specialized sectors.[94]

Figure 3-7 Ukrainian Startup Awards

Source: Facebook of Lift99 Kyiv[95]

[93] Website https://www.lift99.co/kyiv-hub (accessed on 30 November 2020)
[94] Interview with Lift99

[95] https://www.facebook.com/LIFT99KyivHub/?ref=page_internal (accessed on 30 November 2020)

1991 Open Data Incubator[96]

1991 Open Data Incubator was organized in 2016 for developing more sustainable support to start-ups. The main challenge is the development of an open data ecosystem. The incubator raised USD 1.8 million, and have more than 100 mentors.[97]

It has the programs such as:

1. Open data of government in the partnership with USAID and UK;
2. Cybersecurity;
3. The EU Association Lab – Support for startups from civil servants funded by GIZ (German Corporation for International Cooperation) (see below); and
4. Corporate acceleration program.

The goal of the EU Association Lab is to make a new connection between Ukraine and the EU. Ministers of Ukraine generated their ideas and applied them to the incubator's program. In the program, applicants draft and revise what they want to do with supervisors within 2 days. After that process, the finalists are selected. The finalist has a support program for 6 months, which is needed for implementing in their ministries or some regulation of the states. The incubator has another workshop in 6 months. During the workshop, the participants develop and transform their ideas with the design thinking methodology. It also provides technical support: money, knowledge, international exchange. On the Final demo-day, they demonstrate their products.[98]

Figure 3-8 The pitch event of 1991 Open Data Incubator

Source: Material provided by 1991 Open Data Incubator

[96] Website: http://1991.vc/en/about-incubator/ (accessed on 30 November 2020)

[97] Interview with 1991 Open Data Incubator

[98] Ibid.

Lviv IT Cluster[99]

Lviv IT Cluster is a community of ICT companies, authorities, and educational institutions in Lviv. Lviv IT Cluster unites more than 100 ICT companies and more than 18,000 specialists working in Lviv.

The projects of Lviv IT Cluster are concentrated on the three areas: education, promotion, and infrastructure. In education sphere, Lviv IT Cluster is actively involving progressive companies in the modernization of the education system. New bachelor's programs from state universities are part of its "IT Expert" project. In the program, ICT experts tell students the opportunities in the ICT sphere.

Promotion of the ICT industry is one of the main missions of Lviv IT Cluster. It holds a business conference called Lviv IT Jazz Conference that unites major IT, investment, and business representatives. Moreover, the Cluster published the printed magazine ITID Lviv, introducing the most interesting projects and technologies to ICT specialists. The annual survey of the city's ICT industry shows the dynamics and impact on other industries and the economy.

Lviv IT Cluster's infrastructure projects are a way to influence the urban development of Lviv. Lviv IT Cluster initiated the launch of a large-scale technology park for ICT business - Innovation District IT Park in 2020[100]. It is expected to turn the city into a real business center with modern offices, training laboratories, and a university.

Moreover, Lviv IT Cluster has relationships with local authorities. Its Supervisory Board has a representative from the City Council, and representatives of the City Council have an advisory voting right. Lviv IT Cluster also has provided ICT consulting to the Lviv City Council.

Figure 3-9 Symposium of Lviv IT Cluster

Source: Facebook of Lviv IT Cluster[101]

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[99] Website: https://itcluster.lviv.ua/en/ (accessed on 30 November 2020)

[100] Lviv IT Cluster, IT Park

https://itcluster.lviv.ua/en/projects/it-park/ (accessed on 30 November 2020)

[101] Website: https://www.facebook.com/lvivitcluster/photos/?ref=page_internal (accessed on 30 November 2020)

3.4.2.3 Venture Capital Association

Ukrainian Venture Capital Association (UVCA)[102]

UVCA is a not-for-profit, non-governmental organization that unites active players in the Ukrainian investment market. UVCA unites venture capital funds, angel investors, private equity funds, accelerators, incubators, law firms, and audit companies.

The members of UVCA are not only from Ukraine. Around 30% of the organizations are from other countries, such as the US and some European countries. It plays a role as a gateway to the Ukrainian investment market, and we help find partners and core investors.

When UVCA started in 2014, the Ukrainian government did not have the innovation market or start-ups as their focus. Then, UVCA understood that it needed to support tech talents in Ukraine because there were no government programs. So UVCA leveraged its expertise and directed it to educate entrepreneurs or tech specialists to create more companies and give them different opportunities.[103]

UVCA started making different contests and free workshops. It also invited networks from different countries. UVCA were organizers of the Ukrainian pavilion at the Consumer Electronics Show (CES).

UVCA works with the six committees:

- Legal Committee: Works with legislation to ease the investing in Ukrainian companies to make inflow of foreign capital into the Ukrainian market.
- Blockchain committee
- Energy committee: Looks at organization focusing on cleantech, GreenTech, alternative energy.
- Research Committee: Prepares market reports
- ICT Committee
- Invest in Ukraine committee: Does activities to change the perception about the Ukrainian investment opportunities and to spread the word about member companies.

UVCA has experience of cooperation with foreign developing partners such as the World Economic Forum, USAID, and Japan Venture Capital Association (JVCA). Moreover, UVCA has large foreign companies as its members, such as Samsung and Intel. UVCA supports the companies, which seek new tech talents and technology in Ukraine. [104]

According to UVCA, Asian countries are still far for Ukrainian start-ups, though there are certain organizations that are getting in touch. Therefore, there is still room for collaboration with Ukraine ahead

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[102] Website: http://uvca.eu/en (accessed on 30 November 2020)

[103] Interview with UVCA

[104] Interview with UVCA .

of other Asian countries.[105]

3.4.3 Challenges and Needs

One of the significant challenges for Ukrainian ICT ecosystem is the lack of linkages between ICT sector and other sectors. According to the World Bank[106], the emergence of a domestic ICT sector should be ideally linked to the diffusion and adoption of digital solutions within other sectors of the economy, otherwise known as "backward linkages." However, in Ukraine, the growing ICT sector is largely disconnected from the other sectors of the economy. There are several factors inhibiting the backward linkages in Ukraine.

First, industrial engineering capabilities have declined since the Soviet Union collapsed. The design and construction bureaus in the Soviet Union possessed a working knowledge of enterprise operations critical for the effective application of ICT in other industries. However, the design and construction bureaus disappeared, and their knowledge no longer exists.

Second, as ICT is increasingly embedded in hardware, when Ukrainian companies buy foreign equipment the software is already embedded within. This limits opportunities for Ukrainian ICT companies to co-develop with local hardware sectors and embed their software in hardware.

Finally, local clients often seek ready-made ICT solutions or hire temporary employees to design ICT solutions. Neither approach encourages the co-development of value-added joint products important for upgrading in the software sector. Low domestic industrial demand for ICT services, the lack of industrial engineering capabilities, and poor inter-industry connectivity mean that both the ICT industry and other industries are not realizing their economic potential. [107]

Moreover, there is a lack of cooperation between outsourcing-focused ICT firms and firms within industrial and production sectors such as aerospace, agriculture, and heavy machinery. The absence of cooperation implies that firms within other sectors cannot make full use of potentials of ICT companies and compete globally.[108] The stimulation of cooperation between ICT companies and non-ICT companies should be an important remedy to enhance competitiveness of Ukrainian companies and the overall economy in the country.

From the viewpoint of ICT companies, another challenge is their size. Most ICT companies in Ukraine are

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[105] Interview with UVCA .

[106] World Bank (2019), "Path for Ukraine's Economic Growth: Technology Upgrading", http://documents1.worldbank.org/curated/en/880431575641119051/pdf/Path-for-Ukraines-Economic-Growth-Technology-Upgrading.pdf?fbclid=IwAR0tb0KFlnhy1tP7JpaPJvtT45faT2oUH8lVLV4lQm4QvNi-La1IllgnDEc (accessed on 30 November 2020).

[108] Interview with UVCA .

small, and they specialize in relatively low-value-added software development and services. The FOP tax system was critical to the emergence of the ICT industry, but could also disincentivize firms from building managerial capabilities important for scaling and upgrading.

Regarding the startup ecosystem, there are several challenges identified in the interview with a platformer:[109]

- Local venture capitals lack knowledge of fundraising and starting business.
- The tax system is complex and not transparent which require entrepreneurs to hire accountants.
- Cross border business needs a lot of cost for the translation.
- Most private companies are not willing to work with government officials due to the governments' bureaucracy.

3.5 Legal Framework for Security and Personal Information

3.5.1 Security

The main statutes and regulations that promote cybersecurity in Ukraine are listed in Table 3-6. Yet, most industrial sectors have no specific cybersecurity regulations at the moment.

On the other hand, one of the most developed sectors regarding regulation is banking and finance. The National Bank of Ukraine (the National Bank) is a regulator responsible for developing and implementing preventive, organizational, and educational measures in promoting cybersecurity in the banking and financial system in Ukraine. It adopted the Decree on the Measures for Ensuring Information Security in the Banking System of Ukraine.[110]

[109] Interview with Lift99 Kyiv, Ukrainian Start-up Fund, 1991 Open Data Incubator, Lviv IT Cluster, UVCA and so on.

[110] Asters (2020), "Cybersecurity in Ukraine", https://www.lexology.com/library/detail.aspx?g=e5d42a92-c71b-4d92-bcb3-450f54013d59#:~:text=The%20Cybersecurity%20Law%20establishes%20a%20specific%20regime%20for%20operators%20of%20critical%20infrastructures.&text=In%20particular%2C%20it%20adopted%20the,banks%20and%20other%20financial%20institutions. (accessed on 30 November 2020)

Table 3-6 Statutes and regulations for cybersecurity in Ukraine[111]

Regulation	Description
The Law on the Main Principles of Maintaining Cybersecurity of Ukraine (the Cybersecurity Law)[112]	The Cybersecurity Law is a high-level set of rules defining main concepts, protective measures, and the competence of the governmental authorities in the cybersecurity domain.
The Law on the Protection of Information in Information and Telecommunication Systems[113]	
The Budapest Convention on Cybercrime (the Budapest Convention)[114]	
The Resolution of the Ukrainian National Security and Defence Council on the Cybersecurity Strategy of Ukraine, approved by Presidential Decree (the National Cybersecurity Strategy)	The National Cybersecurity Strategy defines strategic objectives and high-level action plans for the cybersecurity of Ukraine. The purpose of the strategy is to establish the conditions necessary for ensuring the safe use of cyberspace by individuals, society, and the government.
The Decree of the Cabinet Ministers of Ukraine On the Adoption of the General Requirements for Cyber-Protection of Critical Infrastructure Objects (the General Requirements for CIOs)	The General Requirements for CIOs establish the baseline technical, technological, and organizational requirements for operators of information infrastructures. In particular, the owners of CIOs must implement a particular type of information security system with the required certification of conformity.

[111] Asters (2020), "Cybersecurity in Ukraine", https://www.lexology.com/library/detail.aspx?g=e5d42a92-c71b-4d92-bcb3-450f54013d59#:~:text=The%20Cybersecurity%20Law%20establishes%20a%20specific%20regime%20for%20operators%20of%20critical%20infrastructures.&text=In%20particular%2C%20it%20adopted%20the,banks%20and%20other%20financial%20institutions. (accessed on 30 November 2020)

[112] The Law of Ukraine "On Cybersecurity" https://zakon.rada.gov.ua/laws/show/2163-19#Text (accessed on 30 November 2020)

[113] The Law of Ukraine "On the Protection of Information in Information and Telecommunication Systems" https://zakon.rada.gov.ua/laws/show/80/94-%D0%B2%D1%80#Text (accessed on 30 November 2020)

[114] Council of Europe https://www.coe.int/en/web/conventions/full-list/-/conventions/treaty/185 (accessed on 30 November 2020)

In terms of the international standards, the Ukrainian government has implemented into its legislation the following standards:

- ISO:27001 (Information security management systems – Requirements), ISO:27002 (Code of practice for information security management)
- ISO:27005 (Information security risk management)
- ISO:27006 (Requirements for bodies providing audit and certification of information security management based systems)

The main regulatory authorities related to cybersecurity are the followings:

- the Security Service is responsible for fighting cyberterrorism and cyberespionage, and countering cybercrimes that pose a direct threat to the vital interests of Ukraine;
- the National Security and Defence Council Coordination is responsible for the control of defense sector actors responsible for cybersecurity in Ukraine;
- the SSSCIP is responsible for the development and implementation of the government policy to protect the government information resources and critical information infrastructure;
- the Ministry of Defence and General Staff of the Armed Forces are responsible for preparation of the state to respond to military aggression in cyberspace;
- the National Police is responsible for countering cybercrimes;
- the intelligence agencies are responsible for operations to address the threats to national security in cyberspace; and
- the National Bank determines the procedure, requirements, and measures for ensuring cybersecurity in the banking system of Ukraine and for entities transferring funds.

3.5.2 Personal Information Protection

The main law to ensure personal data protection is The Law "On Personal Data Protection" which was adopted in 2010.[115] This law has been amended several times, but the 2014 amendment changed the substance of the whole data protection system of Ukraine.[116] The law aims to protect personal information during its collection, storage, and processing, as well as where personal data is used for purposes other than in private or certain professional circumstances.

The Law defines personal data as data that can identify or specify a natural person. The Law provides that any individuals concerned must give their consent to the processing of their data (except for anonymized data). The consent is now defined as the permission by individuals for the processing of their data according

[115] The Law of Ukraine "On Personal Data Protection" https://zakon.rada.gov.ua/laws/show/2297-17#Text (accessed on 30 November 2020)

[116] DataGuidance (2020), Ukraine – Data Protection Overview https://www.dataguidance.com/notes/ukraine-data-protection-overview (accessed on 30 November 2020)

to the defined purpose of processing. This permission must be expressed in writing or in a form that enables verification. In practice, in websites, the permission usually is expressed by way of ticking the consent box in the system.

Under the Law, the "Human Rights Ombudsman of Ukraine"[117] commenced activity as the data protection authority in 2014 and has been active in issuing new regulations as required by the amendments. Administrative and criminal liability for information data protection is required by the amendments to Certain Legislative Acts of Ukraine Concerning the Strengthening of Responsibility for Violation of Legislation on Personal Data (referred to as "the Liability Law"), adopted in Jun 2011[118]. The Liability Law amends the Criminal Code[119], the Code of Administrative Offences[120], the Criminal Procedure Code[121], and the Law of Ukraine "On Information"[122], to establish individual responsibility for violations of legislation on personal data protection.

Based on the laws, the infringements in the data protection area may result in a fine in an amount of up to UAH 34,000 (USD 1,190), or criminal liability including imprisonment for a term of up to five years.

In terms of personal data protection, a relationship with the General Data Protection Regulation (GDPR)[123] is also important. Since Ukraine entered the EU-Ukraine Association Agreement, it published a plan of measures for effective implementation of the Agreement. The plan pays special attention to the harmonization of Ukrainian legislation with EU law. According to this plan, the Ukrainian Parliament Commissioner for Human Rights was required to revise legislation on the protection of personal data and bring it into compliance with GDPR. As a result, the Ukrainian government prepared the draft law amending the Law and brought it in line with the GDPR.[124]

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[117] Web site of "Human Rights Ombudsman of Ukraine", http://www.ombudsman.gov.ua/ (accessed on 30 November 2020)

[118] About modification of some legislative acts of Ukraine on strengthening responsibility for violation of the law on the protection of personal data
https://zakon.rada.gov.ua/laws/show/3454-17#Text (accessed on 30 November 2020)

[119] КРИМІНАЛЬНИЙ КОДЕКС УКРАЇНИ (Відомості Верховної Ради України (ВВР), 2001, № 25-26, ст.131)
https://zakon.rada.gov.ua/laws/show/2341-14#Text (accessed on 30 November 2020)

[120] Кодекс України про адміністративні правопорушення (статті 1 - 212-24) (Відомості Верховної Ради Української РСР (ВВР) 1984, додаток до № 51, ст.1122)
https://zakon.rada.gov.ua/laws/show/80731-10#Text (accessed on 30 November 2020)

[121] Кримінально-процесуальний кодекс України(Затверджений Законом від 28.12.60 (1000-05) ВВР, 1961, N 2 ст. 15)
https://zakon.rada.gov.ua/laws/show/1001-05#Text (accessed on 30 November 2020)

[122] Про інформацію (Відомості Верховної Ради України (ВВР), 1992, № 48, ст.650)
https://zakon.rada.gov.ua/laws/show/2657-12#Text (accessed on 30 November 2020)

[123] REGULATION (EU) 2016/679 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504&qid=1532348683434 (accessed on 30 November 2020)

[124] Website of "Human Rights Ombudsman of Ukraine",
http://www.ombudsman.gov.ua/ua/all-news/pr/ofis-ombudsmana-gotuye-zmini-do-zakonodavstva-pro-zaxist-personalnix-danix/

3.5.3 Challenges and Needs

There are several needs concerning personal data protection, as pointed out by the Ukrainian Parliament Commissioner for Human Rights.[125]

First, some legislations for personal data protection need update. Many legal documents for information protection have been adopted from the Soviet Union without changes, and are completely behind modern needs. They lack clear definition of the purpose of personal data processing, as well as the exhaustive list of personal data to be processed. Moreover, some of them are not compliant with the principles of personal data processing.

Second, as the COVID-19 pandemic has accelerated digitalization in Ukraine, government agencies has been actively introducing electronic services to provide administrative services. Given that this digitalization can increase the risk of violation of personal data protection, authorities need to take into account requirements for personal data protection at the stage of design, development and implementation of state electronic resources (e.g. information systems, portals, registers).

3.6 Summary

Along with the global expansion of the ICT market, Ukraine's ICT sector has been rapidly growing. Its highly skilled ICT-oriented workforce and the comparatively low wages among ICT engineers in the country have made the country one of the ICT outsourcing hubs for Europe and the US. The country's tax system encouraging entrepreneurship among ICT engineers has also contributed to development of the ICT sector. Nevertheless, higher education institutions are not keeping up with the needs of the sector, as their curricula do not sufficiently reflect the sector's evolving technical requirements nor the demand for managerial capabilities. Most ICT firms in Ukraine are small and perform in relatively lower value-added sectors because they lack managerial and organizational capabilities. Moreover, the "brain drain" of ICT talent pool combined with the increasing demand for ICT engineers has led to significant labor shortages and rapidly increasing wages, thereby reducing Ukraine's competitiveness in the outsourcing area.

For the ICT sector to continue to grow and drive the country's development in other sectors, the Ukrainian government could continue working on improving ICT training, both in terms of the size of talent pool and the content of training. The government could also consider shifting from the FOP tax system to develop workforce with organizational capabilities to scale based on the permanent employment. Additionally, it could also stimulate demand in other sectors for domestic ICT services in order to enhance the country's overall productivity.[126]

(accessed on 30 November 2020)

[125] Ukrainian Parliament Commissioner for Human Rights (2021), "Annual Report of Ukrainian Parliament Commissioner for Human Rights on Observance and Protection of Human Rights and Freedoms of Citizens of Ukraine 2020".

[126] Aridi, A. et al. (2020), "Windows of opportunities for catching up: an analysis of ICT sector development in Ukraine", The

4 e-Government

This chapter provides an overview of the current issues in development of e-Government in Ukraine. It describes the country's vision and strategies, the laws and regulations, its e-Government infrastructure, existing ID systems, the new portal "Diia", and relevant activities supported by foreign development partners.

4.1 Vision and Strategy

4.1.1 President Zelensky's vision, "A State in a Smartphone"

Advisors to President Zelensky have presented a digital action plan so-called "state in a smartphone".[127] This action plan aimed to fight corruption by limiting bureaucracy and digitalizing the country's economy. The idea originated from one of Zelensky's presidential election campaign promises. Presidential advisor Mikhail Fedorov, the first Minister of Digital Transformation, emphasized that the roadmap offered by President Zelensky's team outlined priority steps and specific goals until 2024.

The President's team strives to implement the "one-stop-shop" idea, give citizens a single web address for all available services, introduce a unified authorization and identification system, and make the entire system more citizen-oriented. The "one-stop-shop" idea became the Diia project.

4.1.2 Program of Action of the Cabinet of Ministers of Ukraine

In September 2020, President Zeelensky unveiled the "Programme of Action of the Cabinet of Ministers of Ukraine."[128] In the document, MODT showed its vision of e-Government as follows:

1. Achieve digital transformation in priority sectors and areas of public life.
2. Ensure access to citizens and business to quality and convenient public services, free from corruption risks.
3. Ensure conversion of most frequently requested public services in the electronic form.
4. Ensure speedy and convenient delivery of public services at administrative services centers, optimize the delivery procedure of public services.
5. Develop and expand the network of administrative services centers and increase the number of services provide through such centers.
6. Regulate fees for administrative services by introducing a common framework for determining

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Journal of Technology Transfer, https://doi.org/10.1007/s10961-020-09795-5.

[127] President of Ukraine official website, "I dream about a state in a smartphone - Volodymyr Zelenskyy" https://www.president.gov.ua/en/news/ya-mriyu-pro-derzhavu-u-smartfoni-volodimir-zelenskij-55585 (accessed on 30 November 2020)

[128] Ukrinform (2020), Cabinet of Ministers approves priority action plan for 2020 https://www.ukrinform.net/rubric-polytics/3096396-cabinet-of-ministers-approves-priority-action-plan-for-2020.html (accessed on 30 November 2020)

the amounts of administrative fees, payment procedure, and use of the fees paid.

7. Introduce a system for monitoring and evaluation of the quality of public service delivery.
8. Develop and optimize public electronic registries, centralize support, build basic public electronic registries, and implement electronic interaction.
9. Ensure reliable protection of information contained in public electronic registries and create an effective system to counteract cyber threats, ensure personal data protection, in line with the European standards.
10. Develop e-democracy tools, in particular an online platform for interaction between public administration and civil society, put in place a mechanism for electronic voting to elect public councils at central and local executive bodies.
11. Develop means of electronic identification, new mechanisms for qualified electronic signature, and opening of data sets.
12. Raise citizens' awareness of available public services, in particular, those accessible electronically.

4.1.3 Vision and Strategy before Zelensky's presidency

Background

Recent years have been a turning point in the penetration of ICT in various spheres of public life in Ukraine. A large number of various electronic services have appeared, which greatly simplifies access for ordinary citizens to a wide range of services and promote the realization of their civil rights: from buying electronic train tickets and paying for utilities to obtaining information from state registers, business registration, NGOs and funds mass media.

It should be noted that the situation described above is primarily related to political transformations in society, which requires transparency and efficiency of public authorities and local governments. These requirements of society have been implemented quite locally, within their competencies by individual ministries and departments, and are a good example of the fragmentary implementation of components of e-government and the development of the information society[129].

At the same time, each stakeholder attempted to develop and implement complex informatization projects, which provide for interagency automated interaction, provision of administrative services, outlined many problems in the field of informatization, including[130]:

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[129] O.B. Ryzhenko, OI Burba, Analysis of conceptual principles of public administration in the field of national program of informatization of Ukraine / http://www.oridu.odessa.ua/9/new_options/pdf/010/Ryzhenko-%20Burba.pdf (accessed on 30 November 2020)

[130] the State Agency for Science, Innovations and Informatization of Ukraine (DKNII) (2014) http://www.dknii.gov.ua/content/shchorichna-dopovid-pro-rozvytok-informaciynogo-suspilstva (accessed on 30 November 2020)

1. the institutional mechanism of formation, coordination, and control over the implementation of the tasks of building the information society, despite the administrative reform, is imperfect, including the system of state regulation and supervision of the ICT sphere;
2. insufficient national coordination in the implementation of national informatization projects, which are of large-scale and decisive importance for the state (lack of supervision and control, technical regulation);
3. chaos and unsystematic approach in the implementation of informatization projects (an incompatibility of created systems and information resources, duplication of information, non-compliance with state standards, and lack of uniform rules), including at the regional level.

National Program of Informatization (NPI)

NPI is the modern vision and system of the development of informatization in Ukraine at the time and tries to achieve systematic and effective implementation of the latest ICT in the field of public administration

Recent large-scale studies in the field of informatization include an expert survey and open focus group discussions were conducted in 2015 under the eGovernment for Accountability and Participation (EGAP) with the financial support of the Swiss government. The study was joined by 400 Ukrainian experts and key Stakeholders (313 of whom participated in the survey and 87 in six focus group discussions)[131]. According to the expert community, one of the main conditions for full-scale implementation of e-government is the provision of ICT infrastructure and technical support to public authorities and local governments, which will increase the readiness to implement e-democracy tools in society.

Therefore, in the field of information society development, the key points are further optimization of regulatory and institutional support, at least eliminating duplication of powers and jurisdiction, regulatory role within the government, as well as optimization of mechanisms for stable financing of NPI.

Today, the conceptual principles and mechanisms of public management and administration of the development of information infrastructure of public authorities at the national, sectoral, regional and local levels are defined in the Law "On the Concept of the National Informatization Program"[132] and the Law "On the National Informatization Program"[133]. These laws were adopted in 1998 and changed for the adoption of other laws not related to informatization. Given the rapid development of information technology and their widespread introduction in various areas of public administration, the existing

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[131] Jordanka Tomkova et al. (2016), eДемократія в Україні: Погляди громадян і ключових зацікавлених сторін https://www.researchgate.net/publication/340117206_eDemokratia_v_Ukraini_Pogladi_gromadan_i_klucovih_zacikavlenih_storin (accessed on 30 November 2020)

[132] Law of Ukraine “On the Concept of the National program of informatization”, https://cis-legislation.com/document.fwx?rgn=17749 (accessed on 30 November 2020)

[133] Law of Ukraine “On the National Informatization Program” https://cis-legislation.com/document.fwx?rgn=31607 (accessed on 30 November 2020)

provisions of these laws are obsolete and do not ensure their effective use, do not fully meet modern requirements, including the state of technical and technological progress, democratization, decentralization, deregulation, European integration, etc.

The concept of NPI includes ten main areas of informatization:

- policy development and organizational and legal providing informatization;
- formation of national informatization infrastructure;
- informatization of strategic directions of development statehood, security, and defense;
- informatization of socio-economic development processes;
- informatization of priority sectors of the economy;
- informatization of the financial and monetary system, state financial and economic control;
- informatization of the social sphere;
- informatization in the field of ecology and use of natural resources;
- informatization of science, education, and culture;
- international cooperation.

4.1.4 Major Agenda and Action Plans related to E-government

Digital Agenda for Ukraine[134][135]

In 2018, the Government and State Agency for eGovernance of Ukraine laid the groundwork for the future with the publication of the new Digital Agenda for Ukraine. eGovernance is one of the main policy directions of its current Government. The plan outlined the principles of Ukraine's development in the digital space and the basis for the development of the digital economy. The Digital Agenda for Ukraine consists of seven main pillars:

- Telecommunications and ICT Infrastructure;
- Digital Skills;
- eMarket;
- Digital Governance;

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[134] Hi-Tech Office (2016), Digital Agenda of Ukraine - 2020 https://ucci.org.ua/uploads/files/58e78ee3c3922.pdf?__cf_chl_jschl_tk__=9fbf872d75cdd7d14b9c87ef33f69cd6a1409a70-1606627813-0-ASs1BRGc6fJtIFfS7PElvN1ervwzxxR_7-Alsv8GGN2KZL6thkWgd6BJRw6ISNw59NhX28mB3Bkn8BnH78DAJHoZjPnjV3juKAM73glNHNYzw7StKGoYW9xdyKJYpozJP61mws3ZVadH-GJf9hNh8gXX8dCYhYGOmIenGwx_UqCCDXbz7wNKbxcEm10anASD0UvsEVI4s43DPhmn-jBSTKYNUAWZw3u79WK3gHEPf_WigRPsiwhB-LIatvHfsEGKe1D0i-83dgUWNjtKbuFWf90ddMsDzffmr8efYvClawajq0P3QW76DEZB5tCY6lch-AZbvGJ72WBrdD_ACDL3omnRGZQkZuzVluewKMsGMuBX (accessed on 30 November 2020)

[135] European Commission (2019), Digital Government Fact Sheet 2019 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Ukraine_2019.pdf (accessed on 30 November 2020)

- Innovation and R&D;
- Trust and Cybersecurity;
- Benefits from ICT for Society and Economy.

The Digital Governance pillar laid down actions that would help to modernize Ukraine's public administration. Included was the development of an architecture of ministries' functions; data collection, application, technology, information security architectures, common business processes, introducing unified document templates, and standard solutions.

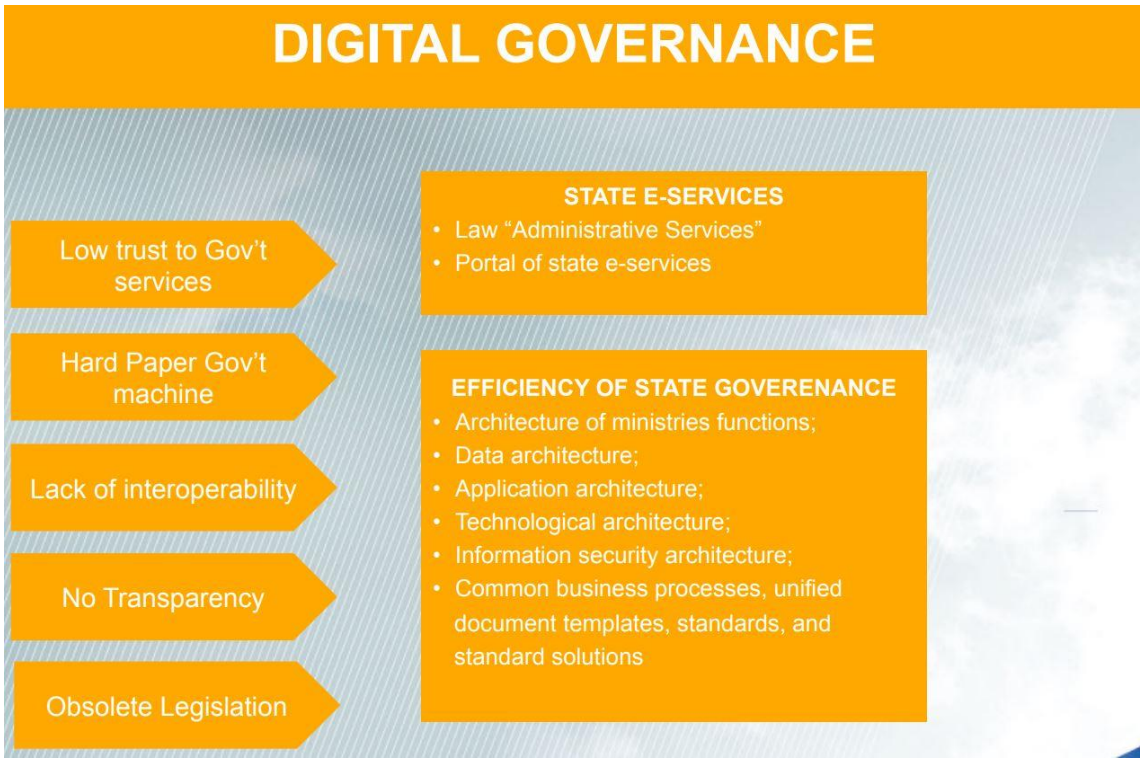

Figure 4-1 Contents of Digital Agenda for Ukraine

Source: Digital Agenda for Ukraine[136]

Action Plan for the Implementation of eGovernment Development Concept for the Years 2018-2020[137]

On 22 August 2018, the Government adopted the Action Plan for the Implementation of the eGovernment Development Concept for the Years 2018-2020. The document explained the concrete activities to be undertaken by state entities to ensure the development of eGovernance until the year 2020. The Action

[136] Digital Agenda for Ukraine http://www.e-ukraine.org.ua/media/Lviv_Minich_2.pdf (accessed on 30 November 2020)

[137] European Commission (2019), Digital Government Fact Sheet 2019 https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Ukraine_2019.pdf (accessed on 30 November 2020)

Plan is focused on three key initiatives:

- Modernization of eServices and development of electronic interaction between state entities, citizens, and businesses;
- Modernization of public administration via information technology;
- Management of eGovernment development. The implementation allows for the improvement of public sector efficiency, the eServices delivery system, and investment promotion and business.

Action Plan for the Implementation of eServices Development for the Years 2019 - 2020 [138]

On 30 January 2019, the Government adopted the Action Plan for the Implementation of eServices Development Concept for the Years 2019 - 2020. The document details actions to improve the quality of administrative services delivery for citizens and businesses. The Action Plan complies with EU requirements. The main priorities of the action plan includes:

1. Improving public-sector efficiency based on principles of effectiveness, efficiency, transparency, accessibility, and accountability;
2. Ensuring mobility and competitiveness of citizens and business in a modern economic environment;
3. Eliminating possible corruption risks during administrative services provision; improving investment promotion, business environment, and competitiveness of the country;
4. Driving the development of an information society.

4.2 Laws and Regulations

In Ukraine, the main laws and regulations that promote e-government are the following:

Decree no. 56 Some Questions of Digital Development[139]

On 30 January 2019, the Government approved a decree, Some Questions of Digital Development, which defines the digital by default principle. It establishes key principles: mobile-first principle, the necessity of eParticipation, digital inclusion, and engagement. The decree also stipulates that the implementation of the digital by default policy models, the joint method for access to services via the Internet, management of electronic information resources, and data protection. The advantage of the digital by default principle is that the state entities can save time, reduce spending for service delivery, increase transparency, and improve the quality of services provided to citizens and businesses.

[138] Ibid.

[139] Decree no. 56 Some Questions of Digital Development https://www.kmu.gov.ua/npas/deyaki-pitannya-cifrovogo-rozvitku (accessed on 30 November 2020)

Law On Access to Public Information[140]

The Ukrainian parliament adopted this law in 2011, with the latest amendments made in 2015. The law determined citizens' right of access to public information held by the state and other owners. The law contained statements on the obligatory disclosure of information by the central and local state authorities. The law was adopted following basic principles and practices decided by the European Court of Human Rights, the United Nations Economic Commission for Europe (UNECE) Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, Recommendations of the Council of Europe No. R(81)19 on the access to the public information stored by the state authorities, and Council of Europe Convention on Access to Official Documents.[141]

4.3 Trembita

Background of implementation of Trembita

The system is developed and implemented with support from EGOV4UKRAINE within the framework of U-LEAD which started in November 2016, funded by the European Union and its member states such as Denmark, Estonia, Germany, Poland, and Sweden. EGOV4UKRAINE experts provide advisory assistance in technical aspects of connection to the Trembita System and establishing electronic interaction.

The EGOV4UKRAINE project was officially launched at the conference for IT Managers of Ukraine on 24 January 2017 and registered by the Ministry for Development of Economy, Trade, and Agriculture on 6 February 2017. The State Agency for E-Governance of Ukraine (SAEGU) was approved as the Project beneficiary at the registration. In addition to SAEGU, 12 institutions were approved as recipients at the repeated registrations of the Project on 13 March, 10 June, and 4 September 2019. [142]

On 2 September 2019, the Cabinet of Ministers of Ukraine decided to reorganize SAEGU to MODT. On 18 October 2019, MODT was approved as a Project beneficiary at the re-registration. Since the decision of the Cabinet of Ministers, there have been two government agencies operating in parallel: SAEGU has been handing over assets and preparing for the closing down of the agency. MODT started formalizing the ministry's activities, recruiting staff, and taking over assets from SAEGU. Trembita was successfully procured, developed, and delivered to SAEGU in September 2018. Trembita is a product that was certified in December 2018.[143]

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[140] Law of Ukraine "On Access to Public Information" https://zakon.rada.gov.ua/laws/show/2939-17#Text (accessed on 30 November 2020)

[141] European Comission (2019), Digital Government Fact Sheet https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Ukraine_2019_0.pdf (accessed on 30 November 2020)

[142] The Roll-Out Phase of the U-LEAD with Europe's Support to Improved Administrative Service Delivery https://tsnap.ulead.org.ua/wp-content/uploads/2019/04/U-LEAD_Visual-Report_ENG.pdf (accessed on 30 November 2020)

[143] The Roll-Out Phase of the U-LEAD with Europe's Support to Improved Administrative Service Delivery

Technical Overview of Trembita

Trembita plays a key role in electronic interagency interaction. Trembita is a system designed to ensure informatization and technological support to exchange in electronic data from information resources between the executive and local self-governance bodies under related service provision procedures as well as other bodies and agencies following assigned tasks through the use of a service-oriented architecture involving applied programming interfaces to assess state electronic information resources developed under the same requirements, formats, protocols, guidelines, templates, etc. The general purpose of Trembita development is to establish an information infrastructure to simplify access to state electronic information resources without any security risks for data and minimum changes applied to information systems currently used by public administrations.

Trembita will make it possible to structure state registers and optimize relevant expenditures. In Ukraine, there are currently over 350 public electronic registers, maintained by over 80 state institutions. This leads to the terrible duplication of information of citizens accumulated in many registers. Trembita will allow minimizing such problems of data duplication and accumulation of unnecessary information.[144]

The Trembita conceptual design base is a service-oriented architecture of the "X-Road" application successfully applied in Estonia, Finland, and Azerbaijan. This is one of the conceptual models of the European Functional Interoperability fully compliant with the public service conceptual model used in the European Union.

The principles of Trembita include the following:

- Decentralized system: Trembita is a fully decentralized robust system with a single data exchange format. This system is realized by API, and leads to vendor lock-in avoidability.
- Security: Trembita is designed in a way to ensure compliance with security, authenticity, integrity, and validity requirements to data exchange while ensuring the top-level access to electronic services and confidentiality of personal data contained within state registries;
- Heterogeneity (Interoperability): Trembita ensures integration of data acquired from other systems based on any platform; it pays no regard to internal use of technologies and tools by related users; neither does it require any significant reengineering efforts for business processes;
- Reliability: Trembita platform contains no points of failure; all the infrastructure components may be duplicated to ensure the highest possible resistance level to failures and attacks;
- Easy-to-deploy: Trembita infrastructural solutions allow fast and efficient deployment, extension,

https://tsnap.ulead.org.ua/wp-content/uploads/2019/04/U-LEAD_Visual-Report_ENG.pdf (accessed on 30 November 2020)

[144] The Reforms Delivery Office (2019), State Secretaries will Speed Up Implementation of the Trembita System https://rdo.in.ua/en/news/state-secretaries-will-speed-implementation-trembita-system (accessed on 30 November 2020)

and scalability capacities at the cost of Web Services under a single interaction protocol.

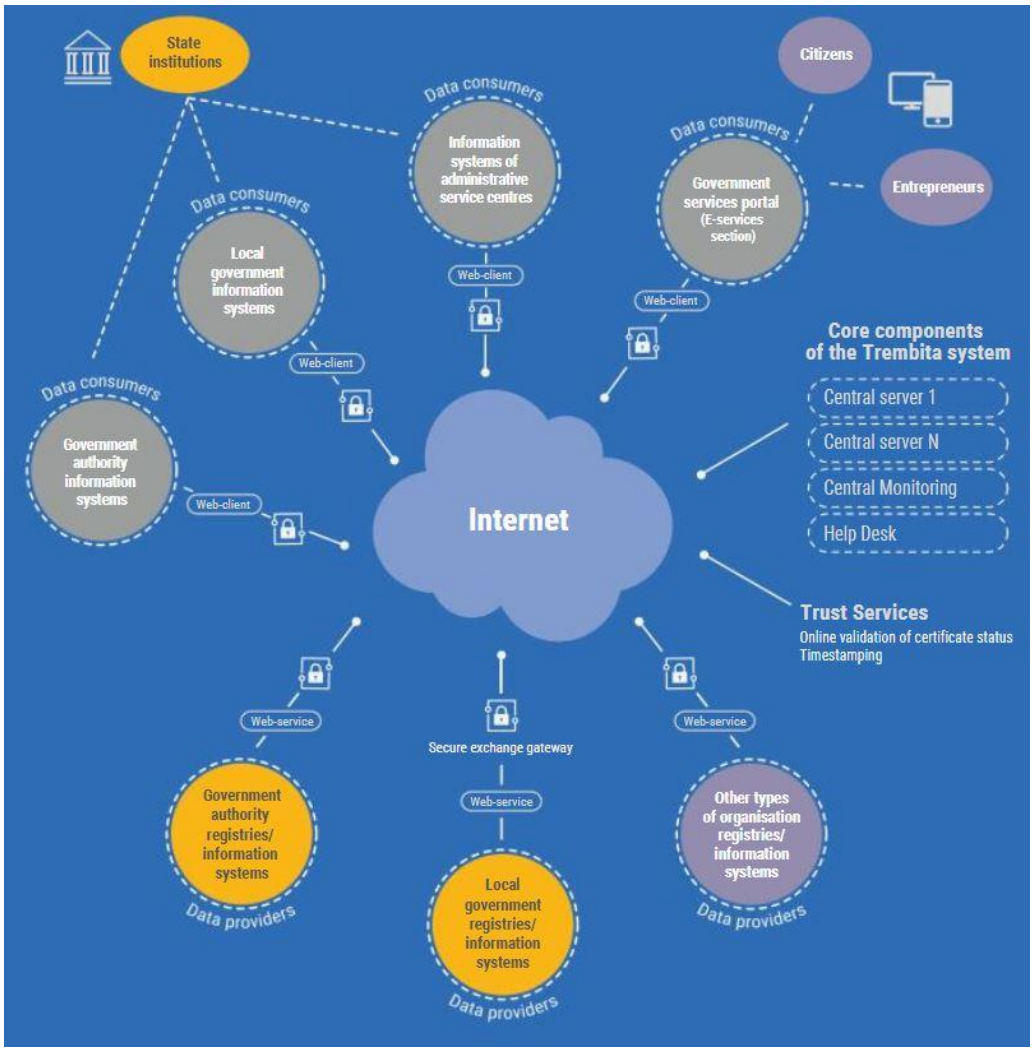

Figure 4-2 Structure of Trembita

Source: A data exchange system of state electronic information resources - Trembita [145]

The systematic use of Trembita software and hardware components ensures the following:

- records on providers' Web Services are integrated into Trembita with the use of the tools contained in the National Register of State Electronic Resources;
- providing user access to Web Services (applied programming interfaces) at the Trembita level (information systems);
- ensuring recorded web-based electronic message exchange between Trembita (information systems), service providers, and users;

[145] e-Governance Academy (2020), A data exchange system of state electronic information resources - Trembita https://issuu.com/e-governanceacademy/docs/booklet_trembita_f_eng (accessed on 30 November 2020)

- ensuring service provider and using electronic identification and authentication at the subsystem level (legal entities as Trembita providers/an information system or its component);
- ensuring recorded electronic message send-receive time;
- ensuring electronic message integrity and authenticity as well as providing data for tracking an electronic message history;
- ensuring recorded actions performed by service providers and users as well as Trembita participants under a related electronic interagency interaction;
- ensuring the operability of secure exchange gateways used to publish related Web Services (applied programming interfaces) and their interaction as well as compliance with regulated procedures under a related electronic interagency interaction.

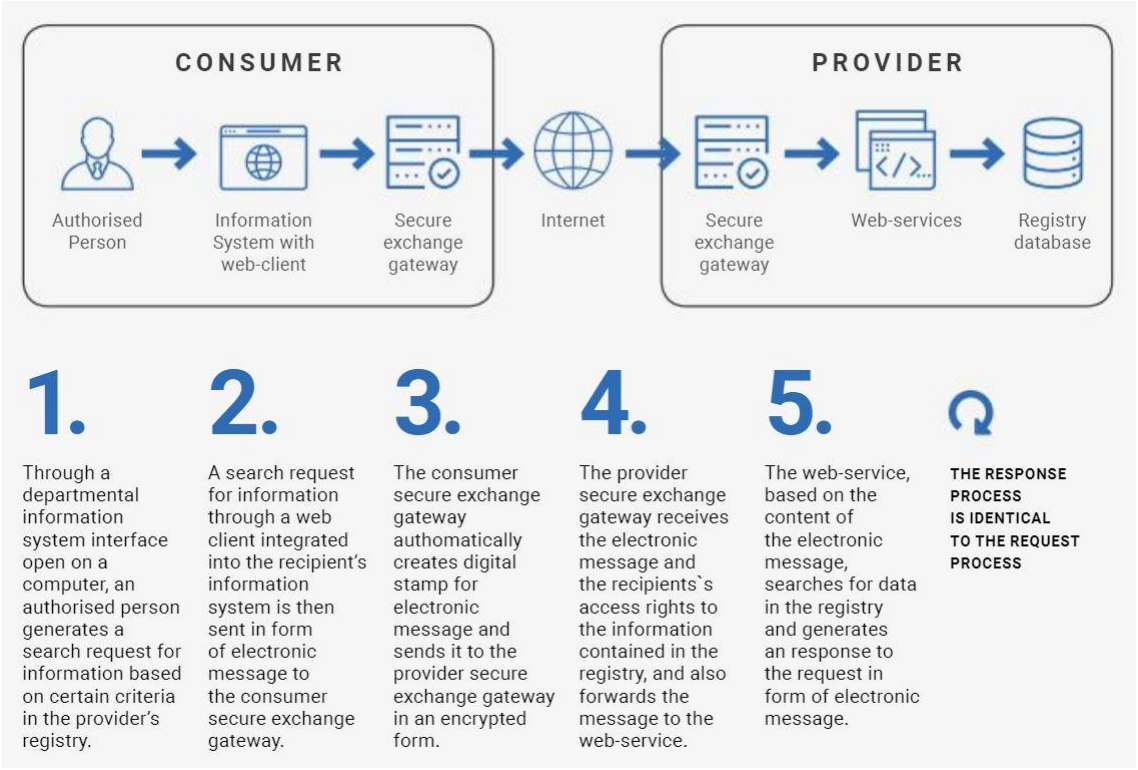

Figure 4-3 Process of Data in Trembita

Source: A data exchange system of state electronic information resources - Trembita [146]

4.3.1 Law and Regulations related to e-Government infrastrucutures

The law and regulations to define the basic rules of the public information infrastructure such as Trembita and Diia are introduced from the following viewpoints:

- The Law on Administrative Services

[146] e-Governance Academy (2020), A data exchange system of state electronic information resources - Trembita https://issuu.com/e-governanceacademy/docs/booklet_trembita_f_eng (accessed on 30 November 2020)

- The Law on Public Electronic Registries
- Regulation of Member Organization of Trembita
- Domain-specific legislation (especially eHealth)

The Law on Administrative Services[147]

This law defines the legal basis for the realization of the rights, freedoms, and legitimate interests of individuals and legal entities in the provision of administrative service.

In terms of provision of information for administrative services, this law ensures the applicants receive free information on the services and the procedure with the Government portal, operation of telephone help, and so on.

The treatment of administrative services in the electric form is also ensured by the law. The services are provided through the Unified State Portal of Administrative Services[148] The procedure and requirements for integration of information systems of state bodies and local self-government bodies with the portal shall be approved by the central executive body, which ensures the formation of state policy in the field of administrative services, together with the central executive body e-government. From January 1, 2020. "Portal Diia"[149] also performs the functions of the Unified State Portal of Administrative Services.

This law ensures the so-called "once-only principle" in administrative services, which enables that the citizens only have to provide certain standard information to the government authorities once because the government authority is allowed to re-use and exchange the data with each other. The data exchange platform shall be Trembita in this country.

The entity providing administrative services has the following obligations:

1. To ensure the free provision of such documents or information no later than three working days from the date of receipt of the request from the subject of administrative service, unless otherwise provided by law
2. To take measures to develop a system of interdepartmental electronic interaction, providing free and open access to their information systems and databases, unless otherwise provided by law
3. Following the law, to ensure the storage and protection of information obtained as a result of the provision of administrative services
4. To provide free remote access to their information systems and electronic databases (registers) containing information necessary for the provision of administrative services, administrators of administrative service centers and entities providing such administrative services, including through the system of electronic interaction of state electronic information resources;

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147 https://zakon.rada.gov.ua/laws/show/5203-17 (accessed on 30 November 2020)

148 Website https://my.gov.ua/ (accessed on 30 November 2020)

149 Website https://diia.gov.ua/ (accessed on 30 November 2020)

5. To take measures to introduce the provision of administrative services in electronic form.

The Law on Public Electronic Registries[150]

The law aimed to ensure a single interoperable system of public electronic registries and determined the institutional structure of public electronic registries and the standards of their development, maintenance, interoperability, administration, modernization, and reorganization. It set standards for the registries. The point is that the law mandated the use of Trembita for all interactions between state registries. The draft law prohibited public authorities from requesting data from citizens that already existed in the registries to ensure the prevention of data duplication among base registries. The law also ensured every citizen to have free access to information about themselves. According to the draft law, the state registries should be registered in the Registry of Registries.

Regulation of Member Organization of Trembita

Participants of the Trembita system are state and local self-government bodies that can use it according to the requirements of:

- Regulation on Electronic Interaction of State Electronic Information Resources (approved by the Cabinet of Ministers of Ukraine of September 8, 2016, No. 606 "Some Issues of Electronic Interaction of State Electronic Information Resources").[151]
- Procedure for Organizing Electronic Information Interaction of State Electronic Information Resources (approved by the Cabinet of Ministers of Ukraine of May 10, 2018, No. 357 "Some Issues of Organizing Electronic Interaction of State Electronic Information Resources").[152]
- This decree established procedures for electronic interaction between state electronic information resources. It established the Registry of Registries (RoR) at the legislative level. According to the decree, the RoR should contain information including the owners, master data, data of creation, services for data exchange, etc.[153]
- Ordinance of the Cabinet of Ministers of Ukraine of September 5, 2012, No. 634-p "On Approval of the Concept of Creation and Functioning of the Information System of Electronic Interaction of State Electronic Information Resources"[154]
- Cabinet of Ministers of Ukraine Resolution No. 606 of September 8, 2016 "Some Issues of

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[150] http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=64437 (accessed on 30 November 2020)

[151] https://zakon.rada.gov.ua/laws/show/606-2016-%25D0%25BF#Text (accessed on 30 November 2020)

[152] https://zakon.rada.gov.ua/laws/show/357-2018-%25D0%25BF#Text (accessed on 30 November 2020)

[153] European Commission (2019), Digital Government Fact sheet 2019 Ukraine https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Ukraine_2019.pdf

[154] https://zakon.rada.gov.ua/laws/show/634-2012-%25D1%2580#Text (accessed on 30 November 2020)

Electronic Interaction of State Electronic Information Resources"[155]

- Resolution of the Cabinet of Ministers of Ukraine of May 10, 2018, No. 357 "Some Issues of Organizing Electronic Interaction of State Electronic Information Resources"[156]
- Order of the State Agency for Electronic Governance of Ukraine of September 13, 2018, No. 51 "On approval of electronic message formats and data exchange of the electronic interaction system of state electronic information resources"[157]
- Draft law on "Public Electronic Registries Act" (Draft law No 2110)[158]
- Decree no. 55 Some Questions of Administrative Activity Recording
- The decree provided instructions on how to record administrative activity in an electronic format, and also how to organize work with electronic documents in management processes as well as in electronic interagency exchange. [159]
- Decree no. 60 On Requirements to Data Formats of Electronic Documents Flow in State Entities
- This document determined data formats according to the ISO/IEC 21320-1:2015 used in electronic documents and the electronic document flow operated by state entities. It also provided metadata for electronic documents and instructions on verification procedure[160]

4.3.2 Base Registries and Organizations connected to Trembita

4.3.2.1 Current situation of base registries

Today there are more than 135 national registers such as the Registry of Taxpayers and State Demographic Registry. The registries are owned by more than 40 public authorities. Installing all state registers is currently impossible due to the lack of a single resource that would contain information on all state registers. The largest number of state registers is now available to the following institutions:

1. Ministry of Justice of Ukraine (20 registers)
2. State Fiscal Service of Ukraine (15 registers)
3. Ministry of Internal Affairs Ukraine, taking into account all of its divisions (12 registers).

It should be noted that financial support for the improvement of the majority of state registers is carried out at the expense of the state budget. According to calculations based on 23 state registers, the average

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[155] http://zakon.rada.gov.ua/laws/show/606-2016-%25D0%25BF (accessed on 30 November 2020)

[156] http://zakon.rada.gov.ua/laws/show/357-2018-%25D0%25BF (accessed on 30 November 2020)

[157] http://zakon.rada.gov.ua/laws/show/z1087-18%3Flang%3Duk (accessed on 30 November 2020)

[158] https://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=66772 (accessed on 30 November 2020)

[159] European Commission (2019), Digital Government Fact sheet 2019 Ukraine https://joinup.ec.europa.eu/sites/default/files/inline-files/Digital_Government_Factsheets_Ukraine_2019.pdf (accessed on 30 November 2020)

[160] Ibid.

costs for the maintenance in each of the state spends about UAH 21 million (USD 0.735 million) per year. The total cost is distributed in the following areas[161]:

- Employee retention - 3.09%;
- Software - 3.68%;
- Hardware - 45.91%;
- Communication channels - 6.88%;
- Accommodation costs - 0.31%;
- Other costs (information protection, system modernization, service maintenance, and technical support, etc.) - 40.13%.

Due to the high cost of modernization of the data centers, the state could not replace their equipment. Therefore, the data centers use obsolete equipment and will need comprehensive technological modernization over the next three years.

As for data security, only 60% of state registers have certified comprehensive information security systems. This creates huge privacy risks for data stored in an insufficiently protected environment. [162]

The insufficient investment in data centers results in the lack of electronic interactions between state registers and causes many different problems that lead to a deterioration in the quality of public services, especially in electronic form. Also, the lack of e-interaction between state registers leads to the need to duplicate information, especially that relating to personal data. Consequently, the lack of electronic interaction cannot allow you to enjoy effective transparent government services.

The lack of a concept of basic state registers leads to the duplication in different registers as well have equal priority. As a consequence, the state organs are forced to keep a large amount of information collected by each state register separately, which in turn leads to a significant increase in the complexity and cost of maintaining state registers. Moreover, the data fragmentation occurs in each registry and leads to a restriction of the functionality of registers, which prevents obtaining reliable and complete information. Usually, the reasons for fragmentation are the absence of information in digitized form by a certain period before the creation of the state register.

4.3.2.2 Registries and Organizations connected to Trembita

The state electronic information resources connected to the Trembita system are the following[163]:

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[161] TAPAS Project (2017), Звіт за результатами аналітичного дослідження "Стан та перспективи розвитку державних електронних інформаційних ресурсів" http://tapas.org.ua/media/zvit-za-rezultatamy-analitychnoho-doslidzhennia-stan-ta-perspektyvy-rozvytku-derzhavnykh-elektronnykh-informatsijnykh-resursiv/ (accessed on 30 November 2020)

[162] Ibid.

[163] Some issues of electronic interaction of state electronic information resources https://zakon.rada.gov.ua/laws/show/606-2016-%D0%BF#Text (accessed on 30 November 2020)

- State Land Cadastre
- State Register of Civil Status Acts
- State Register of Voters
- State Register of Compulsory State Social Insurance
- State register of encumbrances on movable property
- State Register of Real Rights to Immovable Property
- State Register of Individuals - Taxpayers
- Electronic health care system
- The only state electronic database on education
- The only information system of the Ministry of Internal Affairs
- Unified state automated register of persons entitled to benefits
- Unified state demographic register
- Unified state register of vehicles
- Unified state register of court decisions
- Unified State Register of Legal Entities, Individuals - Entrepreneurs and Public Associations
- Unified register of powers of attorney
- Unified register of documents entitling to perform preparatory and construction works and certifying the commissioning of completed facilities, information on return for revision, refusal to issue, cancellation, and cancellation of these documents
- Unified register of state-owned objects
- Register of value-added taxpayers
- Unified State Register of War Veterans
- Electronic register of sick leaves

Web services are now being developed with the support of international technical assistance (EGOV4UKRAINE, TAPAS projects) to accelerate the launch of electronic interactions between registries.

4.3.2.3 Authorities in the environment of the Trembita system (As 25 June 2020)

Authorities in the test environment of the Trembita system

1. State Fiscal Service of Ukraine,
2. Ministry of Internal Affairs of Ukraine,
3. Ministry of Finance of Ukraine,
4. Department of registration of Kharkiv City Council,
5. National Health Service of Ukraine,
6. Pension Fund of Ukraine,
7. State Service of Ukraine on Food Safety and Consumer Protection,

8. State Court Administration of Ukraine,
9. Ministry of Justice of Ukraine,
10. Ministry of Foreign Affairs of Ukraine,
11. Executive Body of Kyiv City Council (Kyiv City State Administration),
12. Executive Committee of Vinnytsia City Council,
13. Executive Committee of Lutsk City Council,
14. Executive Committee of Kryvyi Rig City Council,
15. JSC Commercial Bank "Privatbank",
16. Central Electoral Commission,
17. Executive Committee of Lviv City Council,
18. State Financial Monitoring Service of Ukraine,
19. Ministry of Social Policy of Ukraine,
20. Department of Administrative Services Provision of Odesa City Council,
21. Ministry of Education and Science of Ukraine,
22. Department of Administrative Services of Mariupol City Council,
23. Department of Register Services of Zaporizhzhia City Council,
24. State Service of Ukraine on Medicines and Drugs Control,
25. Ministry of Digital Transformation of Ukraine,
26. State Committee for television and radio broadcasting of Ukraine,
27. Municipal Enterprise "Main Information and Computing Center",
28. Research and Production Enterprise <Medirent> LLC,
29. Soft Xpansion Ukraine LLC,
30. Computer Information Technologies LLC,
31. State Agency of Water Resources of Ukraine,
32. FDI Company LLC,
33. Department of Provision of Administrative Services of Rivne City Council,
34. State Service of Ukraine for Geodesy, Cartography & Cadastre,
35. National Anti-Corruption Bureau of Ukraine,
36. IQUISION IT LLC,
37. National Agency on Corruption Prevention,
38. Assets Recovery and Management Agency.

Authorities in the production environment of the Trembita system

- Pension Fund of Ukraine,
- Department of Registration of Kharkiv City Council,
- National Health Service of Ukraine,

- State Service of Ukraine on Medicines and Drugs Control,
- Ministry of Internal Affairs of Ukraine,
- Ministry of Social Policy of Ukraine,
- Ministry of Justice of Ukraine,
- State Fiscal Service of Ukraine,
- Ministry of Finance of Ukraine,
- Executive Body of Kyiv City Council (Kyiv City State Administration),
- Executive Committee of Vinnytsia City Council,
- Executive Committee of Lutsk City Council,
- Executive Committee of Kryvyi Rig City Council,
- JSC CB "Privatbank",
- Central Electoral Commission,
- Executive Committee of Lviv City Council,
- State Financial Monitoring Service of Ukraine,
- Department of Administrative Services Provision of Odesa City Council,
- Ministry of Education and Science of Ukraine,
- Department of Administrative Services of Mariupol City Council,
- Department of Register Services of Zaporizhzhia City Council,
- Ministry of Digital Transformation of Ukraine.

4.3.2.4 Examples of services on Trembita

Trembita is a secure data transport system. To benefit from it, a G2G service provider or G2G service consumer must be able to develop services for data transmission or data acquisition, collectively called Trembita services. EGOV4UKRAINE continued to train central authorities to provide services and began to support the largest data owners in developing services.

In September 2018, Trembita was successfully procured, developed, and delivered to SAEGU (Now MODT). Trembita was certified in December 2019. During the last 6 months, new additional Trembita modules have been developed. The intensive implementation has taken place. By May 2020, 56 subscription agreements have been signed between SAEGU/MODT and government authorities. 36 government authorities are connected to the Trembita test environment and 23 to the Trembita production environment as of 1 May 2020. During the period, 15 memorandums of cooperation with government authorities and subordinated to these state enterprises and 2 with cities were signed.

4.3.2.5 Services developed or under development with the direct support of

Ministry of Internal Affairs of Ukraine (MIA)[164]

The "Trembita" production environment has 6 MIA EIS web-services published:

1. Verification of lost/stolen passport documents;
2. Verification of valid/invalid passport documents;
3. Verification of wanted individuals.
4. Verification of a driving license;
5. 2 web-services for eMaliatko (eBaby) comprehensive service;

5 MIA EIS web-services are under development:

1. Acquisition of information on an individual's criminal record;
2. Verification of a certificate of criminal record;
3. Acquisition of information on legal entities and individuals from the Unified State Register of Vehicles;
4. Verification of a Unique Register Record Number;
5. Work with MIA EIS references.

3 Web-clients for interactions are under development:

1. Verification of a Tax Payer ID Card registration number (SFS);
2. Verification of educational credentials (MES, Unified State Electronic Educational Database);
3. Acquisition of inputs from the Unified State Register of Legal Entities, Individual Entrepreneurs, and Civic Associations (Ministry of Justice).

State Fiscal Service of Ukraine

A web-service related to verification of a Tax Payer ID Card registration number has been developed and published in the "Trembita" test environment.

Web-services and web-clients for interaction with Registration Departments for State Civil Acts under the "eMaliatko" ("eBaby") comprehensive service has been developed.

3 web-clients developed for implementation with MIA EIS:

1. Verification of lost/stolen passport documents;
2. Verification of valid/invalid passport documents;
3. Verification of wanted individuals.

[164] Interview with MIA

Ministry of Education and Science of Ukraine

Technical environment for the development of web-services and web-clients under the Unified State Electronic Educational Database (MES) has been developed:

<Web-services>

- Verification of educational credentials;
- Verification of student and school IDs issued by higher and vocational (technical-vocational) educational establishments;
- Acquisition of data on student and school IDs issued by higher and vocational (technical-vocational) educational establishments.

<Web-clients for interactions>

- Confirmation of data on a unique record number in the Unified Demographic Register (MIA EIS);
- Verification of a Tax Payer ID Card registration number (SFS);
- Acquisition of inputs from the Unified State Register of Legal Entities, Individual Entrepreneurs, and Civic Associations (Ministry of Justice).

Ministry of Foreign Affairs of Ukraine

6 electronic consulate services based on electronic interaction with MIA EIS are under development:

1. Formalization of Ukrainian citizenship by birth;
2. Formalization of renunciation of Ukrainian citizenship;
3. Formalization of documents for permanent residence abroad;
4. Confirmation of an issued driving license;
5. Acquisition of data on a criminal record;
6. Verification of Ukrainian citizenship.

Ministry of Justice of Ukraine

A Technical Specification for development of web-services and web-clients for interaction with Registration Departments for State Civil Acts under the “eMalyatko” (“eBaby”) comprehensive service developed - 4 web-services.

4.3.3 The Electronic Interaction System of Executive Authorities

In addition to the Trembita system, a document exchange system between the government authorities exists.

The system of electronic interaction of executive authorities (SEI EA) is designed to automate the processes of creation, sending, transmission, receipt, processing, use, storage, destruction of electronic documents and copies of paper documents in electronic form, using electronic digital signatures that do not contain restricted information and control over the implementation of acts, protocol decisions of the Cabinet of Ministers of Ukraine and other documents.

The purpose of creating the SEI EA is:

- creation of single information space for registration, reception, analysis, and storage of organizational and administrative documents of executive bodies in electronic form with the use of qualified electronic signature;
- increasing the efficiency and effectiveness of management decisions;
- strengthening control over the processing, execution, and storage of organizational and administrative documents of executive authorities in electronic form;
- reduction of state budget expenditures due to the transition to the paperless exchange of documents between executive authorities;
- creation of preconditions for the transition to electronic interdepartmental document circulation using exclusively electronic documents.

SEI EA provides the following functions:

- reception/transmission of organizational and administrative electronic documents to the Secretariat of the Cabinet of Ministers and central executive authorities;
- organization of coordination of draft regulations between central executive authorities;
- control over the implementation of instructions of the Secretariat of the Cabinet of Ministers, approval of draft regulations;
- storage of electronic documents and their preparation for transfer to the electronic archive.

4.4 ID

4.4.1 Overview of existing IDs

Another essential component of e-government is a common unified national ID number for Ukrainian citizens. An effective system of interaction between state registers, like any other public policy, should be based on a "human-centered" ideology, according to which the state should serve the interests of citizens through comprehensive ensuring the priority of their rights, freedoms, and interests. In the field of e-government, the main prerequisite for the introduction of such an approach is a radical change of order collection, storage, and processing of personal data.

Personal information should fall into one base state register, and then to be supplemented in other registers with information on the property, rights, obligations, human restrictions, etc. To do so, It is needed to

implement a model in which the state receives personal data independently using the digital identifier of the person and does not force the person to collect this information personally, running on the state established. Today, the main obstacle to the implementation of such a model is the lack of a common unified national ID number.

To date, none of the available unique identifiers used in state registers provides 100% coverage of the population from birth to death. However, the effort to treat different IDs as one ID exists.

4.4.1.1 Existing IDs available for online authentication

National ID card (Internal Passport)

Law №3224 adopted in 2016[165] provides an opportunity for all Ukrainians to receive the new biometric ID-card (called "Internal Passport"). All citizens more than 14 years old can receive the ID-cards free of charge. The electronic chip in the ID-card can contain fingerprints and a digital signature (see next paragraph) of the person. The ID cards are provided by the Ministry of Internal Affairs. The ministry said "The introduction of ID-cards provides a lot of possibilities for further development in the decades ahead because the chip can be complemented with various modern services. For example, ID-cards can be used for electronic voting or for receiving administrative services on-line".[166]

The service of Qualified Electronic Signature (QES) was started in February 2020. The service is available for citizens of Ukraine who have reached the age of 18. Using an electronic signature, citizens can get access to government information systems and use electronic services.[167]

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[165] http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=56689 (accessed on 30 November 2020)

[166] Ministry of Interior of Ukraine (2016), «The introduction of the biometric passports/ID-cards will bring Ukraine closer to visa-free regime with the EU» - Arsen Avakov https://mvs.gov.ua/en/news/1986_Vprovadzhennya_biometrichnih_ID_pasportiv_nablizit_Ukrainu_do_bezvizovogo_rezhimu_z_S___Arsen_Avakov.htm (accessed on 30 November 2020)

[167] https://www.unian.info/society/10861127-ukrainians-able-to-get-id-cards-with-electronic-signature-from-feb-5.html (accessed on 30 November 2020)

Figure 4-4 Card type internal passport (National ID card)

Source: 112.international[168]

Bank ID

The National Bank of Ukraine (NBU), the central bank of Ukraine, launched the BankID project in 2015. The NBU owns the system and regulates the relations between participants of the system. The banks in Ukraine, government agencies, and commercial enterprises can connect to the BankID system free of charge. [169]

The main purpose of creating BankID in Ukraine is to provide reliable and convenient user identification for the provision of administrative and banking services via the Internet. For example, for a certificate of payroll, the service first needs to make sure that exactly the specific person is requesting information.[170] When a citizen uses his/her BankID, he/she enters the login password of his/her Internet banking, passes the second stage of authorization (for example, entering a one-time password from SMS), and thus confirms his/her identity.

The following banks are now participants of the BankID system: Forward Bank, Pivdennyi Bank, First Ukrainian International Bank, Monobank (Universal Bank), Oschadbank, Kredobank, Radabank, Motor-Bank, Vostok Bank, Idea Bank, Alliance Bank, A-Bank, Alfa-Bank Ukraine, PrivatBank, and OTP Bank. (As of May 2020)[171]

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[168] 112.international (2016) Ukraine switches to biometric IDs https://112.international/society/ukraine-switches-to-biometric-ids-9884.html (accessed on 30 November 2020)

[169] Ukrinform (2020) OTP Bank joins NBU BankID system https://www.ukrinform.net/rubric-economy/3026165-otp-bank-joins-nbu-bankid-system.html (accessed on 30 November 2020)

[170] AIN (2018), BankID: what it is and how it works https://ain.ua/en/2018/11/16/bankid-how-it-works/ (accessed on 30 November 2020)

[171] Ukrinform (2020) OTP Bank joins NBU BankID system https://www.ukrinform.net/rubric-economy/3026165-otp-bank-joins-nbu-bankid-system.html (accessed on 30 November 2020)

Mobile ID

"Mobile ID" is a way to identify a person using a mobile phone. It enables a person to log in to various services, including public services. The legitimacy of identity verification by "Mobile ID" is guaranteed by another identity verification document (such as national ID) registered when "Mobile ID" is obtained. Kyivstar and Vodafone Ukraine, the main telecommunication companies of Ukraine, operate MobileID (Kyivstar launched in 2017, Vodafone in 2018)[172] Related ministry is the ministry of Justice.

Others

the State Register of voters contains information about individuals aged 18 and over and based on a set of personal data, such as name, date, and place of birth, series, and passport number, etc. State registers of the State Fiscal Service of Ukraine and the Pension Fund of Ukraine contain their unique identifiers, such as registration number taxpayer account card and the number of the insured's account card persons of the State Register of Compulsory State Social insurance, which, unfortunately, is not mandatory (can be waived) and does not cover the part of minors, which is 14% of the population of Ukraine. At the same time, the forces of the State Migration Service of Ukraine in 2015 were created the Unified State Demographic Register, through which it began distribution of a unique number registry (USDR - citizen' ID in the Unified State Demographic Register). This number is available as the only identifier of the person, from which cannot be refused and which is assigned to a person once after birth (at birth registration) and does not change during all my life. USDR is 14 significant numbers, which encrypts information about gender and date of birth man.

The complexity of the spread of USDR today is a limited resource of the LCA for the issuance of new passports samples (ID cards and biometric passports to travel abroad), after all, USDR is assigned only at issue one of these documents. The average speed of passport distribution today is about 10-12 thousand days. You can predict that on coverage of USDR of the whole population Ukraine will not have to spend less than 12 years. Of course, such a term is unacceptable, and the State the migration service of Ukraine reports all efforts to reduce it by increasing capacity for issuance of identification documents.

The importance of USDR is that this number should become the foundation for building qualitatively new state information systems resources. With its help, it is possible to build information links that will allow the dissemination of personal information between state registers without the need to obtain various references by the person. That is, a person will be born assigned a unique number that will automatically get to other registers as a person will grow up.

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[172] AIN (2018), Ukraine officially launched the MobileID technology. What is this service and how to connect to it https://ain.ua/en/2018/11/12/ukraine-mobileid-technology/ (accessed on 30 November 2020)

Integrated electronic identification system (IEIS)

The Integrated Electronic Identification System (referred to as IEIS), which is designed to technologically provide convenient, accessible, and secure electronic identification and authentication of system users, compatibility and integration of electronic identification schemes, their interaction with official websites (web portals), information systems of public authorities, local governments, legal entities, and individuals - entrepreneurs, ensuring the protection of information and personal data using uniform requirements, formats, protocols, and classifiers, as well as meeting other needs defined by the law adopted in 2019.

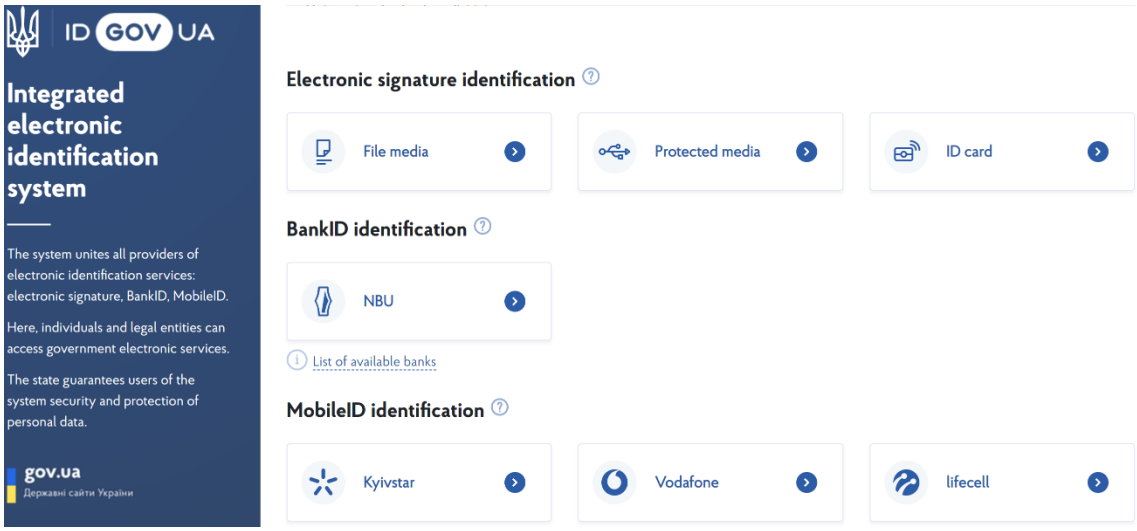

Figure 4-5 The portal site of IEIS

Source: ID.GOV.UA[173]

IEIS users - individuals and legal entities, individuals - entrepreneurs who access the information and telecommunication systems of the subjects of interaction and undergo electronic identification through the system using electronic identification tools, the operation of which is provided by the system, and in the manner prescribed by law processing of personal data.

IEIS is an integral part of the information and telecommunication infrastructure, which provides electronic interaction of the subjects of interaction with the users of the system and provides:

- conducting routine procedures and electronic identification of IEIS users to receive electronic services, access to services;
- interaction and compatibility with information and telecommunication systems that implement electronic identification schemes, and information and telecommunication systems;
- compliance with the requirements of the legislation on the protection of information and personal

[173] ID.GOV.UA https://id.gov.ua/ (accessed on 26 August 2021)

data;

- development of IEIS in the direction of integration into information and telecommunication systems for cross-border electronic identification;
- integration of information and telecommunication systems of the subjects of interaction to IEIS.

(Note that "IEIS" is a system for facilitating public personal authentication and electronic signature, but it cannot be used as a single ID to ensure interoperability.)

As of today[174], IEIS has integrated:

- 67 Electronic identification schemes
- 23 Provider of electronic trust services
- 38 BankID service providers
- 2 MobileID service provider
- 203 Systems connected to IEIS for authentication
- 110 Systems connected to IEIS to create and verify a qualified electronic signature

Access to IEIS is carried out through an open information resource that has an official address on the Internet.

4.4.2 Regulations

The main regulations related to the above IDs are followings.

Law on Electronic Trust Services[175]

The law was adopted in November 2017 and established identification tools such as electronic digital signature, Mobile ID, electronic stamp, and the electronic timestamp. Also, It ensured the privacy and complete protection of personal data. Thanks to the law, electronic identification certificates will be mutually valid between the EU countries and Ukraine (eIDAS Regulation). The law was amended to establish the function and use of IEIS

Procedure of Compliance Assessment in the Sphere of Trust Electronic Services[176]

The procedure was approved in 2018 and established the procedure for compliance assessment to authorize trust e-Services providers. It determined procedures of interaction between legal entities, private entrepreneurs intending to provide their e-Services, authorized trust e-Services providers, and so on.

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[174] 26th August 2021

[175] https://zakon.rada.gov.ua/laws/show/2155-19#Text (accessed on 30 November 2020)

[176] https://zakon.rada.gov.ua/laws/show/1215-2018-%D0%BF#Text (accessed on 30 November 2020)

Procedure of Use of Trust Electronic Services by State and Local Authorities, and by State-Owned Enterprises[177]

The procedure was approved in 2018 and was developed in compliance with the law On Electronic Trust Services. Implementation assured the development of the eServices sphere with electronic document flow. Also, it established the validity of open key certificates and strengthened activities to improve the identification process security of personal keys.

Order on Requirements to the Electronic Identification Tools and their Use in eGovernance[178]

The order was issued in 2018 and established the organizational, methodological, and technical conditions of electronic identification tools in the e-Government sphere.

4.5 Diia

4.5.1 Concept

President Zelenskyy mentioned at the beginning of the presentation which launched the Diia app in February 2020,

> *"For citizens, the government should be just a service – simple, but more notably comprehensible. In general, our goal is to make sure that all relations with the state can be carried out with the help of a regular smartphone and the Internet. In particular, voting. This is our dream, and we will make it real during presidential, parliamentary or local elections. It is a challenge. Ambitious yet achievable,"*

Diia is based on the "one-stop-shop" Portal idea, give citizens a single entry for all available services, introduce a unified authorization and identification system, and make the entire system more citizen-oriented.

Diia will be a platform to provide a large variety of services, not only limited to certificates and governmental administration services but also expanding to education, business consulting, etc. The website of Diia explains that Diia is available as a web Portal (One-stop-shop for state services), Mobile app (e-documents and available data about the person from state registers), Education (Portal with online courses), Business (Portal for helping small and medium business) and TSNAPs (Centers for administrative services providing in every corner of Ukraine[179].

In September 2019, MODT officially had the presentation of the portal and the "Diia" program. The presentation of the project was broadcast online on YouTube. In the presentation, the Minister told what services are going to be included in the project. For example, registration of a car online and electronic

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[177] https://zakon.rada.gov.ua/laws/show/749-2018-%D0%BF#Text (accessed on 30 November 2020)

[178] https://zakon.rada.gov.ua/laws/show/z1462-18#Text (accessed on 30 November 2020)

[179] https://plan2.diia.gov.ua/en/ (accessed on 30 November 2020)

rights, eBaby, registration of FOP, licensing online, registration to the doctor, etc.[180] Diia was announced as an application and a portal that would unite in a single electronic window for all the public services. In December 2019, test access to the application was opened for the first 5,000 who applied for the beta testing.[181]

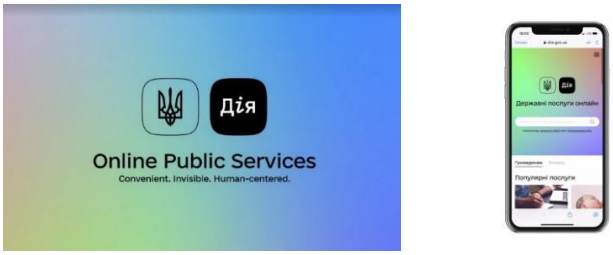

Figure 4-6 Image of Diia

Source: PlanDiia 2.0[182]

On 6th February 2020, Ukraine's president and the prime minister presented the country's mobile e-governance application Diia. More than one million Ukrainians downloaded this mobile app in the first four days after its release.[183]

Figure 4-7 Interface of Diia

Source: Fbc.net.ua[184]

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[180] ZNAJ.UA (2019) Дія - держава и я": які послуги надасть "держава у смартфоні" Зеленського https://znaj.ua/society/265598-diya-derzhava-i-ya-yaki-poslugi-nadast-derzhava-u-smartfoni-zelenskogo (accessed on 30 November 2020)

[181] The Ukrainian Weekly (2020), Zelenskyy administration launches "State in a Smartphone" app http://www.ukrweekly.com/uwwp/zelenskyy-administration-launches-state-in-a-smartphone-app/ (accessed on 30 November 2020)

[182] PlanDiia 2.0 https://plan2.diia.gov.ua/en (accessed on 30 November 2020)

[183] The Ukrainian Weekly (2020), Zelenskyy administration launches "State in a Smartphone" app http://www.ukrweekly.com/uwwp/zelenskyy-administration-launches-state-in-a-smartphone-app/ (accessed on 30 November 2020)

[184] Fbc.net.ua https://fbc.net.ua/news/obshhestvo/kabmin-priznal-ofitsialnym-tsifrovoj-pasport/ (accessed on 30 November

On the analogy of "X-ROAD" in Estonia, the ideal relationships between Diia and Trembita are the following:

- The interoperability among databases, including base registries, of public authorities is ensured by Trembita with a common unique ID.
- Each administrative agency such as MIA operates its services by accessing personal data of related databases through Trembita and provide through Diia (Web Portal or Mobile App).
- Citizens enjoy the e-Services provided through Diia with his/her ID for authentication.

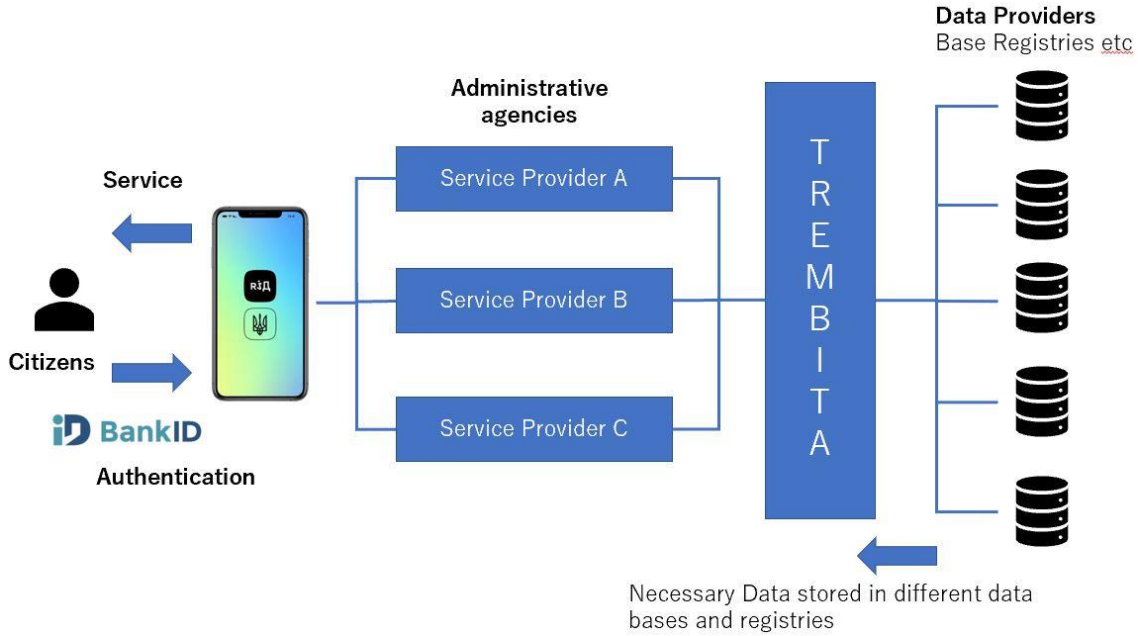

Figure 4-8 Diagram of Diia application (in case of BankID as Authentication)

Source: Original

4.5.2 Function of Diia

After installing the Diia, citizens will be able to freely use ID-card and biometric passport (based on USDR number), digital driver's license, student card, vehicle registration certificate, and insurance policy. To receive electronic versions of the documents, a citizen must download the application and log in. They will appear in the application automatically if there is complete data in the registry.

The Portal Diia performs the following main tasks:[185]

2020)

[185] The Cabinet of Ministers of Ukraine (2019) Issues of the Unified State Web Portal of Electronic Services and the Unified State Portal of Administrative Services https://zakon.rada.gov.ua/laws/show/1137-2019-%D0%BF#n15 (accessed on 30 November 2020)

- provision of electronic services (including administrative and other public services) with the receipt and use, if necessary, of information from national electronic information resources, which is necessary for the provision of such services;
- creation and functioning of the user's electronic cabinet on the web portal, as well as providing users with access to information from national electronic information resources, in particular about the person, through the specified cabinet;
- providing users with information on electronic and administrative services, as well as other public services, the provision of which is carried out using a web portal
- providing official electronic correspondence during the provision of services, consideration of appeals and administrative cases (cases considered by executive authorities, local governments, their officials, other entities that are authorized by law to perform public administration functions, to make decisions of individual activities aimed at the acquisition, change, termination or implementation of the rights and obligations of the person, as well as the protection of his rights), as well as during the consideration using the web portal of other challenges
- payment of administrative fees for the provision of administrative services, fines for administrative offenses, state duties and other payments; settlements for other public, in particular housing and communal, services
- providing the subjects of the appeal with information on the course and results of the provision of services, consideration of appeals, and administrative cases in real-time to the service providers.
- providing the receipts by the subjects of the appeal of the results of the provision of electronic services, consideration of appeals and administrative cases (receipts of the service delivery)
- reporting the results to the service providers with filing complaints based on the results of providing services, consideration of appeals and administrative cases, providing official electronic correspondence during appeal procedures, providing the appellant with information on the course and results of the complaint in real-time, as well as receiving these results;
- formation through a web portal, including with the use of the mobile application of the Portal Diia (Diia), digital images of documents that can be presented (provided) by a person on a smartphone through the specified mobile application
- surveying initiatives projects in various spheres of public life;
- monitoring and evaluation of the quality of services provided using the web portal, in the centers of administrative services or by the subjects of consideration of appeals directly;
- protection of data (including personal) of the specified web portal from unauthorized access, destruction, modification;
- submission of electronic appeals through the web portal;

The function of the mobile application of the Portal Diia is following:

- Urgent information messages.
- Display the passport of the citizen of Ukraine in the form of an ID-card.
- Display of biometric passport.
- Display of student card.
- Display of driver's license.
- Display of the car registration certificate that belongs to you.
- Display of insurance policy.
- Authorization via BankID.
- Online and offline mode.
- Validation of digital documents via a temporary QR code.
- Online support and chatbots.
- Create electrical cabinet in the portal Diia

4.5.3 Development of Diia

Cooperation of foreign development partners

No public funds of Ukraine government are spent on the Diia project. The Diia Portal was created in cooperation with the MODT with the support of the USAID / UK Aid project "Transparency and Accountability in Public Administration and Services / TAPAS", the EGAP Program funded by the Swiss Agency for Development and Cooperation and implemented by the Eastern Europe Foundation and Innovabridge, USAID Interaction!" (SACCI) and the EGOV4UKRAINE project.

the Unified State Portal of Administrative Services

Portal Diia was established as “the Unified State Web Portal of Electronic Services”[186], whose tasks are mentioned in the above section. Moreover, Diia will integrate “the Unified State Portal of Administrative Services” [187]. The Cabinet of Ministers of Ukraine is responsible for the Unified State Portal of Administrative Services. Currently, the two portals are functioning in parallel.

The portal of administrative services provides:[188]

- access to information on administrative services and on subjects of the provision of

[186] Ministry of Justice (2020), ЄДИНИЙ ДЕРЖАВНИЙ ВЕБ-ПОРТАЛ ЕЛЕКТРОННИХ ПОСЛУГ «ПОРТАЛ ДІЯ» https://kharkivobljust.gov.ua/news/iedynyj-derzhavnyj-veb-portal-elektronnykh-posluh-portal-diia/ (accessed on 30 November 2020)

[187] Website https://my.gov.ua/ (accessed on 30 November 2020)

[188] The Cabinet of Ministers of Ukraine (2013), On approval of the Procedure for maintaining the Unified State Portal of Administrative Services https://zakon.rada.gov.ua/laws/show/13-2013-%D0%BF (accessed on 30 November 2020)

administrative services

- availability for downloading and filling in electronic forms of applications and other documents required to obtain administrative services
- the possibility for submission of an application through telecommunication;
- the possibility for receiving the results of the provision of administrative services through telecommunication
- the possibility of payment for administrative services.

4.5.4 Examples of Services

This section introduces the several services provided through Diia. The list of services of Portal Diia is given on the Diia Portal.[189]

Digital education[190]

MODT developed the online platform for digital education supported by the Eastern Europe Foundation in the framework of the Swiss-Ukrainian program "E-government for government accountability and community participation EGAP". On the online platform, every citizen can learn digital skills for free in a new modern format. The digital literacy of Ukrainians will be one of the national competitive advantages. The goal of this platform is to give educational courses to 6 million users in 3 years.

Moreover, The educational platform includes the training menu for elder people named “Smartphone for Parents”. Kyivstar mobile communications operator jointly with MODT has launched a course for mobile literacy and proficiency of using a smartphone on the Diia. In the educational platform, there are 10 interactive video tutorials, where elder people find step-by-step instructions from turning on a brand new smartphone to set it up for themselves.[191]

Business consulting[192]

This service supports businesspersons especially entrepreneurs, and consists of two components: the online platform of Diia.Business, and the offline entrepreneur support centers.

Through this service, businesspersons can find an idea for your own business, learn the success stories of Ukrainian entrepreneurs, choose business support programs, and get advice on how to develop one’s business.

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189 https://diia.gov.ua/services (accessed on 30 November 2020)

190 https://osvita.diia.gov.ua/ (accessed on 30 November 2020)

191 Interfax-Ukraine (2020), Kyivstar jointly with Ministry of Digital Transformation launches Smartphone for Parents course on Diia platform
https://en.interfax.com.ua/news/economic/643692.html (accessed on 30 November 2020)

192 https://business.diia.gov.ua/hubs (accessed on 30 November 2020)

The services and features of this portal are the following:

- online consulting (get free consultations)
- national free online school for entrepreneurs (study)
- map of the infrastructure of business support organizations (find a business support organization in your city with the help of smart filters)
- the only catalog of services and opportunities that is regularly updated (find a partner, funding, win a grant, or use an online service)
- catalog of business ideas (find a business idea and download useful templates for the company's operations)
- business directory, current news, and cases

The first entrepreneur support center Diia.Business in Kharkiv opened on July 1, 2020.

e-baby (E-malyatko)

"E-malyatko" is the online service for the registration of childbirth. Thanks to this service, new parents will spend 20 minutes instead of 2 weeks filling documents for 10 government services related to childbirth. E-malyatko is currently available in Kharkiv, Lutsk, Vinnytsia, and Kryvyi Rih. Moreover, 14 maternity clinics joined the project in Kyiv. E-malyatko service will soon be rolled out on the Diia portal.[193]

4.6 Activities of Development partners

The main projects of international technical assistance in the field of e-government development are:

- E-Government Support for Ukraine Decentralization / EGOV4UKRAINE;
- E-Governance for Accountability and Participation' / EGAP program.
- Transparency and Accountability in Public Administration and Services / TAPAS Project
- Support to Ukraine's Reforms for Governance / SURGe/EDGE
- Cyber Security Readiness in Ukraine Public Authorities
- EU4DIGITAL

E-Government Support for Ukraine Decentralization / EGOV4UKRAINE[194]

The project is part of the decentralization program of Ukraine for more transparent and accountable

[193] Government Portal (2020), Oleksiy Honcharuk: New parents will spend 20 minutes instead of 2 weeks on government services related to childbirth https://www.kmu.gov.ua/en/news/oleksij-goncharuk-novospecheni-batki-vitrachatimut-20-hvilin-zamist-2-tizhniv-na-10-derzhavnih-poslug-povyazanih-z-narodzhennyam-ditini (accessed on 30 November 2020)

[194] Website: https://ega.ee/project/u_lead/ (accessed on 30 November 2020)

governance and supports activities funded by the U-LEAD with Europe[195][196].

EGOV4UKRAINE is a U-LEAD support project, which improves public service provision in Ukrainian communities (hromadas) and cities by developing and implementing the governmental data exchange system Trembita and the information system Vulyk for administrative service centers (ASCs). The ICT solutions, created by the project, make the government more transparent and effective at the national and municipal level and support the development of the public services.

ASC is established up to 600 by the end of 2020. The role of ASC is to connect the e-services of local authorities with all citizens including people who are not familiar with ICT technology such as smartphones. ASC is centers to deliver administrative services to citizens, located in a central part of the city with modern equipment. Because The local authorities can provide their services including registration into electric formats to citizens through ASC, citizens can enjoy the merits of e-Services through ASC. They will be established so dense that citizens can reach the closest ASC within 30 minutes by car.

<Data>

- Development Partners: European Union, the Government of the Kingdom of Sweden through the Swedish International Development Cooperation Agency (SIDA), and Government of the Republic of Estonia through the Ministry of Foreign Affairs of Estonia.
- Implementer: E-Government Academy of Estonia.
- Beneficiary: MODT
- Period: 01.11.2016 – 30.10.2020
- Budget: EUR 9.4 million

The 'E-Governance for Accountability and Participation' / EGAP program[197]

The E-Governance for Accountability and Participation (EGAP) program is implemented through 2015–2023 by the Eastern Europe Foundation and the Innovabridge Foundation in partnership with MODT. The program is implemented with the support of Switzerland, provided through the Swiss Agency for Development and Cooperation. The target regions are Vinnytsia, Volyn, Dnipropetrovsk, Luhansk, and

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[195] U-LEAD with Europe is the multinational project, and aims at the decentralization reform in Ukraine focusing on the voluntary amalgamation process and the transfer of powers under the sectoral and fiscal decentralization. U-LEAD is supported by European Commission, German Federal Ministry for Economic Cooperation and Development (BMZ), Ministry of Foreign Affairs of Denmark, Ministry of Foreign Affairs of Estonia, Ministry of Foreign Affairs of Poland, Ministry for Foreign Affairs of Sweden.

It scheduled to start in Jan. 2016 and finished in Dec. 2023. The total amount of aid is 152.3 million EUR.

[196] Decentralization International Cooperation

https://donors.decentralization.gov.ua/en/project/u-lead (accessed on 30 November 2020)

[197] Website: https://egap.in.ua/en/ (accessed on 30 November 2020)

Odesa regions. The work continues on two key components: the development of e-services and e-democracy both at the national level and in the regions of Ukraine.

The objectives of the Program include optimization of business processes, the formation of strategies and improvement of legislation; development of software, online platforms, and services; training of specialists in government and digital education of citizens, promotion of electronic tools among potential users.

During the first phase of the EGAP Program, 2015-2019, nearly half a million Ukrainians used online versions of the following public services:

- registering as an FOP or individual entrepreneur;
- registering a TOV or limited liability company;
- registering a HO or community organization;
- applying for maternity benefits;
- applying for housing subsidies;
- applying for confirmation of a clean police record;
- registering in an electronic queue to apply for biometric documents;
- checking the validity of documents

<Data>

1. Development Partners: Swiss Agency for Development and Cooperation (SDC)
2. Implementer: Eastern Europe Foundation and the Innovabridge Foundation.
3. Beneficiary: MODT
4. Period: 2015 – 2023
5. Budget: CHF 5.4 million (USD 6 million)

Transparency and Accountability in Public Administration and Services / TAPAS Project[198]

The USAID and UK aid-funded Transparency and Accountability in Public Administration and Services (TAPAS) Project, supporting Ukrainian citizens and the Government of Ukraine in reducing or eliminating corruption in key public administration functions and services. The key areas are “eProcurement”, “Open Data”, and “eServices”. The need to develop these areas came out through the discussion with the State Agency for eGovernance (Currently, MODT).[199]

<eProcurement>

TAPAS developed “ProZorro”, which is a kind of online public procurement system for anti-corruption. All of the functionality offered by the online portal is available to the general public without the need to

[198] Website: http://tapas.org.ua/en/ (accessed on 30 November 2020)

[199] Interview with TAPAS

register and without any barriers to access. This project includes proposing amendments to the Law on Public Procurement. Moreover, TAPAS developed training programs for anti-corruption. The contents include not only how to use Prozorro for public servants and other users, but how to use the monitoring tool for journalists and civil activists. This is because checking the prozorro by the audience leads to the transparency of the procurement.[200]

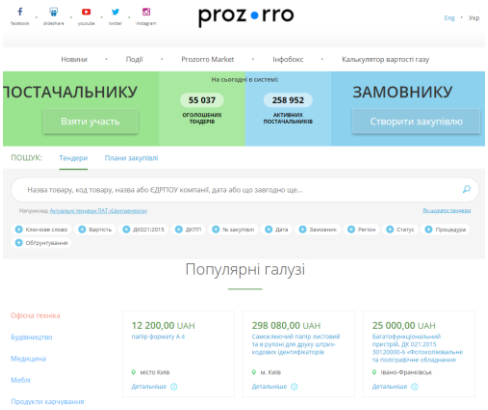

Figure 4-9 Interface of Prozorro

Source: Prozorro Portal[201]

eService

The project will provide regulatory and policy support, and technical assistance to the Government of Ukraine to develop and implement an eServices Roadmap. This project will also facilitate an audit of government registries, develop Trembita, and support the integration of state registries into Trembita. Also, the project partly supported the development of the Diia portal by developing "e-Cabinet", which is a kind of dashboard, and enables citizens to access and retrieve his/her information by themselves. Thanks to e-Cabinet, citizens can treat their personal information by single sign-on, and do not have to log-in to different data sources many times.

Figure 4-10 Image of e-Cabinet

Source: Documents provided by TAPAS

[200] Ibid.

[201] https://prozorro.gov.ua/en (accessed on 30 November 2020)

Open Data

The project team will support all ministries and at least 35 municipalities to publish data on a regular basis and will organize a series of seminars and workshops.

<Data>

- Development Partners: USAID, UKAID
- Implementer: Eurasia Foundation; Open Data Institute
- Beneficiary: The Ministry of Economy, MODT, and MOH
- Period: 04.08.2016 - 03.08.2021
- Budget: USD 24.5 million

Support to Ukraine's Reforms for Governance / SURGe/EDGE[202]

<EDGE Project>[203]

Funded by Global Affairs Canada, The Expert Deployment for Governance and Economic Growth (EDGE) Project responded to critical needs of the Ukrainian government, at the national and regional level.

As of 2016, administrative services were very cumbersome for citizens: fragmented legislation, multiple documents required, different services provided in different locations, long wait times, very limited service hours, rude administrators, requests for bribes, and no inclusivity/accessibility arrangements.

In response to this, the Government initiated a reform that would make services more accessible to citizens. Then, EDGE partnered with the Ministry of Economic Development and Trade (MEDT) and develop Administrative Services Reform Office (ASO).

ASO acts as an independent development partner-funded nongovernment office with a certain mandate from the MEDT to support the administrative services and coordinate the key stakeholders such as MEDT (policy-making, analytical and development partner coordination role; development of Administrative Service Centres (ASCs),) the Secretariat of the CMU (coordination role, preparing Government decisions), the Ministry of Regional Development (coordination of regions in the provision of services at ASCs), major Ministries (policymakers and supervisors for certain services); State E-Governance agency; local administration (for new ASCs). Also, there are multiple development partners in this sector: this support is mostly at the regional level (U-Lead is the biggest project, supported by the EU).

ASO was staffed by a team of ten experts, who assisted in the coordination of the reform strategically with MEDT and other government stakeholders, re-designed selected services (re-engineering) and developed legislation, improved service accessibility in ASCs.

Moreover, ASO worked in the following reform areas:

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[202] Interview with SURGe / EDGE

[203] Website: https://edge.in.ua/ (accessed on 30 November 2020)

- Services re-engineering (making services easier, faster, fewer documents required): top-six most popular services were prioritized;
- Services accessibility: ASO developed a digital map of projected locations for ASCs so that citizens can reach them within a maximum 30 minute driving time;
- Piloting: ASO created a service delivery improvement plan in the pilot region (Kyiv).

Besides the development of ASO, the EDGE project supports 46 reforms in 20+ Ministries and agencies, including reform of administrative services, healthcare, social services for families with children, tax and customs, maritime safety, Prozorro.Sale, sectoral decentralization, development of an electronic learning platform for MinEducation (architecture and terms of reference were developed), etc.

<SURGe Project>[204]

Support to Ukraine's Reforms for Governance (SURGe) is another support project conducted by Global Affair Canada.

Technical assistance under SURGe may include the deployment of experts, training, and capacity building, development of concepts, methodologies, templates, tools, computer software, draft legal acts, communication materials, and other activities.

Currently, 9 reforms are supported under SURGe:

- Reform of administrative services with the MODT: among other components, there is an e-baby, ID14, electronic registration of residence, e-subsidy, services for pensioners, services for people with disabilities; building capacity of ASCs administrators; support to the development of ASCs network; and other components;
- E-health reform with the Ministry of Health: e-Health, including e- sick leave and other software modules;
- Reform of the quality of education in schools with the Ministry of Education and Science of Ukraine: increasing the capacity of communities to manage the quality of education;
- Probation reform, alternative types of serving sentences, reform of the penitentiary system with the Ministry of Justice: incl. the possibility of creating electronic registers is being considered;
- Reform of children's deinstitutionalization together with the Ministry of Social Policy: the majority of children (96%) in orphanages have parents. Creation of social services in communities for families with children, which will allow not to send children to boarding schools.
- Implementation of Results-Based Management in the Secretariat of the Cabinet of Ministers of Ukraine and selected Ministries (Methods of reform planning) and integration of citizen impact assessment. A specialized ICT system for planning and implementing reforms on indicators is

[204] Website: https://edge.in.ua/tags/SURGe/ (accessed on 30 November 2020)

being created.

- Improving the quality of reform planning in the Euro-Atlantic Integration Office for Ukraine's accession to NATO. The approach to planning the NATO-Ukraine Commission's annual programs has been restructured. A specialized ICT system for the development of NATO-Ukraine reform programs is being developed.
- Establishment of cultural service centers together with the Ministry of Culture and Information Policy.
- Regional investment projects facilitation reform together with the Ministry of Community Development. Two pilot regions: Cherkasy and Chernihiv. The goal is to build the capacity of communities to assess their investment needs and design and implement investment projects.

All SURGe reforms are citizen-oriented. Reforms must have a direct impact on citizens.
Model of work: advisory support for specific tasks of ministries by local experts. Initially, an in-depth research is carried out, new approaches are proposed, services are reengineered, concepts, strategies, terms of reference are developed, and the results of reforms are promoted and communicated. Focus on planning and project implementation of reforms, rather than on the implementation of specific ICT solutions.

<Data>

- Development Partners: Global Affairs Canada
- Implementer: Agriteam Canada Consulting
- Beneficiary: MODT
- Period: 30.09.2016 - 31.12.2024
- Budget: USD 21.5 million

Cyber Security Readiness in Ukraine Public Authorities[205][206]

The project aims to increase the operational capabilities of Ukrainian governmental authorities to develop the procedure for assessing the security of government information systems.
The project aims to provide guidelines for organizations on planning and conducting information security testing and assessments, analyzing findings, and developing mitigation strategies. It provides practical recommendations for designing, implementing, and maintaining technical information relating to security testing and assessment processes and procedures.
The project is focused on security assessments and penetration tests of the mission-critical systems of

[205] E-Governance Academy (2020), eGA to improve cybersecurity competences in Ukrainian public sector https://ega.ee/news/ega-improve-cybersecurity-competences-ukrainian-public-sector/ (accessed on 30 November 2020)

[206] Document by eGA

public authorities. Tests are designed to mimic the techniques and methodology used by cyber attackers who have the intent to gain access to the network of the critical service provider. Penetration testing on technological networks is done by identifying and validating gaps in security processes. The tools used for the testing enable network security professionals to understand how attackers can use those vulnerabilities to alter or disrupt operations. As a result of the penetration tests, critical information system owners and/or service providers can take appropriate steps to prevent an attack.

The expected results are the following:

- Ukraine public sector authorities have the description of procedures and guidelines for conducting security assessments;
- In the selected Ukrainian governmental authorities, the critical systems with high business impact are tested. Based on those tests, cybersecurity improvement action plans are developed (minimum 2 systems tested);
- The awareness and competence of selected Ukraine governmental authorities about the security assessments and penetration testing is increased;
- Cooperation at the national level between public authorities and relevant units on carrying out the security assessments and managing cybersecurity incidents is strengthened.

<Data>

- Development Partners: US Embassy in Kyiv and Estonian Ministry of Foreign Affairs
- Implementer: E-Government Academy of Estonia.
- Beneficiary: MODT
- Period: 01.06.2020 – 30.06.2021
- Budget: USD 0.2 million

Public Administration Reform (PAR)[207]

This project is a major EU program for implementing a comprehensive public administration reform, targeting many areas related to e-government, including policy development and coordination, civil service and human resources management, transparency and accountability of public administration, and improvement of administrative service delivery. PAR project has three specific indicators related to e-government: (i) creation of automated Human Resource Management Information System in civil service (HRMIS), (ii) creation of an integrated electronic service "E-baby:9 in 1" and (iii) rolling out of Trembita. By the end of 2020, when PAR finishes, Budget support payments will consider progress achieved on these

[207] European Comission (2019), EU helps to modernise information systems in public institutions of Ukraine https://www.euneighbours.eu/en/east/stay-informed/news/eu-helps-modernise-information-systems-public-institutions-ukraine (accessed on 30 November 2020)

indicators.

<Data>

- Development Partners: European Comission
- Beneficiary: the National Agency of Ukraine for Civil Service
- Period: 2016-2020
- Budget: USD 1.5 Million

Support to the Rule of Law Reforms in Ukraine PRAVO[208][209]

The PRAVO Justice program supports the advancement of electronic registries and promotes e-government solutions in the Ukrainian justice system. The PRAVO Police program supports the introduction of automated fingerprint identification systems for the National Police.

<Data>

- Development Partners: European Comission
- Period: 03.2018-12.2020
- Budget: EUR 15 Million

Support for Migration and Asylum Policies[210]

This project supports the establishment of an Integrated Migration Management Information System (IMMIS), which develops many new functions for existing systems, improves the interoperability between information systems and develops new ICT systems in the area of migration management, with State Migration Service (SMS) and State Border Guards (SBG) being the main beneficiaries.

<Data>

- Development Partners: European Comission
- Implementing organisations: ASTEC GLOBAL CONSULTANCY LIMITED
- Period: 05.2017-05.2019
- Budget: EUR 0.19 Million

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[208] Website: https://www.pravojustice.eu/ (accessed on 30 November 2020)

[209] Website: https://www.pravojustice.eu/post/vakansiya-golovnogo-nacionalnogo-eksperta (accessed on 14 February 2021)

[210] EU Delegation for the Pacific (2017), IT systems monitoring and evaluation of the project 'Support for Migration Management in Ukraine' https://eeas.europa.eu/delegations/fiji/28296/it-systems-monitoring-and-evaluation-project-support-migration-management-ukraine_ko (accessed on 30 November 2020)

4.6.1 Foreign companies

Recently, MODT develops relationships with foreign companies rapidly. Here, representative companies are introduced.

Samsung[211]

In October 2020, MODT signed a memorandum with Samsung Electric Ukraine. The main goal of the cooperation is to make electronic services on the Diia portal and in the Diia mobile application even more accessible and convenient.

Microsoft[212]

In October 2020, MODT signed a memorandum with Microsoft Ukraine. This is for the partnership to utilize Microsoft Azure for the e-government infrastructure and the modern workplace automation solutions for employees of government-owned companies.

Facebook[213]

MODT started the cooperation with Facebook for launching an online training center for small and medium-sized companies. On the website, entrepreneurs can find training programs for promoting business, developing creative content, and examples of effective use of digital tools, which are also available on the Diia Business platform. Online programs have been developed by Facebook experts.

4.7 Activities of local authorities and cities

In Ukraine, several cities apart from Kyiv develop their infrastructures and services to be “Smart cities”.

Lviv[214]

The Lviv City Council made two strategic documents. One is “the strategy of the digital transformation of Lviv 2016-2020”, which identified the key tasks in the fields of informatization and digital transformation

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[211] Facebook of MODT (09.10.20) https://www.facebook.com/mintsyfra/posts/3445623035490941 (accessed on 30 November 2020)

[212] Microsoft (2020), Ministry of Digital Transformation of Ukraine and Microsoft to collaborate in Digital transformation https://news.microsoft.com/en-cee/2020/10/02/ministry-of-digital-transformation-of-ukraine-and-microsoft-to-collaborate-in-digital-transformation/ (accessed on 30 November 2020)

[213] Ukrinform (2020), Digital Transformation Ministry in cooperation with Facebook launches online training center https://www.ukrinform.net/rubric-economy/3129487-digital-transformation-ministry-in-cooperation-with-facebook-launches-online-training-center.html (accessed on 30 November 2020)

[214] Interview with Lviv City Council

of Lviv. The other is “Program for the development of the Lviv integrated information processing system”, which is mainly aimed at ensuring the development of infrastructure: the purchase of software, hardware and telecommunications equipment.

Based on the strategies, Lviv city adopted e-government tools as follows:

- The electronic queue at the kindergarten.
- City chatbots to communicate with city council departments on the most frequently asked questions.
- The city contact center is integrated by API with the information systems of the city utilities, which inform about the planned works.
- The online submission of documents for the registration of children
- Comprehensive services: birth, death.
- Registration of the passport of a facade of the house.
- Open Data.
- Geoportal of the city.
- Public budget.

The sources of funding for e-government development is mainly the city budget. In addition to that, Lviv city actively cooperates with foreign development partners. In particular, with the TAPAS project from 2017 on the implementation of open data tools. Lviv city also cooperated with the EGAP project, introducing systems of electronic petitions and electronic consultations. Moreover, EPAM cooperated for the modernization of the residents’ portal.

Now, Lviv has joined the development of a regional digital transformation strategy together with MODT.

As for the future development plan, the next steps of Lviv city are the following:

- Realize Interoperability with national registers to improve the quality of administrative and utility services.
- Launch Smart City projects. In particular, the use of the Internet of Things in environmental monitoring.
- Automize local administrative services, their reengineering.
- Accept documents to public educational institutions in electronic form.

Kharkiv[215]

Kharkiv has a long history as a smart city compared to other cities. In 1998, inspired by the example of the Lille (France), Oleksandr Popov, the director of the City Information Centre of Kharkiv City Council, started introducing web site of administrative services. In 2007, residents have been able to register any complaints or make suggestions with the city council by email. In 2011, Kharkiv launched a one-stop-shop

[215] Interview with Kharkiv City Council

center for entrepreneurs known as the "Administration Service Directorate".[216]

Today, about 100 different ICT projects are being developed in various spheres of the city's activity. The project structure is supported by Mr. Oleg Drobot, deputy mayor, who brings ICT, not to the level of the application department, but the level of the sphere-forming department.

Kharkiv has a portfolio of solutions for the development of digital infrastructure, which will be most interesting for investors, spending on expensive projects. There are also portfolios of projects on the digital transformation of medicine, education, transport infrastructure, safety, the city council (as a local authority), and data (big data, open data, their use).

A project management system has been introduced to implement projects. Super Project Manager positions have been introduced in the structure of the digital transformation department, which is responsible for the implementation of the portfolio of projects in a specific area of the city's activity. For each project, there is a project passport, project roadmap. A request for funding for 2021 has also been developed for each project. Also, all projects are studied in terms of investment attractiveness.

The representative ICT projects are followings:

- A comprehensive video surveillance system of the city. (The investment component is that all the infrastructure does not belong to the city, and the city buys only data. At the same time, when purchasing data, the costs of maintaining the technical infrastructure are taken into account. Thus, the city does not perform unnecessary functions.)
- Creation of a situation center, which brings together all the dispatch services of the city.
- The sole city data center
- Building a single WiFi network in the city.

According to the deputy mayor, development partner projects are needed for a quick start. The development of ICT systems must be forecasted and foreseen financially in budgets. Unequivocally, the development partner must feel the participation of the beneficiary not only organizationally but also financially. It is also important for development partners to have a project environment.[217]

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[216] StartUs Magazine (2017), Why & How Ukraine's Kharkiv Is Emerging As A Smart City Hub https://magazine.startus.cc/ukraines-kharkiv-emerging-smart-city-hub/ (accessed on 30 November 2020)

[217] Interview with Kharikiv City Council

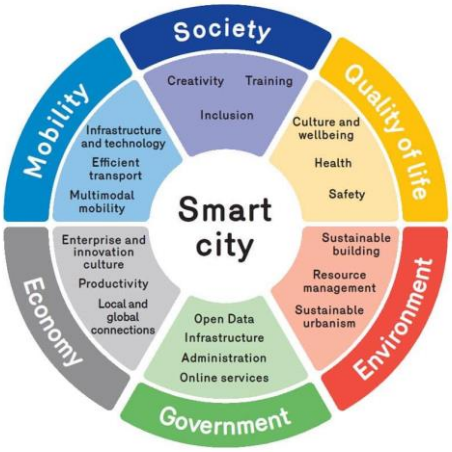

Figure 4-11 The logo of "KHARKIV SMART CITY"

Source: Facebook of "KHARKIV SMART CITY"[218]

Vinnytsia[219]

Vinnytsia is a city in west-central Ukraine, the administrative center of Vinnytsia Oblast, and the population of about 371,000 in 2020.

According to the deputy mayor of Vinnytsia, there are 3 papers related to the development in the e-government sphere: The concept of digital participation of the Vinnytsia city united territorial community for 2019-2025, The concept of integrated development of Vinnytsia 2030, and Digital Development Program for 2018-2022.

Today in Vinnytsia many tools of e-government and e-democracy have been implemented and implemented:

- Electronic petitions
- Electronic appeals
- Online submission of a request for public information
- Open Data Portal of Vinnytsia City Council
- "Budget of public initiatives"
- "Budget of school projects"
- "Competition of socio-cultural projects of civil society institutions"
- Personal office of a citizen
- Single Account Project:

  This was implemented to ensure a unified policy of informing the population on the provision of housing and communal services, improvement and streamlining of the payment system.

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[218] Website https://www.facebook.com/KharkivSmartCity/?ref=page_internal (accessed on 30 November 2020)

[219] Interview with Vinnysia City Council

- Geoportal of Vinnytsia (map of appeals, appeals to round-the-clock guards, movement of special equipment, map of funds of Vinnytsia community, organizations and sights, map of accessibility, installation of advertising media, parking places, inventory of green areas)
- Situational center of Vinnytsia:

  This is a comprehensive solution to ensure full-fledged round-the-clock security in the city. Thanks to this Center, the police of the region has a high rate of searching for missing cars, solving accidents, detecting vandals, hooligans, which allows law enforcement officers to detain violators in minutes. City cameras are connected to the Center, where robotic cameras are used together with ordinary video cameras. Also connected are all city schools, which display not only the courtyard of educational institutions but also pedestrian crossings near the school, as well as the hall of the room.
- Electronic queue in the centers of administrative services
- Electronic registration and online queue at preschool institutions
- Electronic resource "Enrollment of children in the first grades"
- Call-center of the department of operative response "Round-the-clock guard".
- Call-center "Transparent Office" of the Department of Administrative Services
- Online chat with the round-the-clock response department
- Online chat on social challenges
- Telegram-chat "Municipal card of Vinnytsia resident"
- Telegram channel for business "City4Business"
- Section "Entrepreneur" on the official website of VMR
- Electronic document flow of Vinnytsia City Council
- The automated traffic control system:

  The result of the implementation today is an organized "green wave" on the 6 main streets of the city. According to the analysis, the operation of the system allows drivers to reduce the travel time of large intersections by an average of more than 30%.
- Electronic medical card of the patient based on the medical information system:

  Thanks to the system, the quality of medical care for residents, preparation of documentation, accounting and reporting, speed of exchange, and availability of information within the medical space of the city have improved.
- Reconstruction of Heating system:

  This project was conducted with the support of the Swiss Confederation. The system was installed for automatic regulation and control of heat carrier parameters. As a result of the system implementation, operational control, and management of individual heating points and boiler houses is carried out. The advantages of the implementation are additional comfort for residents, optimization of the heating system, reduction of natural gas use, carbon dioxide emissions.
- An automated toll collection system in public transport:

Thanks to the introduction of the system for citizens, the convenience of paying for travel in public transport and receiving social benefits will be increased, and it will be possible to track traffic in real-time.

According to the deputy mayor, one of the successful projects is the Budget of Public Initiatives. More than 20,000 city residents took part in the last budget discussion.[220]

As for the future development plan, the next steps of Vinnytsia are the following:

- Development of e-education (expansion of functional capabilities of distance education; introduction of e-diary)
- Development of e-health
- Update of the official website of Vinnytsia City Council
- Connecting a chatbot of the local community
- Introduction of electronic consultation service
- Support "Startup school of Vinnytsia based on Vinnytsia National Technical University"
- Support of the innovation and technology park "Crystal"

4.7.1 Potential areas of cooperation

4.7.1.1 Assessment of e-Government environment in Ukraine

Here, e-Government effort in Ukraine is compared with Estonia, which has the most advanced e-Government system in the world (see next table)[221]

[220] Interview with Vinnytsia City Counsil

[221] References are summarized in Annex 7

Table 4-1 Comparison of Ukraine and Estonia in e-Government efforts

	Estonia			Ukraine		
	Availability	**Comment**	**Future plan**	**Availability**	**Comment**	**Future plan**
Vision and roadmap	Yes	Current roadmap until 2020	The new roadmap 2021-2030	No	93 Projects of Digital transformation. No strategy document available.	Implementation 100% state projects
Legal framework	Yes	All necessary isses are covered with legal framework	Development according to the emerging needs	Yes	Laws and bylaws about informatisation	
Infrastructure						
Data exchange platform	Yes	Data exchange platform x-road form 2002	Currently version 6, further cooperation to set up data exchange with other EU countries	Yes	System of Electronical Interconnection of State Electronical Information Resources "Trembita"	Implementation Trembita 2.0 version with Security Personal Data Modul
Digital Identity	Yes	Currently in use eID card (1st national document), Mobile ID(based on SIM card) and software application SmartID	Mainly security improvements	Yes	Integration System of Electronical Identity	Implementation approach of the eIDAS standard
Portal	Yes	The protal is consolidating most of the goveernment servicees	Better usability development	Yes	State Portal of e-services "Diia"	Publication 100 % e-services
Mobile application	No	Separate mobila application not available,	Better usability development	Yes	Diia	Development e-services

		the protal is adjusting to mobile screen				
Base registries	Yes	Civic registry, Business registry, Land registry, immovables registry, state property registry	Data is in digitaly format and availablee by x-road	Yes	State Registry of Civil Acts; State Registry of Companies; State Registry of Properties; Unified State Demographic Registry; State Registry Tax Payers; State Registry of Court Decisions.	Development e-services based on registries interconnections
Cyber Security Measures	Yes	Cyber Seecurity Strtategy 2019-2022	The responsibilities are divided between various institutions	Yes	Draft strategy available. National Cyber Security Centre was opened	Draft of the National Cyber Security Strategy
E-services						
Cabinet sessions online	Yes	From 2000	-	Yes	IS "Plan of agendas of Government meetings"	IT system for support of Government meetings
Citizens personal cabinet	Yes	From 2000	-	Yes	Citizen's Cabinet on Diia Portal	Integration all information from State Registries
Online voting	Yes	From 2005	Further security improvements	No	-	Studying of approach of other countries
E-tax declarations	Yes	From 1997	ca 98% of tax declarations submitted online	Yes	Implemenated to Diia Application, Tax Cabinet.	100% public services will are an e-services

E-customs services	Yes	From ca 2000	Most of the custom declarations submitted online	Yes	Developed separate customs e-services	Develping of a comprehensive system
Electronic consumer complaints	Yes	From ca 2010	Most of the complaints submitted online	Yes	State Service of Ukraine on Food Safety and Consumer protection	Further automatization of services
E-land register	Yes	From ca 2010	Official source of land information	Yes	Developed a public cadastr map	Development e-services
Electronic business register (electronic establishment of a company, information on companies, etc)	Yes	From ca 1997	Officiasl source of businesses	Yes	e-service automatic registration of individual enterpreneur is in Diia portal and Diia Application	-
Electronic population data management and related services (registration of birth, application for passport / national identity card, change of place of residence, certificate of citizenship, etc.)	Yes	From 1996	Official source for population	Yes	Comprehensive e-service "e-Baby" which includes 10 services. The Unified state demographic registry. The State Civil Acts Registry.	Further automatization of services
E-visa	No	As stonia is Part of the EU Schengeen visa system, no separatee e-visa system	-	Yes	Posted in MFA portal	-
Electronic register of legal acts	Yes	From 1998	Official source of legal acts	Yes	System of the Verkhovna Rada of Ukraine	Official source of legal acts
E-notary	Yes	From 2005	Official workplace for notaries	No	-	Under construction
E-judiciary system	Yes	From ca 2000	Official system for the court filings	Yes	The unified judicial information and	Official system for the court filings

					telecommunication system.	
E-police	Yes	From ca 2000	Various polic relatd servicees	No	Unified Electronic System of the Ministry of Internal Affairs is only internal use. But this system connected only to Trembita system.	Further automatization of services by Trembita system
E-health records, e-prescriptions	Yes	From ca 2001	Patient portal, behind it various other e-healt services and databases	Yes	e-Health system.	Further automatization of services
E-school, electronic education records, electronic exam results, etc.	Yes	From ca 2000	Various e-school solutions	Yes	Electronic system of external independent evaluation for admission to hight school	Further automatization of services
Electronic road administration services (registrations and licenses)	Yes	From 2010	Various vechicles and driving licences related services	Yes	Drivers Cabinet	-
Electronic procurement register	Yes	From 2011	Fully online procurement environment	Yes	Electronic procurement register	-
Certificate on the absence of a criminal record	Yes	From 2011	Official database for criminal records	Yes	e-Service of Unified Electronic System of the Ministry of Internal Affairs	-
Online social services	Yes	From 2011	Variety of services by national and local governments	Yes	on Diia Portal and Diia Application	Further automatization of services
Electronic work permit, renewal of professional licenses	Yes	From 2015	Registration of short term working permit	No	-	-

Electronic building permit	Yes	Available in various municipalities from various years starting from 2005	Issued by the municipalities, various sites	Yes	on Diia Portal	-
E-banking	Yes	From 1995	Various banks	Yes	Various banks	-
Payment gateway	Yes	From ca 200	Embeded into services, standardizd with commercial banks	Yes	International and national system	-
Open data portal	Yes	Relaunched 2018	789 datasets	Yes	State Open Data Portal	-
Declaration of economic interests for officials	Yes	From 2012	Every governmeent entity collects and stores independently	Yes	National Agency on Corruption Prevention	-
Register of government officials	No	-	-	Yes	HRMIS	-
Electronic system of Government meetings	No	-	-	Yes	IS "Plan of agendas of Government meetings"	IT system for support of Government meetings
Initiatives						
E-participation platforms/services (fighting corruption, e-participation, notifying and giving feedback to government, etc.)	Yes	From 2012	Draft laws and regulations portal	Yes	e-petition	-
E-residency	Yes	From 2014	-	No	-	Under construction
Base registries						

Population registry	Yes	-	-	Yes	-	-
Business registry	Yes	-	-	Yes	-	-
Land registry	Yes	-	-	Yes	-	-
Real estate registry	Yes	-	-	Yes	-	-
State property registry	Yes	-	-	Yes	-	-

To summarize the above table, Ukraine is making progress on e-government in many areas compared to Estonia. In this respect, there may be a reference for e-Government in Japan.
It has also become clear that e-Government efforts have not progressed in some areas: Vision and roadmap, Online voting, E-notary, E-police, E-residency, Electronic work permit. Specific needs may be discovered in these areas by conducting further detailed investigations.
In addition, even in the efforts which are "Yes" in the above table, there is a possibility that the missing part will become clear if a detailed investigation is conducted. In fact, in the "e-Health" field, detailed research has revealed current challenges and possible cooperation idea utilizing with Japanese knowledge and technologies (see next chapter).

4.7.1.2 Needs gathered by interview survey and possible cooperation sicarios

Based on the information obtained through interviews with stakeholders in Ukraine, the needs the field of e-Government in Ukraine were listed at the national and city levels, respectively. (see next table)

Table 4-2 Mapping of Issue / Needs and possible cooperation menu in the National Level

Legend (DT) : MoDT (R) : MCTD (L) : Lviv (K) : Kharkiv (D) : Document

Sector	Issue / Needs	Possible Cooperation Menu Short term (~3 Years)	Mid term (3~6 Years)	Long term (6 Years~)
Policy making	■ More improvement of policy-making ability from a long-term perspective (R)	Expert Dispatch		
Law / Regulation	■ Outdated law for the basis of ICT: NPI (D) ■ Cloud services are difficult to use (Use of overseas servers is prohibited) (L,D)	Expert Dispatch		
ICT Infrastructure	■ Expanding areas of optical fiber networks and 4G networks (R,D) ■ Increasing data centers for storing city data (R)	Financial Support (~ 2 years)		
Human Resources	■ Increasing human resources familiar with ICT in government (R) ■ Increasing high skill ICT engineer (D) ■ Digital divide between urban and rural area (DT)	Expert Dispatch Exchange ICT engineers and students		
Solution	■ Information Operation Center (R) ■ Cooperation for development of each solution (Online voting, E-notary, E-police, E-residency and so on.)	Research	PoC	Implementation

Table 4-3 Mapping of Issue / Needs and possible cooperation menu in the City Level

Legend （DT）: MoDT （R）: MCTD （L）: Lviv （K）: Kharkiv （D）: Document

Sector	Issue / Needs	Possible Cooperation Menu		
		Short term (~3 Years)	Mid term (3~6 Years)	Long term（6 Years~）
Policy making	■ Establish vision or strategy about smart city（DT）	Expert Dispatch		
Law / Regulation	■ Cloud services are difficult to use (Use of overseas servers is prohibited)（L,D）			
ICT Infrastructure	■ Improving processing power of Data Server（L） ■ Improving capacity of broadband（D）	Facility Renovation Financial Support (~2Years)		
Human Resources	■ Increasing smart city expert（DT,R,L） ■ Improving knowledge about analysis of data（DT）	Expert Dispatch		
Solution	■ Start-up hub in the field of smart city（L） ■ Automation of water quality monitoring（L,K） ■ Smart meter of water supply（K）	Research	PoC	Collaboration with funds or municipality in Japan Implementation

Policy Making

An opinion often heard in interview surveys from the perspective of city policy making is that long-term visions and strategies have not been established and then incorporated into concrete policies very well. Some stakeholders eager to learn about Japan's knowledge about this region. Therefore, an expert dispatch scheme to support this should be effective.

Law / Regulation

A literature survey reveals that NPI, the basic law on ICT development, does not match the current situation. Therefore, it finds that there is need for cooperation to modernize the laws on ICT development. In addition, because the government and local governments cannot use overseas servers due to legal restrictions, the use of cloud services that are effective for e-Government is actually restricted. In response to this, consideration from the perspective of infrastructure development in addition to the perspective of law is important when it is discussed about the cooperation from the development partners.

ICT Infrastructure

In addition to the server problems mentioned above, there were calls for assistance with communication infrastructure vulnerabilities (especially the development of fiber optic networks and 4G networks in rural areas). However, MoDT has already set out the development within two years, and requested financial support within one to two years.

Human Resources

There was room to improve knowledge about the DX at national level and smart cities, and there were expectations for the knowledge of Japan, which is working on this in advance. A scheme for dispatching experts from Japan is conceivable, but providing opportunities to exchange information on the respective efforts of Japan and Ukraine can be an interesting initiative from the perspective of the development of both Ukraine and Japan.

Solution

As outlined in the previous section, Online Voting, E-police (police system), etc. will be tackled in the future. Therefore, it is necessary to find out specific support needs by conducting an in-depth survey on this in the future. In addition, when asked about expectations regarding individual fields in an interview survey, there were comments such as the Information Operation Center (a platform that visualizes and analyzes city information collectively) and automation of water quality inspection. For these as well, further investigation is required for the specific background and scrutinize the support menu.

4.8 Summary

This chapter gives an overview of e-Government efforts in Ukraine. It has a history of working on e-Government in the form of Trembita and Prozzoro with the cooperation of donors from Europe and elsewhere. It was President Zelensky, who advocated "a state in a smartphone," and MoDT, who was in charge of the practice, that made these efforts directly benefit the people through a tool called Diia. Moreover, large-scale systems other than Diia have been introduced, such as the introduction of a personal authentication system by IEIS. On the other hand, because issues remain mainly in terms of infrastructure and human resources, active support from development partners including Japan is desired. In addition, digitization are flourishing at the city level, and characteristic efforts were seen in some cities. Because smart city initiatives are also active in Japan, there is a possibility of support here as well.

5 e-Health

This chapter first overview the health status of the people and the current situation of the health systems, as well as the trends of support by the development partners, followed by Ukraine's health reform, how it is planned to respond to the challenges of the health status and health systems to attain its ultimate goal of Universal Health Coverage (UHC). eHealth system, which is designed as the stand bone of the reform is also explained in detail, including the challenges. Finally, the potential cooperation for the Ukraine's eHealth system development by the Japanese ODA as well as The Japanese businesses is discussed in considering the lessons from the digitally advanced countries such as Japan, Finland, Estonia and Denmark.

5.1 Overview of the health sector

5.1.1 Health status

5.1.1.1 Major indicators

The major health indicators of Ukraine are summarized in Table 5-1. Compared to the average of EU and Central Asia (excluding high-income countries), male life expectancy is lower and doesn't reach 70 years old. Among other indicators, maternal mortality ratio and infant and child mortality rates are generally better than those of the neighboring countries. While the prevalence of a few infectious diseases such as tuberculosis is still relatively high, most infectious diseases no longer seem to be the main causes of death in Ukraine. Rather, more than 90% of deaths are attributed to Non-Communicable Diseases (NCDs), particularly ischemic heart disease (IHD) and stroke. Also, it should be noted that out-of-pocket expenditure on health is more than 50% which is quite higher in comparison with the average of EU and central Asian countries excluding high income countries.

Table 5-1 Major health indicators of Ukraine (in comparison with EU and Central Asia)

Category	Name of indicator	Year	Ukraine	Average of EU and Central Asia (exclude high income countries)
Basic information	Life expectancy at birth (years)	2017	Total：71.78 Male：67.02 Female：76.78	Total：73.40
	Mortality rate, under-5 (per 1,000 live births)	2018	8.7	12.72
	Mortality rate, infant (per 1,000 live births)	2018	7.5	11.1
	Maternal mortality ratio (modeled estimate, per 100,000 live births)	2017	19	19
	Mortality rate, neonatal (per 1,000 live births)	2018	5.2	6.5
Cause of death	Cause of death, by communicable diseases and maternal, prenatal and nutrition conditions (% of total)	2016	4.1%	4.9%
	Cause of death, by non-communicable diseases (% of total)	2016	91%	88.6%
	Cause of death, by injury (% of total)	2016	5%	6.4%
Healthcare environment	Hospital beds (per 1,000 people)	2013	8.8	6.4
	Specialist surgical workforce (per 100,000 population)	2014	86.55	64.37（2015）
	Physicians (per 1,000 people)	2014	3.0	3.0 (2015)
	Nurses and midwives (per 1,000 people)	2014	7.1	7.0 (2015)
Infectious diseases	Prevalence of HIV, total (% of population ages 15-49)	2018	1%	N/A
	Incidence of tuberculosis (per 100,000 people)	2018	80	51
Non-communicable diseases	Mortality from CVD, cancer, diabetes or CRD between exact ages 30 and 70 (%)	2016	Total: 24.7% Male: 35.1% Female: 16.2%	Total: 15.5% Male: 31.8% Female: 15.5%
	Smoking prevalence (% of adults)	2016	Total: 28.9% Male: 47.4% Female: 13.5%	Total: 30.9% Male: 47.4% Female: 16.6%
	Total alcohol consumption per capita (liters of pure alcohol, projected estimates, female 15+ years of age)	2016	Total: 8.6L Male: 14.1L Female: 4L	Total: 8.2L Male: 13.2L Female: 3.6L
Others	Mortality caused by road traffic injury (per 100,000 people)	2016	13.7	14.5
	Suicide mortality rate (per 100,000 population)	2016	Total: 13.7 Male: 41.1 Female: 6.3	Total: 18.6 Male: 32.0 Female: 6.3
	Out-of-pocket expenditure (% of current health expenditure)	2016	54.34%	35.9%
	UHC service coverage index	2017	68	72

Source: developed by the survey team based on World Bank's World Development Indicators

5.1.1.2 Disease structure

As partly described in the previous section, the main causes of death have already shifted from infectious diseases to NCDs in Ukraine. As shown in the Figure 5-1, the leading cause of death is IHD (44.9%), followed by stroke (12.7%), Alzheimer's (5.1%), cirrhosis (2.9%), and cardiomyopathy and myocarditis (2.3%). In the WHO's latest report, the main reasons for the disease burden are linked to behavioral risks and metabolic factors, for example, tobacco, alcohol use, unhealthy diet, physical inactivity, and mental health conditions[222].

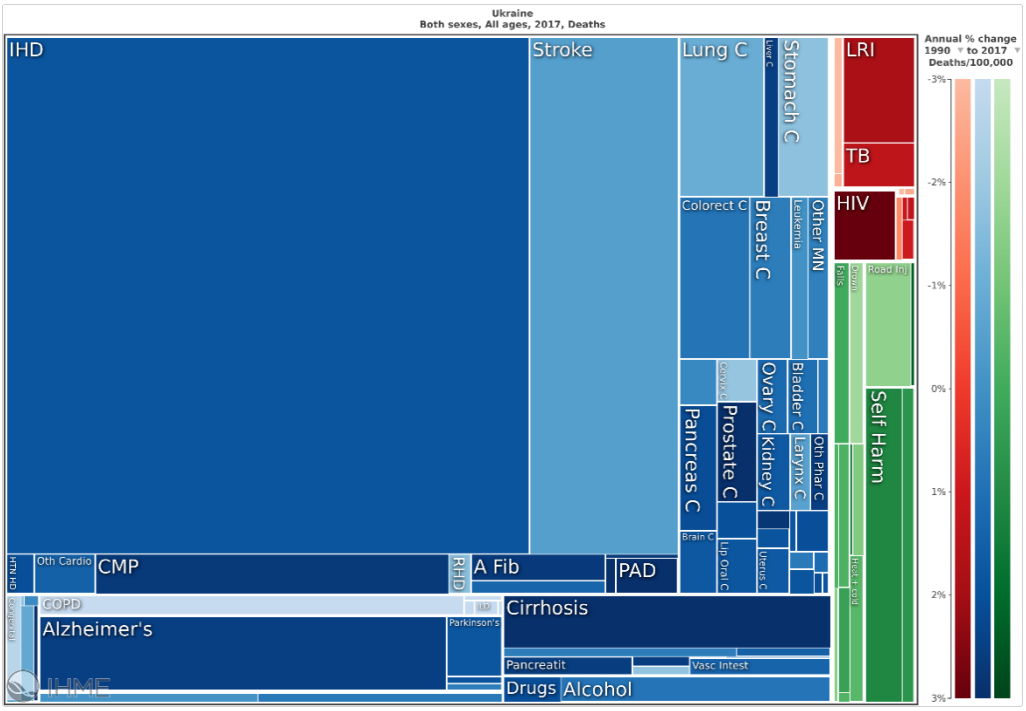

Figure 5-1 Causes of Death in Ukraine (2017)

Source: IHME, GBD Compare Website

Also, some infectious diseases have been an challenge while they are not the main causes of death. Since 2017, the epidemic of measles has been lingering (1,209.25 persons per million as of March 2019)[223]. Mainly the patients are 20 years old or younger and 62% of the reported cases were not vaccinated[224].

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[222] WHO Regional Office for Europe (2020) *Tackling noncommunicable disease in Ukraine 2015-2019*, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0009/425763/Tackling-noncommunicable-diseases-in-Ukraine-2015-2019.pdf (accessed 5 October 2020).

[223] WHO (2019) *WHO EpiBrief No.1/2019*, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0013/400252/EpiBrief_1_2019_EN.pdf?ua=1 (accessed 5 October 2020).

[224] WHO (2019) *Measles and rubella elimination country profile: Ukraine*, Copenhagen: WHO Regional Office for Europe.

5.1.1.3 Covid-19 situation and response

In Ukraine, the first case of COVID-19 was reported on 3 March 2020. The number of new cases and deaths have peaked twice, in November 2020 and March 2021, and as of 14 September 2021, 2,317,824 cumulative new cases and 54,360 cumulative deaths were reported (see Figure 5-2). There is no ban on entry to Ukraine for foreign citizens. Some economic and social activities like going to cafes, events, and educational institutions continue to be restricted[225]. The global pandemic of COVID-19 heavily impacted the Ukrainian economy. According to the UN study, "84% of households have lost income and 43% have at least one family member who has lost a job" due to lockdown and socio-economic restrictions[226].

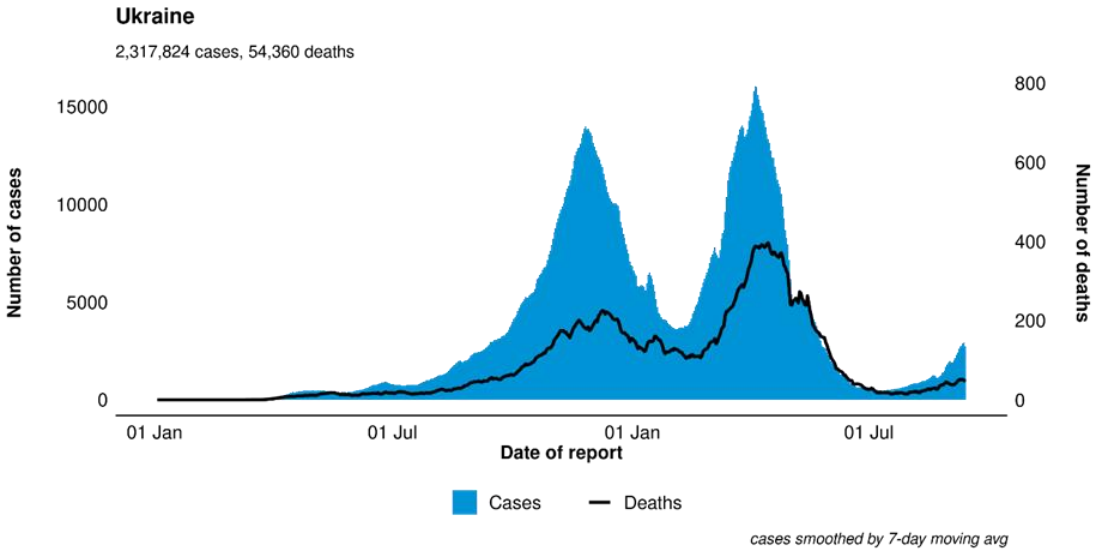

Figure 5-2 New cases and deaths of COVID-19 in Ukraine (as of 14 September 2021)

Source: WHO COVID-19 Situation dashboard

5.1.2 Health systems

5.1.2.1 Governance

Article 49 of the Constitution of Ukraine ensures the people's right to health protection, medical care, and medical insurance and states that health protection and medical and sanitary services should be accessible

Available at https://www.euro.who.int/__data/assets/pdf_file/0016/401227/UKR.pdf?ua=1 (accessed 5 October 2020).

[225] Cavinet of Ministers of Ukraine, COVID-19 pandemic in Ukraine website, available at https://covid19.gov.ua/en (accessed on 14 September 2021).

[226] UNDP (2020) 'UN study documents devastating impact of COVID-19 in Ukraine,' *UNDP website*, available at https://www.undp.org/content/undp/en/home/news-centre/news/2020/UN_study_documents_impact_COVID19_in_Ukraine.html (accessed on 5 October 2020).

to all citizens[227]. However, in the reality, “Semashko model (medical system in the former Soviet Union)”-oriented medical system in the country was often characterized as inefficient service delivery. It is also criticized for its biased and minimal prevention of acute illness, poor public health, and lack of ability to cope with NCDs disease burden which is becoming more and more serious in Ukraine[228].

In such circumstances, the Ukrainian government has been working for healthcare reform. in 2014, MOH has formed a Health Strategy Advisory Group and developed the "National Health Reform Strategy for Ukraine 2015-2020." The government is implementing the reform based on the action plan, mainly in service delivery, health financing, governance, and health system strengthening. Within this context, eHealth has become a part of the health reform's foundation, whose main objective is to increase efficiency, transparency, and convenience. More specifically, this strategy plans a comprehensive approach that includes ePrescription, eConsultation, preventive monitoring, and chronic disease management. With financial and technical support from the World Bank, USAID, and other development partners[228], MOH, NHSU and the state-owned enterprise “Electronic Health” are the primary agencies driving these eHealth initiatives.

Some progress has already been made in setting up rules to regulate the eHealth system and registering medical personnel and health care facilities in a central database. On the other hand, there are also challenges in authentication systems, confidentiality rules, classification of healthcare organizations, ensuring the security of data storage, and developing business models that involve the private sector.[229]

Concerning the recent situation, in response to the spread of COVID-19, the Government of Ukraine formulated and announced a medium-term plan "Program of Action of the Cabinet of Ministers of Ukraine[230]" in September 2020. As with previous policies, the program promotes the digitization of public services and defines the following three priority areas for the medical and health sector: 1) health care system reform, 2) public health, and 3) specialized health care. The program also promotes eHealth in health care system reform, and the implementation of electronic medical records is specified as an expected result and indicator.

5.1.2.2 Health financing

One characteristic of health financing in Ukraine is low public expenditure and thus the dependency on

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[227] Official transcript of the Constitution of Ukraine at the government portal, available at https://www.kmu.gov.ua/storage/app/imported_content/document/110977042/Constitution_eng.doc (accessed 16 November 2020).

[228] Ministry of Health of Ukraine (2014) National Health Reform Strategy for Ukraine 2015-2020. Available at https://en.moz.gov.ua/strategy (accessed on 19 November 2020).

[229] available at https://itukraine.org.ua/en/ehealth-project-when-will-medical-paper-cards-becom-history.html

[230] Programme of Action of the Cabinet of Ministers of Ukraine, Cabinet of Ministers of Ukraine

out-of-pocket (OOP) payments despite that public health services defined in the essential health package are provided to residents at free of charges if they visit institutions of their residence. Goroshko et al (2018) explained 93% of all households paid for their health care in 2015. This is because Ukraine's public spending on health is lower than in other countries in the WHO European Region. In 2018, its health spending was 8.9% of the total government spending[231], making it one of the lowest shares of public health spending in GDP in Europe[232]. Therefore, approximately 55% of health spending comes from OOP payments[233]. While the health reform which is explained later has contributed to reduce the OOP payments at the primary level with family doctors, the patients continue to pay at the secondary and tertiary levels (hospitals) because these facilities are paid only for certain NHSU packages and therefore hospitals began to cut services that are not included in the packages, which results in the inaccessibility of specialized patient care and the increase of the OOP payments.

While the Government has restarted discussions on ways to better fund health, there is a pessimism in times of macro-fiscal turmoil[234]. The funding required to ensure the appropriate level of capacity of the eHealth system is also far from sufficient.

This structure of health financing -- low public health spending and high OOP payments -- has made healthcare services accessible only for residents who can afford to pay for them. The proportion of households that fell into poverty in health services increased from 7.6% in 2013 (about 1.3 million) to 9.0% in 2015.[232] While basically, the most common OOP payments at the facility level are medical examinations and laboratory analysis (blood tests, urine test, etc.)[235], The medicines and inpatient care are the payments that account for the large percentage of catastrophic OOP payments, 54.34% ("catastrophic" is defined as spending more than 40% of one's payment capacity for healthcare).

Another characteristic is the rigid and input-based budget allocation. In Ukraine, public health budgets had

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[231] WHO Global Health Expenditure Database, Health Expenditure Profile: Ukraine (2018). Available at https://apps.who.int/nha/database/country_profile/Index/en (accessed on 12 February 2021).

[232] Goroshko, A., Shapoval, N. and Lai, T. (2018) *Can people afford to pay for healthcare? New evidence on financial protection in Ukraine*, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/en/countries/ukraine/publications/can-people-afford-to-pay-for-health-care-new-evidence-on-financial-protection-in-ukraine-2018 (accessed on 18 November 2020).

[233] Orange Health Consultants (2018) *Health Care in Ukraine*, Hague: Netherlands Enterprise Agency. Available at https://www.rvo.nl/sites/default/files/2019/03/Health-Care-in-Ukraine.pdf (accessed on 18 November 2020).

[234] WHO (2020) *Budgetary Space for Health in Ukraine – Policy document to support budget preparation dialogue for 2021.* Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0007/463327/UKR-Budgetary-space-for-health.pdf (accessed on 30 January 2021)

[235] World Bank (2018) *Tracking the Health Resources in Ukraine*. Washington DC: World Bank. Available at https://openknowledge.worldbank.org/bitstream/handle/10986/30182/ACS21387-WP-PUBLIC-TrackingtheHealthResourcesinUkraineReport.pdf?sequence=1&isAllowed=y (accessed on 18 November 2020).

been allocated based on the population size of administrative units and some other coefficients such as regionality (rural/urban) and structure of the population (age, gender, etc.). The traditional allocation system was input-based to support existing infrastructure and personnel. This means that regardless of the type and volume of services provided, comparable budgets are allocated to facilities of the same size and level. However, it should be noted that budget allocations to Oblast, Rayon, and Municipality are approved 1-2 months after the beginning of the fiscal year (January) and thus interfere with the operation of the facility. Also, health spending is more concentrated in hospitals (64%) than in PHCs (10%) which provide low-cost preventive care[235].

Despite the weak financial base in the health system by the public sector, not many people buy health insurance. Voluntary Health Insurance (VHI)[232][236]

5.1.2.3 Health personnel

As shown in Table 5-1 Major health indicators of Ukraine (in comparison with EU and Central Asia), the number of health personnel such as physicians and nurses in Ukraine is not so small compared to the other European countries. The challenge in the health workforce in this country is more about the quality and corresponding system.

Currently, salary of health personnel is very low, and this affects their productivity and morals, leading to homework and bribery. Specialists are more prestigious and have higher incomes than general practitioners, but workload is concentrated on specialists partly because many patients skip PHCs and directly visit specialists. In the absence of an electronic medical record system, several physicians may diagnose and prescribe the same patient (Same illnesses episodes)[235]. While trainings are available, ICT literacy of the people is generally not strong enough to master eHealth system so far.

There are 20 higher education institutions, 4 medical faculties in universities, 3 Academies of postgraduate education, and 130 medical colleges as health personnel development institutions in Ukraine[233]. However, in fact, medical education has traditionally been one of the most corrupting areas in Ukrainian healthcare, since it opened the way to equally corrupt medical practices, which is why ensuring a sound academic background is one of key prerequisites for healthcare transformation. The current healthcare reform envisages requiring high passing grades for External Independent Testing and more rigorous graduation exams for medical specialties[236].

In addition, there is a possibility that the quantity of health personnel could be a challenge in near future. According to the statistics of the MOH, the medical personnel is aging – 24.5% of total number of doctors

[236] WHO (2019) *Ukraine: Review of Health Financing Reforms 2016-2019*. Copenhagen: WHO for Europe. Available at https://www.euro.who.int/en/countries/ukraine/publications/ukraine-review-of-health-financing-reforms-2016-2019.-summary (accessed 18 November 2020).

is in retirement age[237]. On the other hand, the low salary makes it difficult to employ young people in health sector as they avoid the sector or migrate to other countries[233].

It should also be noted that the health care policy planning capacity and efficiency is not satisfactorily enhanced by implementation of current eHealth system because the policymakers cannot use anonymized and/or aggregated health data to assess trends in population health so as to devise effective and cost-efficient policy interventions to improve health outcomes. On micro level, eHealth System does not facilitate the authorities to undertake medical efficiency and cost-benefit analyses to extend and modify the set of publicly guaranteed health care services and medicinal products.

5.1.2.4 Health information

All reporting and statistical data of the health care system and performance under the MOH are collected through Regional offices of CMS of the MOH. CMS was established by the order of the MOH in 1992. It is the main institution that coordinates the activities of territorial information and analytical centers of medical statistics and treatment and prevention facilities for the collection, processing, and analysis of statistical information[238] .

The main tasks of CMS are:

- Centralized collection, processing, and analysis of statistical information on health status, provision of medical care to the population, health care resources and their use.
- Development and implementation of statistical methodology based on research results, international standards and recommendations.
- Ensuring the reliability, objectivity, efficiency and integrity of statistical information, its adequacy to the task of reforming the industry.

Also, NHSU has published a data analysis and live management dashboard on its website. In July 2019, providers were able to use the International Classification of Primary Care (2nd edition) to enter more information about each practice[236].

Toward more comprehensive and sophisticated management of health information, e-Health system has been introduced in a very tight timeframe. The details of the implementation are described in 5.2.5.

5.1.2.5 Logistics

Introduction of e-procurement system “Prozorro“ in 2016 was one of the novel changes in recent medical procurement. It opened up the public procurement market for pharmaceuticals and medical devices, where previously only a few suppliers were allowed, and encouraged participation of new suppliers including

[237] Data provided by eGA (under confirmation of primary sources).

[238] CMS website, http://medstat.gov.ua/ukr/at.html (accessed on 19 November 2020).

foreign companies. The impact of Prozorro was described in the Lancet that both public access to healthcare services and fiscal consolidation of the country were achieved[239].

While the benefit of Prozorro are recognized, concerns have been reported at the same time: product quality cannot be controlled because of price competition; dubious companies are also available because most companies can participate in procurement; some suppliers require delivery that meets certain conditions depending on the drug but do not comply; and suppliers are reluctant to participate because of transaction costs for small facilities[235].

Further, there are still challenges in the logistics of healthcare services. Provision of pharmaceutical products from central to local health facilities is unpredictable and affects service delivery. Poor planning leads to inefficient drug budgeting, delays in execution, and non-priority delivery. In addition, there are frequent shortages of essential drugs at medical institutions. Medical supplies and equipment are better deployed at primary health care (PHC) levels than at higher levels. The vaccine shortage in polyclinics was serious until the launch in autumn 2016[235].

Apart from the direct logistics challenges, approval and registration of pharmaceutical products and medical devices are also the important factors for the unpredictable provision at the facility level. In Ukraine, state registration of the medicinal product is carried out by the MOH through expert evaluation of the quality, safety and efficacy of the medicinal product. Expert evaluation is conducted by the State Enterprise "State Expert Center of the Ministry of Health of Ukraine". Both a resident and a non-resident of Ukraine (e.g. the manufacturer himself) may act as an Applicant.

Regarding medical devices, State Administration on Medicines and Drugs Control of Ukraine controls the circulation and/or the operation. Medical devices are allowed for use in Ukraine only after conducting the procedure of conformity assessment. The requirements are based on the relevant EU Directives.

5.1.2.6 Service delivery

The health service system in Ukraine consists of three levels: central, province, and local. Services provided at each level and corresponding medical institutions are illustrated in Figure 5-3.

[239] The Lancet (2018) 'Measles, war, and health-care reforms in Ukraine', *the Lancet*, Vol.392, p.711. Available at https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)31984-6/fulltext (accessed on 19 November 2020).

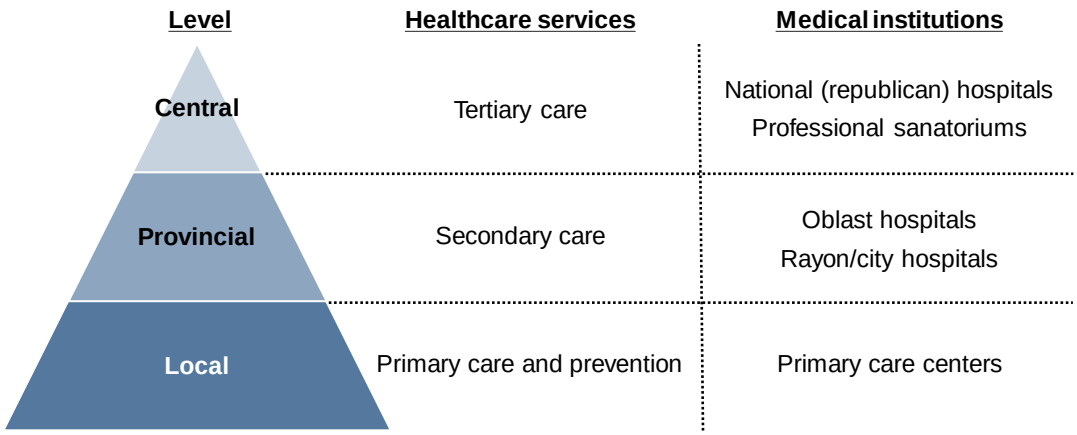

Figure 5-3 Levels of healthcare system in Ukraine

Source: developed by survey team

Table 5-2 The number of health care institutions and health care performance indicators in Ukraine as of April 2020

	Name of indicators	Value
Facilities	Regional hospitals	25
	City hospitals	283
	Specialized hospitals	98
	Children's city hospitals	49
	Central District hospitals	436
	District hospitals	9
	Psychiatric, narcological	63
	Maternity hospitals	71
	Dispensaries	157
	Total number of beds	270,727
	Provision for 10,000 population	64.9
	Average length of stay	10.6
	Hospitalization per 100 inhabitants	18.9
	Number of institutions that provide out-patient care (polyclinic)	2,680
	Number of visits per 1 inhabitant	7.6
Doctors	Total number of doctors (without dentists)	154,265
	Provision for 10,000 population	37.0
	Working under MoH / other ministries / private clinics	85% / 5% / 10%
Nurses	Total number of nursing staff	296,054
	Provision for 10,000 population	70.9

Source: composed by eGA based on the data retrieved from the website: http://medstat.gov.ua/ukr/statdan.html

The change of number of health facilities and health personnel in Ukraine is illustrated in Figure 5-4 and Figure 5-5. At institutional level, while medical institutions which basically support inpatient care are decreasing, capacity of outpatient care is increasing in the last 30 years. It is because Ukraine has traditionally had very high number of hospital beds as a legacy from Semashko/Soviet health care system. The average length of stay (ALOS) in hospital used to be higher compared to countries with more advanced health care system. Therefore, there is a need to increase out-patient services to increase efficiency of the system. Consequently, the number of hospital beds and ALOS are decreasing. Another factor of increase of the number of out-patient clinics is the increase of private out-patient care providers. Looking at health personnel side, the number of doctors experienced a slight decrease but almost stable. The number of paramedical staff both total number and per 10,000 population, continues to decrease.

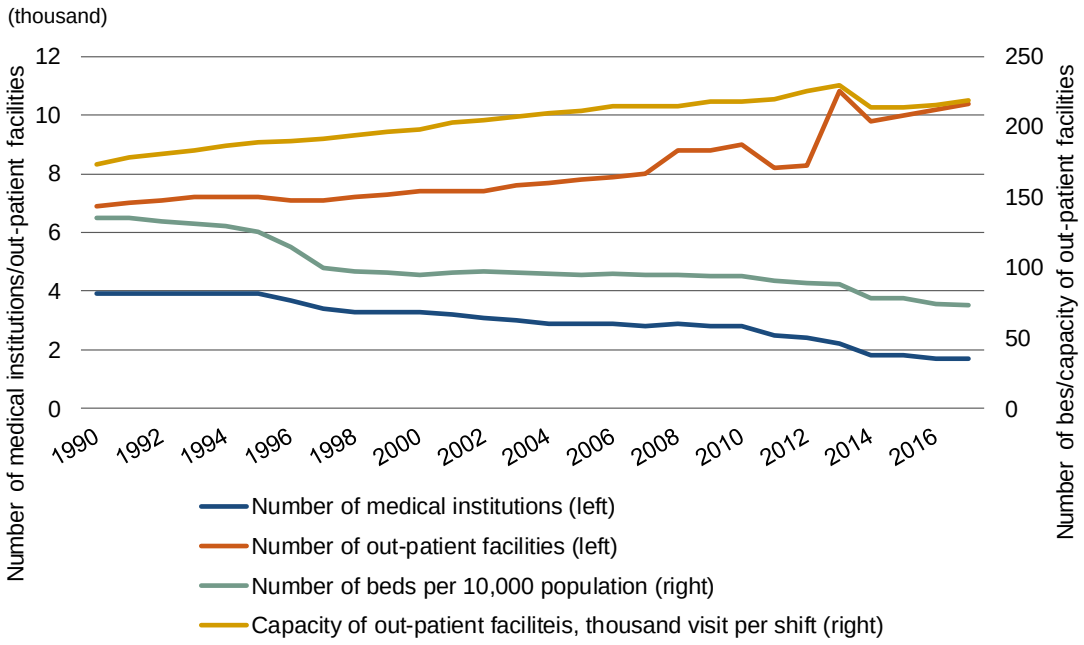

Figure 5-4 Number of medical institutions/out-patient facilities in Ukraine (1990-2017)[240]

Source: data provided by eGA (under confirmation of primary source)

[240] Data excludes the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and temporarily occupied territories in the Donetsk and Luhansk regions.

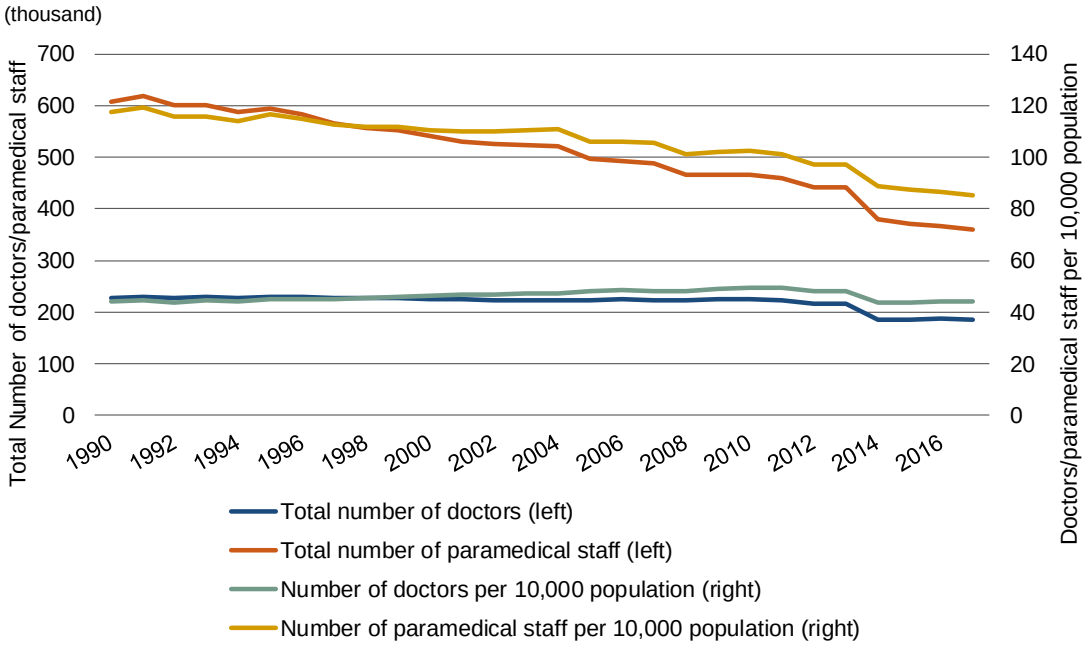

Figure 5-5 Number of doctors/paramedical staff in Ukraine (1990-2017)[241]

Source: data provided by eGA (under confirmation of primary source)

Public health services are provided to residents at free of charges if they visit institutions of their residence. If they visit institutions outside of their own residence, they need to pay for the services. The scope of the essential health package is not clearly defined but the working group composed of the specialists recommended the list of services in the package of NHSU.[242]

Outpatient services are available at PHCs, polyclinics, and dental clinics. There is a formal referral system, but there are people who pay informally and refer them directly to a specialist[243] (if you have a chronic illness, you can go directly to a dental, obstetric, pediatric, or other specialty department). One problem is that although medicines for outpatients are not explicitly excluded from the benefit package, 99% of spending on medicines is through OOP payments. There are regulations concerning the dispensing of medicines, but they can be purchased without a prescription[232].

Regarding inpatient care, in the 2016 survey, one third of the people who needed to be hospitalized were not hospitalized because they could not afford to pay for it. 40% of them were 60 years of age or older[232].

As shown in Table 5-1, the number of beds is not small in Ukraine compared to other European countries. Yet, to justify the overcapacity of the beds, hospitalization rates and average length of stay are higher than

[241] Data exclude the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and temporarily occupied territories in the Donetsk and Luhansk regions. Also, total number of doctors after 2008 excludes dentist.

[242] NHSU brochure https://nszu.gov.ua/storage/editor/files/pmg-booklet-2303.pdf

[243] This is based on the informal hearing from health care specialists and patients by eGA.

those countries[233]. This strange situation could tell the inefficient and unbalanced provision of healthcare resources which are allocated by input-base.

Regarding computerization of healthcare facilities, those that have met the expected level of computerization remains about 60%. According to the standard requirements of the NHSU, the minimum need of a health care institution to be equipped with computers is equal to the number of jobs, plus at least 1 computer in each department, admissions office, registry and statistics office. According to the standard requirements of the National Health Insurance Fund, the minimum need of a health care institution to be equipped with computers is equal to the number of jobs, plus at least 1 computer in each department, admissions office, registry and statistics office.

As standard requirements by NHSU, health institutions need to equip computers equal to the number of jobs, plus at least one computer in each unit, emergency department, and in the front office of statistics[244]. Not only to meet the NHSU requirement, the feedback from Health IT association proposes that there is a need of planning ICT infrastructure in hospitals that takes into account the development and specialization of the whole institution. It is important to develop a technical audit of existing equipment, based on the structure of the hospital.

5.1.2.7 Private sector

Private healthcare facilities account for 8-10% of the total healthcare facilities including public ones[233]. In 2018, Ukraine provided medical services in the private sector in the amount of UAH 21.8 billion (USD 763 billion). As of the beginning of 2019, 10% of doctors and 4% of nurses worked in private structures. The share of doctors and nurses staff working in private structures is gradually increasing due to the reduction of the share of medical staff in the health care institutions that are under the management of MoH and other agencies[245].

At the end of 2018, dentists and dermatovenereologists were more often involved in the private sector than other specialists: the share of dentists in private health care institutions was 31.5%, the share of dermatovenereologists was 17.1%. In 2014–2018, the share of physicians working in private entities increased among all categories of physicians. During this period, the average annual growth rate of share of doctors working in the private sector was +26.4% among family doctors, +22.3% among pediatricians, +20.9% among oncologists, +15.7% among surgeons, +12.8% among psychiatrists, 12.3% among obstetricians-gynecologists, +11% among dermatologists, +10.8% among therapists and +7.1% among dentists[245].

Most doctors and nurses work in institutions that belong to the sphere of management of the MoH or other

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[244] Euro.med website: https://euromd.com.ua/1-novyny/post-8322-stan_computerization/

[245] Data provided by eGA (under confirmation of primary source)

ministries and departments. Only one tenth of doctors (mostly dentists and dermatovenereologists) and 4% of nurses work in private structures as their main place of work.

In the market for private medical services, the following features can be distinguished. In contrast to the public sector, there is competition between the participants in the private medical services market, which stimulates them to constantly improve the efficiency of their work, improve the quality of services provided by attracting highly qualified personnel, and purchasing new equipment. Today, there are a number of doctors who are employed in both the public sector and the private sector or are moving to private clinics fully, as they offer higher salaries. Another trend in the private medical services market is the consolidation of market players by expanding the profile and format of the institution, as well as developing a network of medical centers. Reliable figures about the total number of private health care providers and their beds are not found. However, the information about private health care in Ukraine shown below is relevant.

Table 5-3 Distribution of private and public clinics by departments of inpatient care in large cities in 2018

	Public		Private	
	In-Patient	Out-patient	In-Patient	Out-patient
Kyiv	24	102	19	355
Dnepr	6	24	9	56
Odessa	8	28	8	41
Kharkiv	13	55	10	83
Lviv	10	60	9	44

Source: Composed by eGA based on the internet search, including: http://medstat.gov.ua/ukr/main.html

5.1.3 Trends of support by development partners

5.1.3.1 Major development partners

Major development partners to Ukraine include the EU Institute, Germany, the United States, Poland, and Global Fund (see Figure 5-6). Assistance for health and population is around 4.66% of the total to Ukraine, which is the 6th component of the total bilateral ODA (see Figure 5-7). The largest component is the other social infrastructure and services such as social protection and culture and recreation, etc.

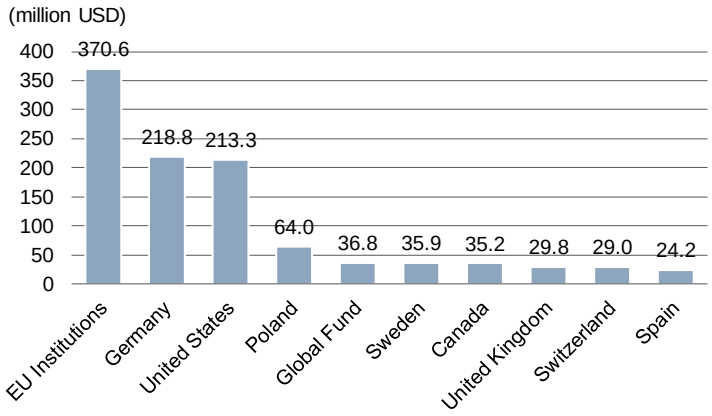

Figure 5-6 Top 10 Development Partners of Gross ODA for Ukraine, 2017-2018 average

Source: developed by the survey team based on OECD statistics

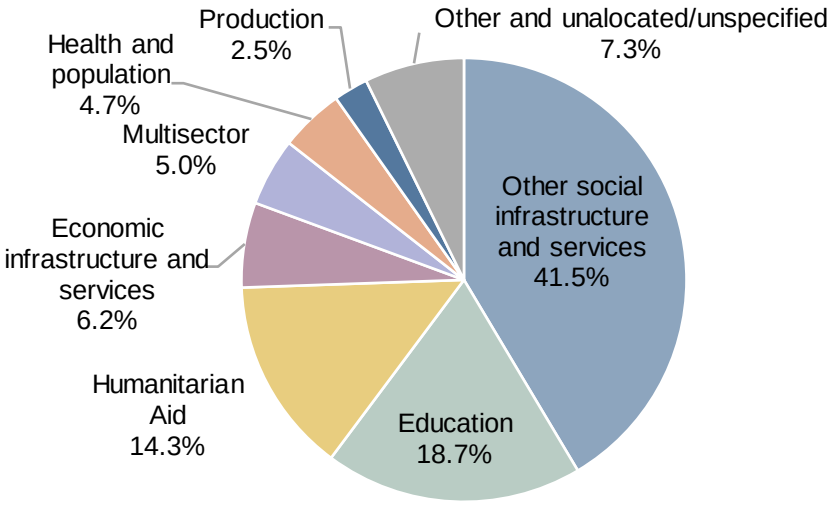

Figure 5-7 Bilateral ODA by sectors for Ukraine 2017-2018 average

Source: developed by the survey team based on OECD statistics

5.1.3.2 Major development partners in health sector

In the heath sector, major development partners are the Global Fund (specializing in infectious diseases only), the United States (focusing on sexually transmitted diseases and human resources development), Switzerland (heath policy, basic education, health education, etc.) and Japan focusing on medical services and basic health infrastructure. Table 5-4 shows the size of assistance by sub-sectors. Highlighted cells indicate that the volume is relatively larger than others.

Table 5-4 Breakdown of ODA in the health sector by development partners in 2018

(million USD)

	Health policy and administrative management	Medical education /training	Medical research	Medical services	Basic health care	Basic health infrastructure	Basic nutrition	Infectious disease control	Health education
Australia	0	0	0	54,509	0	0	0	0	0
Austria	0	0	0	111	0	26,641	0	0	0
Canada	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	23,010	42,798	0	0	0
Finland	0	0	0	0	0	0	0	0	0
France	0	2,759	0	0	334,002	0	0	0	0
Germany	0	70,458	0	19,056	5,826	522,876	83,796	83,796	0
Greece	0	0	0	0	0	0	0	0	0
Hungary	0	22,204	0	79,564	0	11,612	895,284	895,284	0
Ireland	0	0	0	0	0	0	0	0	0
Italy	3,563	14,251	0	4,131	0	0	0	0	0
Japan	15,584	0	0	500,000	0	556,695	0	0	0
Korea	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Norway	424,104	0	0	0	0	0	0	0	0
Poland	0	1,381	0	0	0	17,703	0	0	0
Slovak Republic	0	0	0	0	29,510	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0
Spain	0	0	0	0	0	0	0	0	0
Sweden	0	0	44,014	0	0	0	0	0	0
Switzerland	4,361,386	0	0	1,234,022	354,331	590,551	3,579,098	0	3,579,098
United Kingdom	0	0	0	0	0	0	0	0	0
United States	790,490	0	0	0	328,070	516,800	0	0	0
UNAIDS	0	0	0	0	0	0	0	0	0
UNDP	0	0	0	0	0	0	0	0	0
UNFPA	0	0	0	0	0	0	0	0	0
UNICEF	308,790	0	0	0	73	0	0	0	0
WHO	721,846	0	49,888	494,727	2,036	0	0	30,678	0
Gavi	0	0	0	0	0	0	0	0	0
Global Fund	0	0	0	0	0	0	0	41,046,918	0
Australia	0	0	0	0	0	0	0	0	0
Austria	0	0	5,311	0	0	0	0	35,407	0
Canada	0	0	0	0	0	0	0	0	0
Czech Republic	0	0	0	0	0	0	0	0	0
Finland	0	0	0	0	0	0	0	0	0
France	0	0	0	0	0	0	0	41,308	0
Germany	0	0	0	0	0	0	0	0	0
Greece	0	0	0	0	0	0	0	0	0
Hungary	0	0	0	0	0	0	0	0	0
Ireland	0	0	0	0	0	0	0	0	0
Italy	0	0	0	0	0	0	0	0	0
Japan	0	0	0	0	0	0	0	0	0
Korea	0	0	0	0	0	0	0	0	0
Luxembourg	0	0	0	0	0	0	0	0	0
Norway	0	0	0	0	0	0	0	0	0
Poland	0	247,827	0	0	0	0	0	20,768	0
Slovak Republic	0	0	0	0	0	0	0	0	0
Slovenia	0	0	0	0	0	0	0	0	0
Spain	0	0	0	826	0	0	0	0	0
Sweden	0	0	0	0	0	0	0	0	0
Switzerland	236,220	0	0	3,068	0	0	0	0	0
United Kingdom	0	0	0	0	0	0	0	0	0
United States	5,450,000	0	0	0	0	0	0	18,671,400	0
UNAIDS	0	0	0	0	0	0	0	136,376	0
UNDP	0	0	0	0	0	0	0	0	0
UNFPA	0	0	0	0	0	0	0	0	0
UNICEF	0	0	0	0	0	9,031	0	184,212	0
WHO	2,647	376	0	0	0	4,254	0	0	0
Gavi	0	0	0	0	0	0	0	0	0
Global Fund	0	0	0	0	0	0	0	0	0

Source: developed by the survey team based on OECD Statistics

5.1.3.3 Support by development partners in eHealth

The characteristics of the major development partners in the health sector of Ukraine are as follows.

Canada

Canadian government has been supporting Ukraine's eHealth development in its SURGe Projects (2019-2024) focusing on financing the salary of SE Electronic Health staff and purchase of software modules[246]. In February 2018, the government of Ontario and Ukraine signed a Memorandum of Understanding on cooperation in the healthcare sector. The cooperation focuses on telehealth and telemedicine, disease prevention and control, emergency care, mental health and addictions, education of health care professionals, and rural medicine and health care delivery[247]. However, the cooperation has not been materialized because the final accord from the Ukrainian Government was not attained[248].

DFID[249] (UK)

As a part of Good Governance Fund, it has invested in the health reform program with USAID (the implementing entity is Deloitte). DFID also supports the reconstruction of health and sanitation infrastructure and the provision of medical supplies in the conflict-affected areas in the eastern region[250].

EU

EU supports Ukraine in developing a modern public health system with 3 million Euro (implemented mainly by a German consulting company). Specific initiatives include strengthening the functions of the public health centers and building a safe blood management system in the country[251].

GIZ (Germany)

GIZ had also been involved in supporting the construction of Prozorro, a public procurement system. Currently, they are implementing a project to improve access to health services for eastern Ukraine until 2022[252].

Global Fund

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246 Interview with the Canadian embassy on 7 December 2020.

247 Ontario MOH website, available at http://health.gov.on.ca/en/news/bulletin/2018/hb_20180209.aspx (accessed on 8 October 2020).

248 Interview with the Canadian embassy on 7 December 2020.

249 Current Commonwealth & Development Office (FCDO)

250 DFID website, available at https://www.gov.uk/government/news/uk-programme-assistance-to-2019-2020 (accessed on 6 October 2020).

251 EU website, available at https://eeas.europa.eu/delegations/ukraine/66050/support-ukraine-developing-modern-public-health-system_en (accessed on 6 October 2020).

252 GIZ website, available at https://www.giz.de/en/worldwide/82081.html (accessed on 6 October 2020).

It is highlighted that the significant improvement in HIV/TB diagnostic kits and drug procurement through anticorruption interventions by its past implementation[253]. Currently, three funding projects are active with a total of 130 million USD[254]. These are designed to improve access to diagnosis and treatment to reduce the burden of TB/HIV and to scale up the scale of evidence-based HIV interventions.

International Renaissance Foundation

Though it's not a foreign development partner but a domestic private charity organization, this foundation also promotes efforts for democratization mainly in health policy. For instance, accountability of public health expenditures, anti-corruption measures in the health sector (public procurement reform), etc.[255].

SADC (Switzerland)

According to the strategy 2020-2023[256], 13.6 million CHF (1.5 billion JPY), approximately 13% of its total assistance to Ukraine, will be supported in the health sector. Major programs include strengthening primary healthcare system with a focus on disease prevention, health promotion and improving environment for the prevention of NCDs and healthy lifestyle.

UNDP

Reforming the pharmaceutical procurement process with Crown Agents is a major initiative as an administrative reform. In addition, the Ministry of Health is supporting the mainstreaming gender perspectives in procurement[257].

UNICEF

There is a strong awareness of challenges especially in the high percentage of out-of-pocket expenditures for health services, the high burden of HIV/TB diseases, and the lack of immunization coverage. It places particular emphasis on maternal and child health (especially immunization and nutrition), HIV, and health

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253 The Global Fund (2017) *Accelerating Ukraine's progress towards sustainable public health response to TB and HIV: Summary Information*. Geneva: the Global Fund. Available at https://data.theglobalfund.org/investments/documents/UKR/-/-/Active (accessed on 6 October 2020).

254 The Global Fund website, available at https://data.theglobalfund.org/investments/grants/UKR/-/-/Active (accessed on 6 October 2020).

255 International Renaissance Foundation website, available at https://www.irf.ua/en/program/health-en/ (accessed on 6 October 2020).

256 SADC (2020) Swiss Cooperation Programme Ukraine 2020-23, Geneva: SADC. Available at https://www.eda.admin.ch/countries/ukraine/en/home/international-cooperation/strategy.html (accessed on 6 October 2020).

257 UNDP website, available at https://www.ua.undp.org/content/ukraine/en/home/democratic-governance/health-reform-and-procurement-support-services/ (accessed on 6 October 2020).

care reform in their plan until 2022[258].

USAID (US)

Originally USAID program was predominantly focused on infectious diseases but restructured their health assistance to solve health system problems first for both infectious diseases and NCDs[259]. Between September 2018 and September 2020, the "Supporting eHealth Infrastructure Development in Ukraine" project was implemented to reduce corruption and achieve a highly transparent health system. Along with the health reform support, efforts to responding infectious diseases such as HIV/AIDS, TB and hepatitis C and improving immunization coverage for diseases such as polio are being continued[260].

WHO

Supported particularly health policy development (including the use of eHealth), improvement of essential health services (human resources development, improvement of service models), and improvement of access to pharmaceuticals and medical technologies during 2016 to 2019. In addition, assistance for internally displaced persons due to the Crimean crisis has been implemented as an individual program since 2014[261].

World Bank

Decided to contribute 215 million USD to the Serving People, Improving Health Project. The project focused on introducing new financing mechanisms in hospitals, strengthening primary and secondary prevention, early detection, and strengthening of heart disease and cancer treatment in eight regions in the country. eHealth was also identified as one of the components of the project[262].

- Component 1: Prevention, early diagnosis, and treatment of heart disease and cancer
- Component 2: Strengthening MOH governance in payment systems, eHealth information systems development, public health, information and communications, and capacity building.
- Component 3: Project Implementation Support and Technical Assistance (Including Collection and Analysis of Monitoring-Related Data)

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[258] UNICEF website, available at https://www.unicef.org/ukraine/en/health-programme (accessed on 6 October 2020).

[259] Interview with USAID Ukraine team on 17 June 2020.

[260] USAID website, available at https://www.usaid.gov/ukraine/global-health (accessed on 6 October 2020).

[261] WHO (2019) WHO support for health system development in Ukraine 2016-2019, Copenhagen:
WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0006/413925/WHO_Health-Systems_support_Ukraine.pdf?ua=1 (accessed on 6 October 2020).

[262] The World Bank website, available at https://projects.worldbank.org/en/projects-operations/project-detail/P144893 (accessed on 6 October 2020).

In summary, the assistance by development partners in the health sector is illustrated in Table 5-5.

Table 5-5 Mapping of major development partners and activities

Organization	Governance	Health finance	Logistics	Health personnel	Health information/ eHealth	Primary healthcare	Maternal and child health	Infectious diseases	NCDs	Mental health	Humanitarian activities (east part)
Canada			O	O	O					O	
DFID (UK)	O	O									O
EU				O		O					
GIZ (Germany)			O					O			
Global Fund			O		O			O			
SADC (Switzerland)				O		O			O		O
UNDP			O					O			
UNICEF	O	O				O	O	O			O
USAID (US)		O			O			O		O	
WHO	O	O	O		O						O
World Bank		O	O		O	O			O		

Source: developed by the survey team

5.2 Health Reform and eHealth

5.2.1 Background of the reform

During the last 5 years the Ukrainian authorities have renewed their efforts to modernize health care system and to move on to a more efficient framework from what could be characterized as Semashko model[263]. The overarching goal of the authorities is to introduce universally accessible health care system that will ensure availability of publicly guaranteed set of primary care and specialist health care services in Ukraine. Moreover, the authorities will guarantee the availability of a set of essential medicinal products to Ukrainian citizens.

The renewed principles of universal health coverage were implemented by establishing National Health Service of Ukraine (NHSU) as the single public sector strategic purchaser of health care services and medicinal products. The roles of related organization including NHSU is shown in the figure below. NHSU executes its strategic purchasing capacity through contracts with autonomous service providers for both primary (started in 2018) and since 2020 specialist health care delivery. The authorities intend also to push forward with quality improvement in health care system by a combination of enabling patients to have a more prominent role in choosing service provider and having control over their health, and social and health care data, and by furnishing health care system with necessary infrastructure, including eHealth

[263] Health system under former Soviet Union, which is characterized by the centralized plan and free service for all. It contributed in raising the level of the public health but the system is known to be inefficient due to lack of competition and inefficient. Kaori Matsumoto 2015. Achievable at http://www.arskiu.net/book/pdf/1456379538.pdf

system to enable more efficient delivery of care. The health care services are purchased with equal conditions both from public and private health care providers.

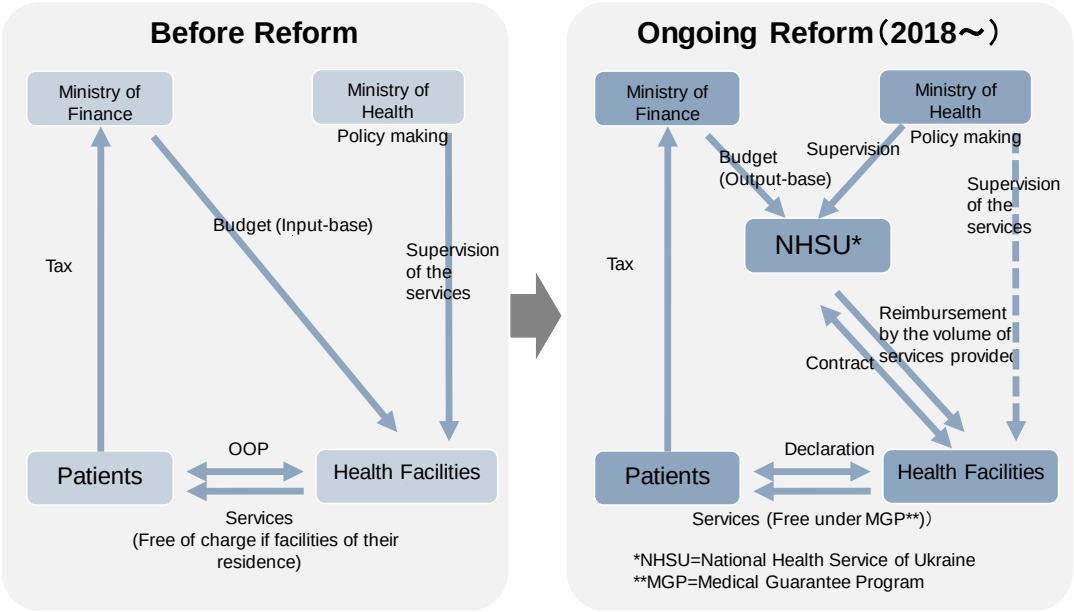

Figure 5-8 The roles of related organization before and after the reform

In 2017, Ukraine initiated the public health system reform aimed at changing the funding system and implementing the “money follows the patient” principle. (It is legally defined by the Law "On State Financial Guarantees of Public Health Care" as explained in detail in the following section.) An important measure for implementing the reform became development of eHealth system, which was planned to ensure a significant increase of efficiency and transparency of the health care system.

Table 5-6 Summary of the Public Health System Reform

Policy document	"National Health Reform Strategy for Ukraine 2015-2020"
Goal	Introduce universally accessible health care system that will ensure availability of publicly guaranteed set of primary care and specialist health care services in Ukraine.
Legal framework	On State Financial Guarantees of Public Health Care
Details	Implement the reform to improve service delivery, health financing, governance, and health systems through the Medical Guarantee Program and the Affordable Medicine Program. Within this context, eHealth has become a part of the health reform's foundation, whose main objective is to increase efficiency, transparency, and convenience. More specifically, this strategy plans a comprehensive approach that includes ePrescription, eConsultation, preventive monitoring, and chronic disease management.

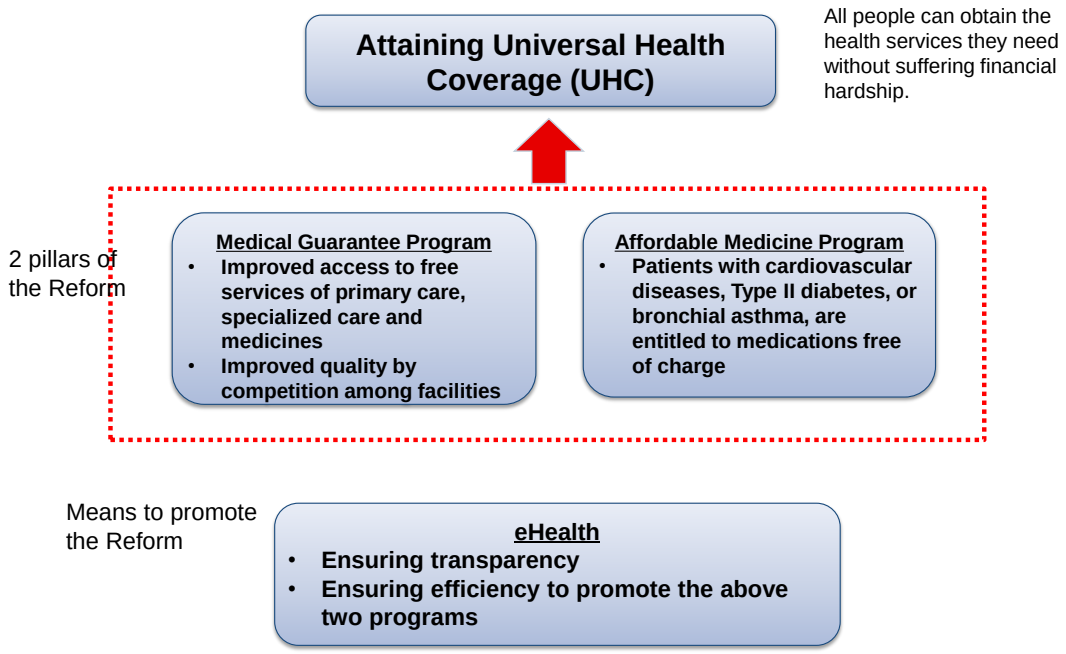

Figure 5-9 The ultimate goal of the reform

The national campaign for the selection of family doctors, therapists, and pediatricians started in April 2018. Ukrainians were for the first time given a free choice of their doctors not bound to their registered residential address. Currently, more than 27 million Ukrainians signed declarations choosing their doctors. One can change the doctor at any time by signing the declaration with another doctor.

In 2018, health care institutions can only sign doctor choice declarations and contract with NHSU through eHealth System. In 2019, family doctors, therapists, and pediatricians change over to electronic document management that includes Affordable Medicines prescriptions, referrals to medical specialists, and medical certificates. Family doctors were to abandon paperwork by the end of 2019 which is not the case.

The next stage following the primary component reform is the Free Diagnosis program. It covers 80% of the patient's needs for diagnosis by the family doctor, therapist, or pediatrician, most needed free examinations and tests, services of medical specialists. When referred by their family doctor, therapist, or pediatrician, patients will be able to have examinations such as X-ray, ultrasound, mammography, echocardiography, and others for free by any health care institution that has contracted with NHSU. Therefore, clinics, which are institutions specializing in in-patient care, will be transitioning to the new funding model.

5.2.2 Legal framework

The main legal regulative act of the funding system reform is Law "On State Financial Guarantees of Public Health Care" (Date: 19 October 2017; Document number: 2168-VIII; Author: Parliament of

Ukraine), which is closely related to the medical guarantee program and eHealth system.

The legislation on state financial guarantees of medical care is based on the Constitution of Ukraine and consists of the fundamentals of the legislation of Ukraine on health care, this Law and other laws and regulations governing public relations in the field of health care.

In accordance with this Law, the state guarantees full payment in accordance with the tariff at the expense of the State Budget of Ukraine to provide citizens with the medical services and medicines they need, which are provided by the program of medical guarantees.

Within the framework of the program of medical guarantees the state guarantees to citizens, foreigners, stateless persons permanently residing on the territory of Ukraine, and persons recognized as refugees or persons in need of additional protection, full payment at the expense of the State budget of Ukraine, and medicines related to the provision of:

- emergency medical care
- primary care
- secondary (specialized) medical care
- tertiary (highly specialized) medical care
- palliative care
- medical rehabilitation
- medical care for children under 16 years of age
- medical care in connection with pregnancy and childbirth

Local governments within their competence may finance local programs for the development and support of public health facilities, in particular for the renewal of material and technical base, overhaul, reconstruction, increase of salaries of medical workers (programs of "local incentives"), and as well as local health care programs, local public health programs and other health programs.

The Law defines the terms as follows:

- program of state guarantees of medical care (program of medical guarantees) – a program that determines the list and scope of medical services (including medical devices) and medicines, the full payment of which the state guarantees to patients at the expense of the State Budget of Ukraine according to the tariff for prevention, diagnosis, treatment and rehabilitation in connection with diseases, injuries, poisonings and pathological conditions, as well as in connection with pregnancy and childbirth;
- electronic health care system – information and telecommunication system that provides automation of medical services and management of medical information by creating, posting, publishing and exchanging information, data and documents in electronic form, which includes a central database and electronic medical information systems, between which the automatic exchange of information, data and documents through an open application programming

interface (API) is provided

- medical records – information on medical care of the patient or his/her results, set out in a unified form in accordance with the requirements established by law
- providers of medical services – health care institutions of all forms of ownership and natural persons - entrepreneurs who have received a license to conduct business in medical practice and entered into an agreement on medical care with the main managers of budget funds (i.e. mainly NHSU and other related ministries)
- reimbursement – a mechanism of full or partial reimbursement to business entities engaged in retail trade in medicines, the cost of medicines that were dispensed to the patient on the basis of a prescription, at the expense of the State Budget of Ukraine
- tariff – a rate that determines the amount of full payment for medical services and medicines provided by the program of medical guarantees
- authorized body – the central executive body that implements state policy in the field of state financial guarantees of medical care. This institution is currently NHSU

Among other strategic dimensions, this law also gives mandate for eHealth implementation. More specifically, eHealth is regulated by the Decree of Cabinet of Ministers of Ukraine of 25 April 2018 #411 Kyiv “On some issues regarding the eHealth system” (With changes made in accordance with the Resolutions of the Cabinet of Ministers № 526 dated June 19, 2019 and № 348 dated 15.04.2020). The full text of this Decree in English is attached in Annex 2 of this document.

Handling of electronic records is regulated by the Order of the Ministry of Health of Ukraine February 28, 2020 № 587 Procedure for maintaining the register of medical records, referral records and prescriptions in the electronic health care system.

The order determines the list of information to be entered in the register of medical records, referral records and prescriptions in the electronic health care system. This procedure is mandatory for business entities that conduct business activities on the basis of a license in the retail sale of medicines (pharmacies) and have entered into a reimbursement agreement with the NHSU, as well as for health care institutions and natural persons - entrepreneurs who have received a license to conduct business in medical practice, which are obliged to provide medical care to patients free of charge in accordance with the law “On State Financial Guarantees of Public Medical Services”. Business entities that do not belong to the entities specified above may, with the consent of the patient obtained in accordance with the Law "On Personal Data Protection", make medical records, referral records and prescriptions to Register, in case of their medical information system is compliant with the electronic health care system. By signing the declaration on the choice of the primary health care physician, the patient (his/her legal representative) agrees to access the data on him/her contained in the electronic health care system to such a physician, as well as to other

physicians referred to him/her in the limits necessary for the provision of medical services by such doctors. The NHSU is obliged to publish on the official website the data accumulated in the electronic health care system, subject to depersonalization of personal data in accordance with the Law of Ukraine "On Personal Data Protection", in the amount and in the manner prescribed by the Cabinet of Ministers of Ukraine. Necessary for the purposes of health care, the establishment of a medical diagnosis, the provision of care, the operation of an electronic health care system provided that such data are processed by a health care professional or other person.

Entry in the register of prescriptions is subject to the Rules for prescribing medicines and medical devices, approved by the order of the Ministry of Health of Ukraine dated July 19, 2005 № 360, registered in the Ministry of Justice of Ukraine on July 20, 2005 for № 782/11062 (as amended by the order of the Ministry of Health of Ukraine dated October 4, 2018 № 1819). Entries in the register of referrals are made considering the Procedure for referring patients to health care facilities and individuals – entrepreneurs who in the manner prescribed by law have received a license to conduct business in medical practice and provide medical care approved by the Ministry of Health.

Protection of information in the Register is carried out in accordance with the Law of Ukraine "On protection of information in information and telecommunication systems"[264].

According to the Order of Ministry of Health of Ukraine “On approval of the Register of medicinal products subject to reimbursement, as of May 28, 2020” and in accordance with the second paragraph of paragraph 10 of the Procedure for determining the amount of reimbursement of medicines, approved by the Cabinet of Ministers of Ukraine dated March 17, 2017 № 152 "On ensuring the availability of medicines" (as amended by the Cabinet of Ministers of Ukraine dated April 15, 2020 № 286) the Register of Medicinal Products Subject to Reimbursement as of May 28, 2020 is shown in the Annex 3.

Other major related legal documents are summarized in the Annex 4.

This section explains that the legal regulations that are needed for implementation of NHSU eHealth services are in place. However, Ukraine is missing the regulatory and legal framework for other health care institutions that have no contract with NHSU and for a personal use of digital health data, rules for data storage and maintenance, rules for audits and appeals, and licensing.

[264] This law provides requirements for the owners of systems, responsible for ensuring the protection of information in the system. State information resources and classified information must be processed in an integrated, protected and verified system certified by the competent state agency. Under the Law on Personal Data Protection data controllers, data processors and third parties are required to protect personal data from accidental loss or destruction, as well as unlawful processing, including unlawful destruction of or access to personal data.

5.2.3 National Health Service of Ukraine (NHSU)

The NHSU, as the central executive body, implements the policy in the field of state financial guarantees of medical care and is an authorized structure responsible for the efficient spending of budget funds in the provision of medical services under the Medical Guarantee Program. This is provided by the Law "On State Financial Guarantees of Public Health Care" and the Regulation on the NHSU. The task of the NHSU is to purchase quality and safe medical services needed by the patient within the existing budget of the Program. Therefore, the NHSU should make sure that such a provider will ensure the provision of quality and safe medical services and efficient use of budget funds.

eHealth contains electronic patient records, and the NHSU will be able to use data analysis to identify errors and violations. Data can also be used to monitor the quality of PHC provider care and to promote evidence-based care[265]. However, the eHealth system is not functioning yet in the way as anticipated.

NHSU's achievements to date:

- Between April 2018 and May 2019, 27.6 million Ukrainians (over 65%) signed a decision with a PHC doctor.
- Between June 2018 and May 2019, the NHSU signed contracts with 1276 PHC providers (1024 public facilities, 131 private facilities, and 121 family doctors) to provide PHC service packages.
- 1024 public PHC facilities became independent legal entities, both managerial and budgetary.
- The formula for calculating PHC service packages and payments was clearly defined: an appropriate level of single rate/rate was set, and new incentives were presented to PHC providers through a mechanism of head-rate payments.
- NHSU started the Government Affordable Medicines Program on April 1, 2019. Since then, the NHSU has signed a contract with 1,000 pharmacies (573 private companies).
- The NHSU is developing its ability to become a strategic buyer. Includes digital processing systems such as e-contracting, patient e-registration, information and management dashboards on NHSU's website[266].
- The NHSU has published a data analysis and live management dashboard on its website. In July 2019, providers will be able to use the International Classification of Primary Care (2nd edition) to enter more information about each practice. (WHO, 2019)

However, as WHO pointed out, the eHealth system has been introduced in a very tight timeframe to support

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[265] WHO (2019) WHO support for health system development in Ukraine 2016-2019, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0006/413925/WHO_Health-Systems_support_Ukraine.pdf?ua=1 (accessed on 6 October 2020).

[266] WHO (2019) WHO support for health system development in Ukraine 2016-2019, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0006/413925/WHO_Health-Systems_support_Ukraine.pdf?ua=1 (accessed on 6 October 2020).

health reform, with many redundancies and misspellings. Registration is not integrated with registration systems in other national registers and data such as death and birth cannot be quickly updated. Many existing registrations seem to lack accuracy. Directory formats and databases are not standardized, making it difficult to link third-party management information systems to e-Health[267].

5.2.4 Medical guarantee program

5.2.4.1 Medical Guarantee Program and service provision

Overview

The program of medical guarantees determines the list and volume of medical services and medicines, the payment of which is guaranteed at the expense of the State Budget of Ukraine.

Medical services and medicines that are not included in the program are not subject to payment at the expense of the State Budget but may be covered by the State Budget of Ukraine provided for the implementation of relevant state programs and measures.

The amount of funds of the State Budget directed to the implementation of the program of medical guarantees is annually determined in the Law of Ukraine "On the State Budget of Ukraine" as a share of gross domestic product (in percent) of at least 5 percent. Expenditures on the medical guarantee program are protected items of budget expenditures. However, the targeted amount is not secured, and the actual amount remains around 3% of GDP.[268]

Basic principles of the program of medical guarantees include providing equal state guarantees for patients to exercise the right to health care regardless of age, race, color, political, religious and other beliefs, sex, ethnic and social origin, property status, registered place of residence, language or other signs, ensuring the preservation and restoration of public health through the provision of medical services and medicines of appropriate quality, publicity, transparency and accountability of public authorities and local governments, their officials in the field of state financial guarantees of medical care, and competition and non-discrimination of health care providers.

Patients have the right to:

- obtaining the necessary medical services and medicines of proper quality at the expense of the State Budget of Ukraine, provided for the implementation of the program of medical guarantees, from providers of medical services

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[267] WHO (2019) WHO support for health system development in Ukraine 2016-2019, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0006/413925/WHO_Health-Systems_support_Ukraine.pdf?ua=1 (accessed on 6 October 2020).

[268] WHO (2020) Budgetary Space for Health in Ukraine. Available at https://www.euro.who.int/__data/assets/pdf_file/0007/463327/UKR-Budgetary-space-for-health.pdf

- free of charge receipt of information from the Authorized Body or providers of medical services on the program of medical guarantees and providers of medical services under this program, which may provide the necessary medical service to the patient
- the possibility of choosing a doctor in the manner prescribed by law
- granting doctors, third parties the right to access personal data and other information contained in the electronic health care system, including information about their health, diagnosis, information obtained during a medical examination, for conditions for such persons to comply with the requirements of the Law of Ukraine "On Personal Data Protection"
- receiving from the Authorized Body information on persons who have submitted requests for the provision of information contained in the electronic health care system about such a patient
- appeal against decisions, actions or omissions of medical service providers or the Authorized Body and its territorial bodies in the manner prescribed by law
- judicial protection of their rights
- appeal to the Public Control Council regarding actions or inaction of the Authorized Body
- other rights provided by law
- Patients are obliged to
- provide the relevant medical service provider with reliable information and documents necessary to obtain medical services and medicines
- undergo preventive medical examinations in accordance with the procedure established by the central body of executive power, which ensures the formation of state policy in the field of health care
- follow the doctor's medical prescriptions and follow the rules of procedure of the medical service provider
- comply with other requirements provided by the legislation on health care

Provision of medical services and medicines under the program of medical guarantees related to secondary (specialized), tertiary (highly specialized), palliative medical care and medical rehabilitation shall be carried out under the direction of a primary care physician or a physician in accordance with the law, except in cases where the law does not require a doctor's referral. When providing medical care in an outpatient setting, medicinal products under the medical guarantee program are provided to the patient on the basis of a doctor’s prescription by an economic entity engaged in retail trade in medicinal products (e.g. pharmacies and hospitals) and concluding a reimbursement agreement with the NHSU.

Each eligible institution providing medical services in an inpatient setting may enter into an agreement with the NHSU to provide:

- surgical care, which includes surgical operations for adults and children at the inpatient stage in medical specialties: gynecology, pediatric gynecology, combustiology, neurosurgery, pediatric

neurosurgery, oncogynecology, oncology, pediatric oncology, trauma and otolaryngology, onco-otolaryngology, , otolaryngology, pediatric otolaryngology, ophthalmology, pediatric ophthalmology, proctology, vascular surgery, thoracic surgery, transplantology, urology, pediatric urology, surgery, pediatric surgery, heart and main vessel surgery, maxillofacial surgery

- medical care, which provides care for adults and children with non-surgical (somatic) diseases in hospital in the following areas: obstetrics and gynecology, allergology, pediatric allergology, gastroenterology, pediatric gastroenterology, hematology, pediatric hematology, gynecology, pediatric dermatovenero pediatric endocrinology, immunology, pediatric immunology, infectious diseases, pediatric infectious diseases, cardiology, pediatric cardiorheumatology, narcology, neurology, pediatric neurology, nephrology, pediatric nephrology, pediatrics, pulmonology, pediatric pulmonology, rheumatology, therapy
- specialized medical care for women during childbirth and newborns, as well as premature and / or sick newborns in the neonatal period
- specialized medical care for acute stroke and acute myocardial infarction

Treatment of acute myocardial infarction, acute stroke, as well as medical care for women in childbirth and premature and / or sick newborns in the neonatal period, have been identified as priorities in the field of health care in 2020-2022. Therefore, separate requirements for their medical services have been developed. Each case treated in an inpatient setting according to the patient's primary diagnosis and intervention will be assigned to a separate diagnostic-related group (DRG).

Separate packages of medical care provide:

- diagnosis and chemotherapeutic treatment of cancer in adults and children
- diagnosis and radiological treatment of cancer in adults and children
- psychiatric care for adults and children
- diagnosis and treatment of adults and children with tuberculosis
- diagnosis, treatment and support of people with human immunodeficiency virus

treatment of persons with mental and behavioral disorders due to the use of opioids with the use of substitution maintenance therapy.

Payment

Uniform tariffs[269] for payment for the provision of medical services, medicines and medical devices, the

[269] Tariffs may be set, in particular, as: 1) global rates, which provide for the payment of a fixed amount to medical service providers for a certain number of services or a certain period; 2) capitation rates, which are set in the form of a fixed amount for each patient; 3) rates for the treated case; 4) rates for medical service; 5) rates based on the results of the implementation of

amount of reimbursement of medicines provided to patients under the program of medical guarantees shall be established for the entire territory of Ukraine.

Payment according to the tariff is guaranteed to all providers of medical services in accordance with the agreements concluded with them on medical care.

The tariff is paid by the NHSU at the expense of the State Budget of Ukraine in accordance with the program of medical guarantees directly to the providers of medical services. Reimbursement of the cost of medicines under reimbursement agreements under the medical guarantee program shall be carried out by the NHSU. Providers of medical services, which are state and municipal health care facilities, are prohibited from demanding compensation from patients in any form for medical services and medicines provided under the medical guarantee program. Such actions are the basis for prosecution under the contract on medical care, including unilateral termination of the contract at the initiative of the NHSU.

The health care provider prepares a report in the electronic health care system, which indicates the number of medical services and medicines provided to patients.

NHSU has prepared specific medical packages for the purchase of medical services. Each medical package has specification of medical services and terms of purchase of medical services. The list of packages[270] is as follows:

- Primary health care
- Emergency medical care
- Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care
- Mammography
- Hysteroscopy (Diagnostic / With endoscopic manipulation)
- Oesophagogastroduodenoscopy (Diagnostic / With endoscopic manipulation)
- Colonoscopy (Diagnostic / With endoscopic manipulation)
- Cystoscopy (Diagnostic / With endoscopic manipulation)
- Bronchoscopy (Diagnostic / With endoscopic manipulation)
- Treatment of patients by extracorporeal hemodialysis in an outpatient setting

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agreements on medical care for the population by the provider of medical services. These rates can be used both together and separately from each other. The methodology for calculating tariffs and adjustment factors shall be approved by the NHSU that ensures the formation of state policy in the field of health care, in agreement with the central executive body that ensures the formation and implementation of state financial and budgetary policy. When calculating tariffs and adjustment factors, the basis for determining the wage component of health workers is a value that is not less than 250 percent of the average salary in Ukraine for July of the year preceding the year in which such tariffs and adjustment factors will be applied.

[270] Medical Service Package – Content and Approach to Contracting of Health Care Institutions, NHSU. Available at https://nszu.gov.ua/storage/editor/files/paketi-medichnikh-poslug-07022020_1581100466.pdf (Accessed on 1st February 2021)

- Surgical operations for adults and children in inpatient conditions and inpatient care for adults and children without surgery
- Medical care in case of acute cerebral stroke in stationary conditions
- Medical care in the acute myocardial infarction
- Medical care at childbirth
- Medical care for newborns in complex neonatal cases
- Diagnosis and chemotherapeutic treatment of cancer in adults and children
- Diagnosis and radiological treatment of cancer in adults and children
- Psychiatric care for adults and children
- Treatment of adults and children with tuberculosis
- Diagnosis, treatment and support of persons with human immunodeficiency virus (HIV)
- Treatment of people with mental and behavioral disorders as a result of opioid use of drugs replacement supportive care
- Inpatient palliative care for adults and children
- Mobile palliative care for adults and children
- Medical rehabilitation of infants born prematurely and / or ill during the first three years of life
- Medical rehabilitation of adults and children from three years with musculoskeletal disorders
- Medical rehabilitation of adults and children from three years with a lesion of the nervous system
- Inpatient care for patients with acute respiratory disease COVID-19
- Medical care provided by mobile medical teams trained to respond to acute respiratory disease COVID-19
- Inpatient care for patients with acute respiratory disease COVID-19, provided by selected health care facilities during April 2020.
- Transitional financial support for the comprehensive provision of medical services by health care institutions.

Packages of medical services payable within the framework of the medical guarantee program are defined by the Order of Minister of Health. Some examples of specifications and conditions for the purchase of medical packages in 2020 (agreed by the Ministry of Health on January 21, 2020) are presented in Annex 5.

In 2020, all state and municipal medical institutions will receive funds under the contracts with the NHSU. Starting from 2018, such a mechanism operates at the level of primary care – today almost all utilities already operate under a contract for medical care. From 2020, institutions that provide secondary (specialized) outpatient and inpatient care, emergency, palliative care and rehabilitation will also switch to the model of payment for medical services provided to patients.

If the institution can provide guaranteed medical services under the program of medical guarantees in a

certain area, then each treated case in this area will be paid in accordance with 40% of the tariff for diagnostically related groups. 60% will be paid in the form of a global rate based on past performance data. A necessary condition for this is the entry of medical data into the electronic health care system and the submission of electronic reports on the services provided to the NHSU. For 2020, new classifiers were introduced: the Australian modification of the International Classification of Disease (ICD) and Australian Classification of Medical Interventions (ACMI). Training on the basics of coding based on these classifiers were offered by NHSU. Information on all medical services provided by the institution need to be submitted to the electronic health care system encoded in accordance with the specified classifications.

5.2.4.2 Affordable Medicines Program

In April 2017 the Government started the Affordable Medicines program. Patients with cardiovascular diseases, Type II diabetes, or bronchial asthma, are entitled to medications free of charge or at a fraction of the price, as they are one of the most common diseases with the largest burden to the society. Other diseases are not covered in the same extent.

From 1 April 2019, medicines under the government's Reimbursement Program "Affordable Medicines" can only be obtained with an electronic prescription issued by family doctors, therapists and pediatricians through the electronic health care system.

The e-prescription and reimbursement work as follows:

- Step 1. The patient is registered and comes to see a family doctor, therapist or pediatrician, with whom s/he signed a declaration. It will be impossible to use the "Affordable Medicines" program without a declaration.
- Step 2. The doctor makes an appointment and writes a prescription.
- Step 3. When issuing an electronic prescription, the doctor together with the patient should check whether the mobile phone number specified in the declaration is relevant and belongs to the patient. The doctor should tell the patient the mobile operator's code and the last digits of the number.
- Step 4. After checking the phone number, the doctor writes a prescription in the electronic health care system.
- Step 5. The patient's mobile phone receives an SMS with a unique prescription number and confirmation code to receive medication at the pharmacy. SMS content: “Your recipe: XXXX-XXXX-XXXX-XXXX. Confirmation code: XXXX ».
- Step 6. If necessary or at the request of the patient, the doctor may print a consultation opinion, which contains a section with prescriptions. This section provides information on prescription medications and e-prescription numbers.
- Step 7. The patient goes to any convenient pharmacy that participates in the Affordable Medicines

Program.

- Step 8. The pharmacy offers the patient medicines. The patient chooses one of the drugs (including generics) and calls a four-digit confirmation code and receives his/her medication. If the required drug is not available, the patient can go to another pharmacy and get medication there.

The Wholesale Price Register determines the maximum price of a drug that can participate in the government's Affordable Care Act. The state reimburses the cost of the cheapest drug that applied for the Affordable Care Act. That is, the patient will be able to receive such a drug free of charge. A more expensive drug, the price of which does not exceed the reference limit, the patient can get by paying the difference between the minimum price and the retail price of the selected drug. Medicines that exceed the reference price in 5 neighboring countries are not eligible for reimbursement. Also, the availability of the drug in the program depends on the decision on its participation from the manufacturer – one must apply for inclusion of their drug in the register.

On August 15, 2019, the Ministry of Health of Ukraine approved a new register of drugs of the "Affordable Medicines" program – the sixth since the beginning of the program. The updated register includes 254 drugs, of which 78 are free for patients, others – with a small surcharge. The cheapest drug, which is 100% reimbursed by the state, costs UAH 5.22 (USD 0.18), the most expensive - UAH 863.43 (USD 30.2).

Contract with NHSU

The contract on medical care under the program of medical guarantees is concluded between the health care institution regardless of the form of ownership or a natural person - entrepreneur, who in the manner prescribed by law has received a license to conduct business in medical practice, and NHSU.

Requirements for medical services that will be provided under the Medical Guarantee Program are designed for institutions (providers of medical services) that wish to enter into an agreement with the NHSU. Requirements were formed on the basis of industry standards, unified clinical protocols for the provision of medical care, indicative tables of material and technical equipment, other applicable regulations and international recommendations governing the provision of medical services. The necessary equipment for the provision of medical services may be owned by the institution or another legal entity may provide the necessary equipment under the terms of the contract.

Health care institutions may voluntarily undergo accreditation in accordance with the procedure established by the Cabinet of Ministers of Ukraine.

All grounds for payment for medical services provided to patients and grounds for termination of payments will be provided in the contracts. The only criterion for increasing the amount received by the institution will be the number of quality services provided when applying the tariff for medical services. In the new system, money goes to specific services for a specific patient. Requirements for the provision of medical

services, their number, calculated based on historical data for each medical institution, and the terms and model of payment will be specified in the contract signed by the medical institution and the NHSU. The management of the institution will know the exact amount of money that will be received in advance and will be able to estimate how much will be paid for the services provided for the month, based on the number of medical services provided according to historical data.

At the level of specialized outpatient care, the model of payment for medical services works differently than at the primary level: 1) part of the funds are paid as a global budget, which is calculated based on historical data provided by institutions for settlements; 2) there is also a list of priority services that are paid for at the stated rates. These funds are added to payments from the global budget. At the level of hospital care, the following approaches to payment apply: 1) 60% is a global budget calculated on the basis of historical data on medical services provided by institutions and used for calculations; 2) the other 40% will be paid for diagnostic-related groups using the mechanism of payment for the treated case.

Mandatory conditions for concluding agreements with the NHSU are:

- autonomy of the institution (transformation into a municipal non-profit / state enterprise[271])
- computerization of the institution (installation of computers or other technical means, such as tablets, smartphones, etc.)
- connection of the institution to the CDB of eHealth system through the selected MIS
- the institution has a valid license to provide services in medical practice
- signing an agreement with the NHSU

Declaration on the choice of primary care physician

In case of need for medical services and medicines under the program of medical guarantees, the patient (his/her legal representative) shall apply to the provider of medical services in the manner prescribed by law. The patient (his/her legal representative) exercises his/her right to choose a doctor by submitting to the health care provider a declaration on the choice of the doctor who provides primary care. Medical service providers are prohibited from refusing to accept a declaration on the choice of primary care physician and the patient's management, in particular on the basis of the patient's chronic illness, age, sex, social status, financial status, registered place of residence, etc., except in cases provided by law.

[271] The *Law of Ukraine* "*On State Financial Guarantees of Public Health Care*" states that private institution can conclude agreement.

5.2.5 eHealth

5.2.5.1 Introduction of eHealth system

The President Zelensky who assumed office in May 2019 has made achieving "A state in a smartphone" one of his top priorities, while continuing to follow previous policies." Mid-Term Government Priority Action Plan 2020" identifies healthcare and health reform as one of the six priority areas. The government, led by the Ministry of Health, promotes eHealth as part of the reform, and the medical and health sector is one of the priority areas of Ukraine's administrative services for e-government. For the period of 2017-2018, there have taken place a number of system-related shifts in the eHealth domain. The Law “On State Financial Guarantees of Medical Services of Public Health Care” and a number of by-laws that regulate the operation of eHealth system and of the institutions responsible for implementation thereof – Ministry of Health (MOH), NHSU, State Enterprise “Electronic Health“ (“Elektronne zdorovya”) , with effect taken as of 30 January 2018 have been established.

The most recent plan for eHealth development is composed by Ministry of Health and Ministry of Digital Transformation. The concept was revised and approved in December 2020. The purpose of the revised concept is to form political, legal, organizational, technological and ideological conditions and principles of e-health development in Ukraine, which will contribute to improving the quality and accessibility of medical services, expanding the rights and opportunities of patients, ensuring their continuous medical care and safety, improving the efficiency of management and use of resources, and a high level of public awareness on issues of healthy living, disease prevention and medical care. The concept states the ways and means of solving problems in the following areas: regulatory support for e-Health development, organizational, managerial, and technical support of e-Health development, resource provision of e-Health development, ensuring the quality safety and accessibility of e-Health. The action plan has not been approved as of September 2021 therefore the timeframe of actions is not certain yet. Great efforts are being made to deliver the related actions and some have been completed, but many are still in process as shown below.

Table 5-7 Progress in e-Health sector

Functional unit	Deliverable	Responsible institution	Progress made
CONCEPT	Approval of the Concept and Principles of the Electronic Healthcare System (EHIS) Architecture	MoH, MODT	Revised concept was approved 28/12/2020.
	Approval of the Action Plan for the implementation of the Concept of EHIS	MoH, NHSU, MODT	As the concept being approved, action plan will be developed within a month.
DEVELOPMENT	Audit of existing information systems and	MoH, MODT	11/15/2019

	registers in the field of health care		
	Updating the roadmap for the development of EHIS taking into account the requests and recommendations from the stakeholders, as well as the integration with state registers	MoH, NHSU, MODT	Currently in process.
SECURITY	Development, approval and dissemination of recommendations on personal data protection among EHIS users in accordance with the requirements of current legislation	MoH, NHSU, SE Electronic Health, Verkhovna Rada of Ukraine, Commissioner for Human Rights	No information available.
	Conducting a cybersecurity audit in the EHIS, including penetration tests. Carrying out of load tests of the Central database of EHIS	SE Electronic Health, MODT, State Service of Special Communications and Information Protection of Ukraine	Currently in process.
	Carrying out of the state examination of conformity of KSZI[272] of information and telecommunication systems of EHIS to normative documents on technical protection of information	MoH, NHSU, SE Electronic Health, State Service of Special Communications and Information Protection of Ukraine	Completed.
REGULATORY, COMMUNICATION AND OTHER MEASURES	Carrying out the analysis and definition of the plan of introduction of standards of storage and transfer of medical information	MoH, MODT	Currently in process.
	Development and approval of a joint communication strategy for the development of EHIS	MoH, NHSU, MODT, SE Electronic Health	No information available.
	Development of recommendations for the procurement of information systems in the field of health	MoH, NHSU, MODT, ProZorro	
	Coordination with the projects of international technical support of the plan of financing the development of EHIS and	MoH, MODT, NHSU	As of January 2021, no such coordination has

[272] комплексній системі захисту інформації (КСЗІ) - integrated information protection system

	provision of expert support		been done.
	Audit of statistical and accounting forms. Preparation of the regulatory framework for regulating the transition from paper to electronic medical forms. Introduction of a gradual transition in the field of health care from the use of paper to digital documents, forms and data.	MoH, MODT	Some forms are done but not in an integrated manner.
FINANCIAL ISSUES	Assessing the need to finance the development, security and implementation of EHIS	NHSU, MoH, MODT	Some efforts have been made without any results.
	Development of proposals for the financial model of interaction of EHIS participants	MoH, NHSU, SE Electronic Health	Some efforts have been made without any results.

5.2.5.2 Components of eHealth system

By the Decree "On some issues regarding the eHealth system", the electronic health care system includes a central database (CDB) and electronic medical information systems (MISs), between which the automated exchange of information, data and documents through an API is provided. The owner of the CDB, as well as of property rights to the CDB software, is the state, acting through the NHSU. The Ministry of Health is the owner of the information of the Register of Medical Specialists, the Register of Business Entities in the Field of Health Care and the Register of Medical Consultations. The administrator of the Register of Medical Specialists, the Register of Business Entities in the Field of Health Care and the Register of Medical Consultations is the NHSU.

The administrator of the central database is the state enterprise "Electronic Health" (SE Electronic Health), except for the Information System of the NHSU, the administration of which is provided by the NHSU. The administrator does not process patients' personal data but the state processes through NHSU. SE Electronic Health was established by the MoH to ensure the effective functioning and development of information and telecommunication electronic systems. The main tasks of SE Electronic Health are technical support for the creation, implementation and operation of software and information systems of Electronic Health, maintenance of registers, the development of electronic database management systems, and the creation of necessary regulatory framework. The SE Electronic will also coordinate the implementation of on-site software and hardware for the use of electronic systems in the health care sector. Electronic Health, NHSU and the MoH should coordinate in the development of eHealth system but it has not been the reality so far.

Medical Information System (MIS) is an information system and tool for health care providers that allows to automate workflow, to create, view, exchange data and information in electronic form, with a central database. Health care providers are contracting MIS developers which are ICT companies with knowledge of health care and medical processes. Currently, 35 MIS providers are listed on the website of SE Electronic Health with different functionalities and capabilities to integrate with CDB. 22 MIS developers are able or implementing the functionality to exchange information between pharmacies and MIS. One of the largest developers is MedEir whose products are used by approximately 450 healthcare facilities. From an interview with a healthcare facility, a complaint was heard that MISs are not integrated hence information sharing is not possible among different facilities and an open API is needed for interaction.

The CDB component of eHealth system was initially developed and financed by international development partners. The development of the MVP (minimum viable product) of the eHealth system was coordinated by the Project Office created by Transparency International Ukraine and the All-Ukrainian Network of Persons Living With HIV. Funding was provided by international development partners – US and Canadian Governments, the Global Fund, and others. From February 2018, the Ministry of Healthcare took over the further development and implementation of eHealth system, for which the state enterprise "Electronic Health" was created in December 2017.

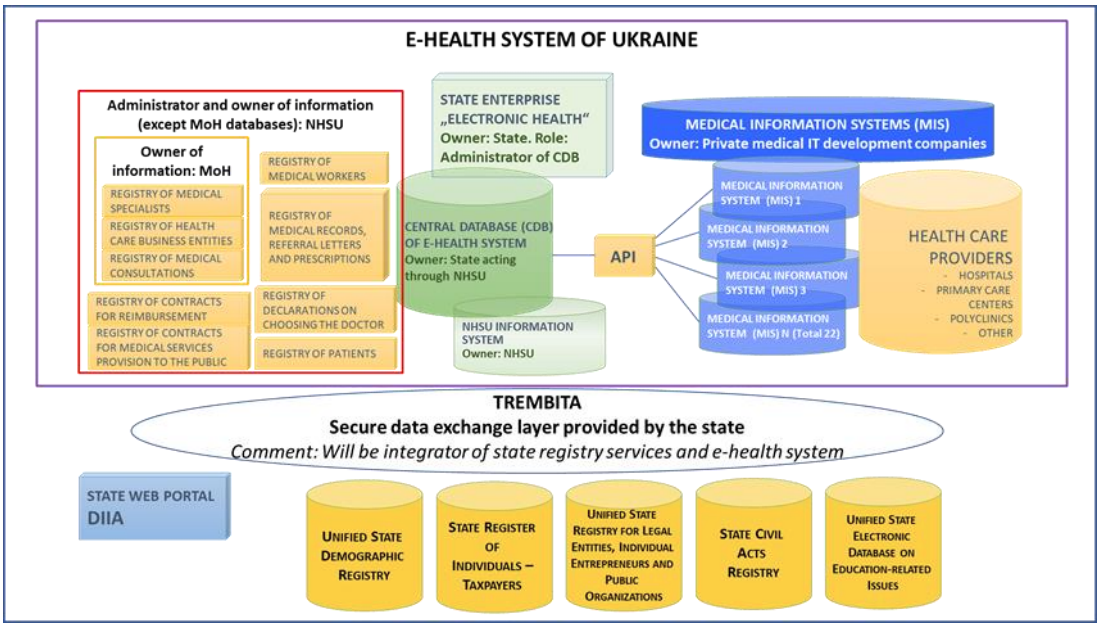

Figure 5-10 eHealth System of Ukraine

Source: Drafted by Dr. Ross (eGA)

Information systems that have been introduced in the public health care institutions are shown in the Table 5-8. Introduction can be said rather sporadic at present. On the contrary, the private institutions are generally more advanced in introducing these information systems. While digital images storage is not

established in central nor in regional level in the public sector, there are some private local Picture Archiving and Communication Systems (PACS). However, since introducing the PACS requires big investment, most individual institutions are not able to realize it.

Table 5-8 Introduction of Information Systems in Public institutions

Information System	*Tertiary hospitals*		*Secondary hospitals*		*Primary level hospitals*	
	Urban	*Rural*	*Urban*	*Rural*	*Urban*	*Rural*
National data related information systems						
Integration with Trembita	-	-	*eBaby (maternity hospital)*	*eBaby (maternity hospital)*	-	-
ePrescription	*Partially*	*Partially*	*Partially*	*Partially*	*Partially*	*Partially*
eBaby	-	-	+	+	-	-
Patient Portal	-	-	-	-	-	-
Inter-facility information systems						
eReferral	+	+	+	+	+	+
Tele-medicine	*Partially*	*Partially*	*Partially*	*Partially*	*Partially*	*Partially*
EHR	-	-	-	-	-	-
Between facilities and home information systems						
PHR	-	-	-	-	-	-
Patient Portal	-	-	-	-	-	-
Visiting care supporting systems	-	-	+/-	-	+/-	-
Intra-facility information systems/Apps						
Ordering system	-	-	-	-	-	-
Rehabilitation system	-	-	-	-	-	-
Laboratory system	+/-	-	+/-	-	-	-
Radiology Information system	-	-	-	-	-	-
PACS	-	-	-	-	-	-
Nursing system	-	-	-	-	-	-
Pharmaceutical system	+	+	+	+	+	+
Dispensing system	-	-	-	-	-	-
Medical accounting system	+/-	+/-	+/-	+/-	+/-	+/-
Supply Processing Distribution system	-	-	-	-	-	-
EMR	+/-	+/-	+/-	+/-	+/-	+/-

5.2.5.3 Functionality and modules of eHealth system

The functionality of the eHealth system must ensure:

- e-registration of users in the CDB, including such means as e-identification
- delimitation of user access permissions for entering, reviewing, editing and adding information

in the CDB

- creating, entering, reviewing and exchanging the declarations on choosing the doctor, who is to provide primary healthcare services, prescriptions, referrals, medical records, other information and documents via the e-accounts in compliance with the users' access permissions
- accessibility for the users with impaired hearing and vision
- patients (and their legal representatives) to give their consent in written form or in the form to access their personal data (patient data for patient's legal representatives), contained in the system, to doctors and other third parties
- patients to receive information on who requested their personal data from the system
- conducting search and review of information in the CDB in accordance with the users' access permissions and in compliance with the Law of Ukraine "On the protection of personal data"
- signing, amending and terminating of contracts for medical services provision to the public, as well as contracts for reimbursement pursuant to the program of state medical guarantees, drawing and submitting e-reports, payment and other documents relating to such contracts (hereinafter – e-reports) via the CDB
- storage, automated backup and restoring of data sent to the CDB, ensuring uninterrupted access to the CDB
- protection of data from unauthorized access, deletion, editing
- logging of operations (entering, reviewing, editing, etc.) with information and documents in the CDB, as well as events in the System, which are related to its security
- using state classifiers, nomenclatures and directories, approved in accordance with the procedure established by law, for entering and systematization of data in the CDB
- usage of unified standards for exchange of medical information, approved by the MoH
- compatibility and electronic interaction, in accordance with the procedure established by law, between the CDB and other information systems and state information resources
- provision of other electronic services in accordance with the procedure established by MoH

The eHealth system works on a modular system. Module is defined as a set of functionalities required for different types of users of the eHealth system. For example, one medical institution can use the administrative module of one MIS, and doctors can use the module "Doctor's workplace" of another MIS. Modules include:

- "Administrative module of a primary health care provider" – for concluding agreements with the NHSU and obtaining funding from institutions providing primary health care.
- "PMD workplace" – for the work of primary care physicians: with declarations on the choice of primary care physician, electronic medical records, issuance of an electronic prescription under

the “The Affordable Medicines Program” reimbursement.

- "Administrative module of the pharmacy" –for registration of pharmacies, their departments and pharmacists and subsequent conclusion of reimbursement agreements with the NHSU.
- "Pharmacist's workplace" - for the work of pharmacists to repay ePrescription under the reimbursement program "The Affordable Medicines Program".
- "Administrative module of the provider of medical services of specialized medical care" – for registration of the institution providing specialized medical care, registration of its divisions and users.
- "Specialized medical doctor's workplace" – for the work of doctors who provide specialized medical care e.g. work with electronic medical records, diagnostic reports, e-referral, electronic hospital records (hospital admission and discharge), work with electronic medical records and e-referral of unidentifiable patients.
- "Working with patient records" - for working with records of identified and unidentified patients; attaching records of an unidentified patient to an identified one.

5.2.5.4 Registration for eHealth system

For the registration with eHealth system the health care institution is provided with the clear instructions. The institution must have:

- the necessary documents for registration, defined by the MIS chosen
- current QES (qualified electronic signature; formerly EDS) of the head of the legal entity
- working email address

The list of modules required to work in the electronic health care system is provided and health care institution can choose one or more MIS according to the needs of the institution and the required functionality. The institution must enter into an agreement with the MIS developer (a legal entity that manages the tested information system and has an agreement with the eHealth system administrator - SE Electronic Health) or must register the institution by filling in all the required fields in the relevant section of the MIS. After successful registration in eHealth system, the institution will receive a letter with a link to confirm the registration of the manager's account. Following the link allows to create a password. After creating the password of the head of the institution, one can proceed to the registration of departments and users. After registration of divisions and users of the institution in the system, the institution can apply for a contract with the NHSU. Details on concluding contracts can be found on the website of the NHSU. Finally, the health care institution can get qualified electronic signature (QES) for employees.

The administrator of the Register and the owner of its information is the NHSU.

The processing of personal data in the Register is carried out to ensure the implementation of the program

of state guarantees of medical care, as well as to ensure the functioning of the electronic health care system. The register is maintained in the central database of the system and is formed from medical records, referral records and prescriptions entered into the system in accordance with the law. Medical records entered in the Register in accordance with this Procedure are the primary medical records in electronic form.

5.2.5.5 Medical records, referral records and prescriptions

Medical institutions are required to ensure that medical records, referral records and prescriptions (for the detailed list of information, see Annex 6) are made during patient care on the day such services are provided. If medical care is provided outside the place of medical practice, medical institutions are obliged to ensure the introduction of medical records, records of referrals and prescriptions no later than the next working day from the date of service. Pharmacies are obliged to ensure the entry in the Register of dispensing of prescription drugs during the dispensing of such drugs.

In case of unavailability of the MISs, or impossibility of data exchange between the electronic medical information system and the central database of the system due to their technical malfunction, or in the absence of appropriate technical capability in the system, medical institutions are obliged to make medical records and prescriptions to the Register no later than the fifth working day after the elimination of the relevant technical malfunction or after the appearance of the relevant technical capability in the system. Notification of the elimination of technical faults in the central database of the system or the appearance of the corresponding technical possibility in the central database of the system is published on the website of the NHSU and SE Electronic Health.

The set of all records about the patient in the Register makes the electronic medical card of the patient. Entering information into the Register and reviewing it is carried out through the electronic portal in accordance with the rights of access to the system.

Entries in the Register must be signed by a qualified electronic signature of the following persons, unless otherwise provided by law:

- medical records on the discharge of the patient from the hospital: attending physicians
- other medical records, referral records and prescriptions: doctors who provide medical care to the patient
- information on the registration of the release of a prescription drug: authorized persons of pharmacies e.g. an employee of a pharmacy institution who, in accordance with the legislation, has been granted access rights to the relevant system data

From April 1, 2020, electronic medical records are mandatory for all institutions that have a contract with the NHSU for medical care under the program of medical guarantees. It is mandatory to make medical records on the provision of outpatient medical services, hospitalization, hospital discharge, referral records and e-prescriptions for drugs to be reimbursed. These records are for reimbursement purposes and contain

limited amount of clinical and medical information, not speaking about sharing of patient's information with other health care institutions. In other words, a doctor from one hospital cannot see medical data of the same patient that has been collected and stored in other hospital.

The electronic form simplifies the keeping of medical records. Medical records will be automated. At the same time, doctors and nurses need to master new electronic tools for the correct maintenance of electronic medical records. New tools need additional training and support. Therefore, the NHSU has prepared a review material on electronic medical records.

At the request of the patient (his/her legal representative), the medical worker with the right to access the relevant data in the system must provide him/her with an extract from the Register in compliance with the requirements of the "On Personal Data Protection".

Medical records, referral records and prescriptions are stored in the system in an impersonal form. Deletion or modification of such records is not allowed.

In case of detection of technical inaccuracy in the medical record, referral record or prescription by the person who entered it in the Register, he or she must make a new record with the appropriate correction or addition and mark the cancellation of the record with technical inaccuracy, and notify the patient by telephone, e-mail or other available means of communication within three days of making such a record.

If the patient (his/her legal representative) or another person in accordance with the access rights has found inaccurate information in the medical record, referral record or prescription, such patient (his/her legal representative) or such person has the right to apply to the persons who have entered in the Register.

The record that contains a technical inaccuracy is stored in the system with the appropriate mark. Changes and additions to the information contained in the central database of the system, at the request of the patient (his/her legal representative) are carried out by the NHSU in the manner prescribed by law.

The following persons have the right to access the entries in the Register:

- the patient (his/her legal representative) regarding records about himself/herself
- Primary health care doctor and other doctors under his/her direction within the limits necessary for the provision of medical services by such doctors
- medical staff during the provision of medical care to the patient and not more than three months from the date of termination of such care
- persons to whom the patient has consented to access his data in the Register
- the person who put his qualified electronic signature on the relevant record (the author of the record)
- authorized employees of the NHSU, who are responsible for ensuring the protection of personal data, exclusively for the exercise of statutory powers
- the authorized person of the business entity to which the patient applied for referral, in terms of information required to register the patient for admission

- an authorized person of a pharmacy who registers the release of a prescription drug to the information about such a prescription

To ensure quality and timely medical care, health care professionals who provide medical care to the patient have the right to review the summary medical information about the patient.

Summary medical information about the patient is as follows:

- last name, first name, patronymic, age, sex of the patient
- last name, first name, patronymic of the primary care physician, his contact details
- last name, first name, patronymic of the patient's proxy for notification in case of an emergency with the patient and his contact phone number
- vaccination (vaccination, immunization)
- allergies and intolerance to drugs
- blood group, rhesus factor, blood transfusions
- performed surgical interventions
- presence of implants and prosthetics
- the presence of pregnancy
- risk factors (risk of thromboembolism, bleeding, cardiovascular disease, etc.)
- use of drugs on a regular basis (corticosteroids, anticoagulants, etc.)
- information on diagnoses for all open episodes of medical care
- such diseases: diabetes, chronic kidney disease, digestive diseases, mental and behavioral disorders, nervous system diseases, bronchial asthma, active or history of cancer, active or history of tuberculosis, circulatory system diseases, hypertension, blood coagulation disorders, autoimmune diseases, congenital malformations, and hereditary diseases that have been diagnosed.

Information on human immunodeficiency virus (HIV) disease must be entered and reflected in the consolidated medical information about the patient in compliance with the law "On Combating the Spread of Diseases Caused by Human Immunodeficiency Virus (HIV)" and Legal and Social Protection of People Living with HIV, and on the state of mental health in accordance with the law " On Psychiatric Care ".

The primary health care doctor, when addressing the patient (his/her legal representative), clarifies with the patient (his/her legal representative) the relevance of the data reflected in the consolidated medical information about the patient, and if necessary, makes appropriate medical records in the system within its competence.

The patient may independently or through his/her legal representative restrict access to the information about himself/herself contained in the Register and the consolidated medical information about the patient through his/her online patient portal or electronic personal health record. The patient also has other rights to protect their personal data in accordance with the Law of Ukraine "On Personal Data Protection" and

the legislation on the eHealth system.

The authorized persons of the NHSU verify the information in the Register in the manner prescribed by law, and in case of discrepancies, make appropriate entries in the Register.

As of July 6, primary and specialized care physicians have created nearly 24 million electronic medical records in the electronic health care system for 5 million patients. Doctors of private clinics, as well as private individuals have created 325 thousand e-medical records. These data can be seen on the new dashboard of the NHSU "Statistics of electronic medical records in the E-health System".

5.2.5.6 Localization of digital document exchange standards

To achieve semantic interoperability certain taxonomies are created, Ukraine has localized and translated International Classification of Primary Care (ICPC)-2 and International Classification of Disease (ICD)-10 classifications as well as Australian DRG system. Primary health care providers are supposed to use ICPC-2 in making patient notes in MIS.

For data exchange, SE Electronic Health is preparing digital document exchange standards based on international experience, including HL7 and Digital Imaging and Communications in Medicine (DICOM). There is established HL7 Ukraine that localizes popular HL7 standards, such as HL7 FHIR ®, HL7V2, HL7 CDA (https://hl7.org.ua/). The efforts have just begun and the progress is to be followed.

The main work of the committees is to create and implement profiles to implement medical standard for the use of standards, development of functional requirements for technical solutions in the exchange of medical information. All decisions on localization of standards and development of profiles are made by the technical committee and voted by members. The standards for e-health are localized and approved by International Research and Training Center for Information Technologies and Systems of the National Academy of Sciences (NAS) of Ukraine and Ministry of Education and Science (MES) of Ukraine (http://www.irtc.org.ua/Eng/Organis_eng.html). The main function of the International Center is to conduct basic and applied research in the field of creation and development of different levels and use advanced information technologies and systems as well as training on basic directions of Cybernetics and Informatics, which meet the requirements of international and national standards.

5.2.5.7 Service providers in the private sector

Below is the list of some Ukrainian start-up companies in the healthcare sector. They play important roles in the health sector, providing unique and needed services. A prominent role is that played by DonorUA who also works on activities to strengthen governance in the sector.

Table 5-9: Ukrainian start-up companies in the healthcare sector

Name of the company	Representative	Year established	Business activities
DonorUA	Ira Slavinska & Alexander Krakovetsky	2015	Operates a blood platform for blood donations. Achieves transparency of blood donation by building a MIS specializing in blood and ensuring blood traceability. It also works on activities to strengthen governance. Currently, DonorUA makes similar efforts not only in the blood business field but also in the fields of organ transplantation and COVID-19 countermeasures.
DOC.UA	Igor Ivanovich Liski	2014	DOC UA is a free online service in Ukraine for finding doctors and making an appointment. They specialize in providing information on medical professionals, medical institutions and assist patients in the selection of doctors, clinics and appointments.This service earns a commission from the clinic for a patient who signed up through the service and made a visit to the doctor. The service is free for patients.
HELSI	n/a	n/a	HELSI is a medical information system that is now one of the largest in Ukraine and covers a large market share. HELSI cooperates with patients, doctors, medical institutions, pharmaceutical companies and insurance companies.More than 2 million users register with a doctor every month through the HELSI system.
Cardiomo	Roman Belkin, Ksenia Belkina	n/a	Cardiomo is the powerful and easy solution for monitoring heart health in real time. Their non-invasive wearable technology keeps doctors and loved ones in the loop about a patient's heart condition by providing an up to the minute data dashboard and alerts system when unusual behavior is detected.
LIKI24	Anton Avrinsky	n/a	LIKI24 is an online drug delivery service where people can know the prices and availability of medicines in 5000+ pharmacies in the city. LIKI24 finds pharmacies with a low price for each drug and people can order the delivery. LIKI24' s couriers buy medicines at their customers' request in pharmacies and deliver them to the customers. This makes it possible for consumers to get quality medicines without wasting time or overpaying.

5.2.5.8 ICT infrastructure in eHealth system

The workload of the eHealth system is now constantly growing. The system contains data of more than 30 million patients, registers of more than 3 700 medical institutions, more than 650 000 medical records are created daily, of which more than 110 000 referrals and more than 50 000 prescriptions. In total, the central database receives 2.5 million queries every hour, 700 every second. The amount of data and information is growing every day. To quickly process this amount of data, the system must have the appropriate

capacity: a certain amount of memory, processors and storage in the data center.

At the same time, the only digital data exchange exists between the NHSU CDB and MISs that are owned by the health care institutions that have contracts with NHSU. There is a need for several other data exchange services such as statistical reporting, public health data indicators, medical data exchange for institutions having no contract with NHSU, etc. Therefore, the need for much more comprehensive health care digital data exchange architecture is needed. There is a need for an electronic highway or e-infrastructure in the health care system of Ukraine, as many other state entities can use it.

5.2.5.9 Challenges on Health Reform and eHealth Development

Based on the desktop reviews and online interviews, the survey team identified the challenges of the health systems and laid out how eHealth could help to overcome such challenges and to contribute to attaining the goal of the reform. The details are shown in the figure below.

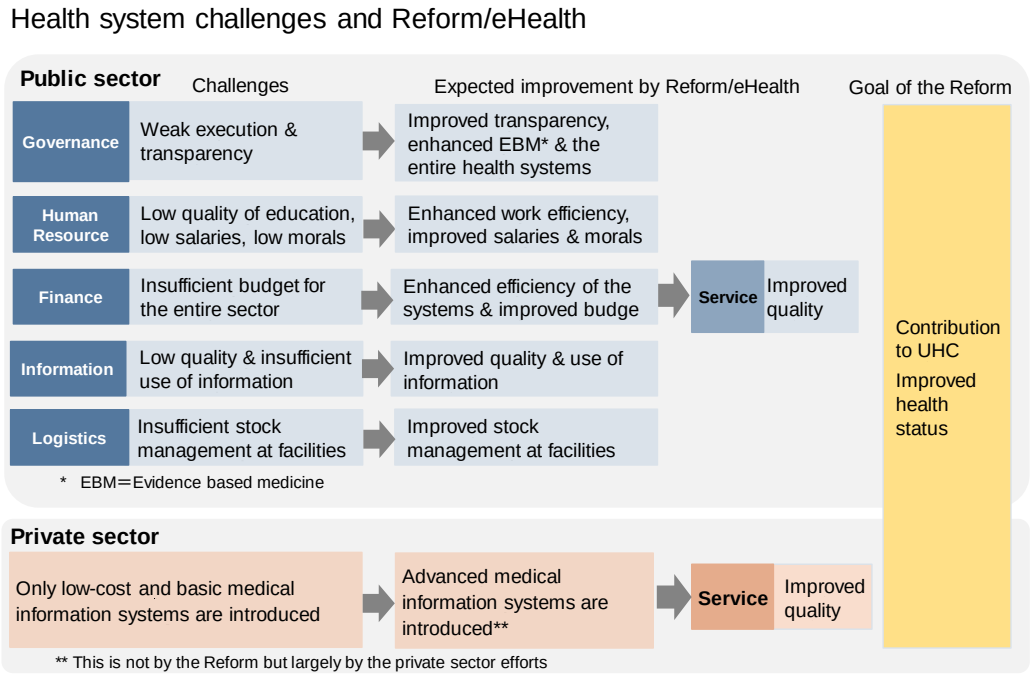

Figure 5-11 Challenges and Reforms in e-Health sector

In the public sector, the governance of the health systems may be strengthened with eHealth, especially at the decision making level of the Ministry of Health, since eHealth enhances the transparency and the ease of using the data for decision makings. In regard with the human resource challenges, eHealth can address both at the administrative and frontline levels as well as the education sector. Since eHealth could improve the work efficiency and the quality of services at the healthcare facilities, health budget can be spent in a more rational manner. With the support of the eHealth system, the quality of health information can be

improved (completeness, accurateness and timeliness) at any level of the health system pyramid. For logistics, the eHealth system can facilitate the stock management at the central and facility levels. If the health systems are strengthened as described above, the service quality will be improved to contribute in UHC and better health of people.

Challenges on Health Reform

- Major challenges of the health reform have overlapped with those of the eHealth development: insufficient budget and the excess focus on the efficiency putting of the quality services.

Challenges on eHealth Development

Challenges on eHealth development are summarized below by categories.

Concept and strategy

- As shown in the Table 5-7, despite certain progress of the use of ICT in NHSU governance areas, the strategic development of health care digitalization and eHealth implementation is missing in large extent. Ukraine is missing eHealth strategy and action plan in longer perspective. While the concept has been reviewed and approved, it does not seem to address the importance of the data needed for the medical care.

Use of eHealth for quality of services and health status improvement

- The planned functionality of the eHealth system is mentioned in the Section 5.2.5.3, but it is not functioning yet in the way as anticipated and the electronic medical records are for reimbursement purposes and contain limited amount of clinical and medical information. Ukraine is still lacking one of the basic principles of eHealth system development what is person-oriented model of system development, i.e. storing and sharing person´s longitudinal health, health care and social care data with Electronic Health Record (EHR) system. According to WHO, it is a system for payment purposes only. eHealth includes NHSU contracts with providers (e-contracting between PHC providers and pharmacies), citizens register with PHC doctors (e-declaration), and reimbursement of drugs within the scope of the Affordable Medicines Program (e-prescription)[273].
- Current eHealth applications in Ukraine are not providing general public and all parties of the health care system a set of possibilities to monitor quality of health, health care and social care in both qualitative and quantitative terms. The data stored in eHealth system do not enable

[273] WHO (2019) WHO support for health system development in Ukraine 2016-2019, Copenhagen: WHO Regional Office for Europe. Available at https://www.euro.who.int/__data/assets/pdf_file/0006/413925/WHO_Health-Systems_support_Ukraine.pdf?ua=1 (accessed on 6 October 2020).

computation and publication of comprehensive sets of quality measures related to care output and outcome on national and regional level from the one side, and for every service provider from the other side. Up-to-date and consistent data on quality of care should be a prerequisite for implementation of value-based principles in strategic purchasing.

- The eHealth system is not giving authorities early warning systems that are based on indicators derived from digitized health data (eHealth system, MISs) and other sources to prevent emergence and outbreaks of communicable diseases, because the medical information as such is collected in a very limited extent and unstructured way.

Human resource capacity

- As pointed out in the Section 5.1.2.3., health care policy planning capacity and efficiency is not satisfactorily enhanced by implementation of current eHealth system. Policymakers cannot use anonymized and/or aggregated health data to assess trends in population health so as to devise effective and cost-efficient policy interventions to improve health outcomes. On micro level, eHealth System does not facilitate the authorities to undertake medical efficiency and cost-benefit analyses to extend and modify the set of publicly guaranteed health care services and medicinal products.
- ICT literacy of the people is generally not strong enough to master eHealth system so far.

Lack of coordination

- As mentioned in the Table 5-7, the development of eHealth system has faced several drawbacks because of poor governance and coordination. MoH, NHSU and SE Electronic Health should coordinate organization, governance, health care quality, implementation, policy and technical challenges but only NHSU seems to have enough capacity to support eHealth system development.
- Ministry of Digital Transformation of Ukraine shall be a coordinator responsible for implementation of e-management, e-government and provision of access to inter-agency public data, with “Trembita” technology solution for exchange purposes between various institutions.

Legal framework

- The regulatory and legal framework, required for implementation of the eHealth system, necessitates improvements identifiers in health care sector, rules for confidentiality compliance, rules for providing access and obtaining a patient’s consent, rules for data use and disclosure, rules for data storage and maintenance, rules for audits and appeals, and licensing. Regulatory framework that supports use of digital medical data is missing in large extent.

Funding

- As mentioned in the Section 5.1.2.2., the funding required to ensure the appropriate level of capacity of the system, and hence - its smooth operation, is not sufficient. The required amount

is UAH 28.8 million (USD 1 million) per year. This amount was submitted as part of the budget request for 2020 (in November 2019). However, only UAH 9 million (USD 0.32 million) was agreed to the capacity of the MoH. This was only a third of the need. Accordingly, these funds were enough to purchase three times less resources for processing and storing information in the electronic health care system which led to significant technical delays in the system.

Localization of standards and terminologies

- As mentioned in the Section 5.2.5.6., the efforts of localization of international standards have just begun and therefore systematic localization, adoption and implementation of health care terminologies and classifiers in eHealth system is missing. The potential of eHealth system to render purchasing and payment framework easily comprehensible for payer and providers alike by furnishing the parties with digital terminology and coding system together with digital billing and payments mechanism is unused.

Infrastructure

- As pointed out in the Section 5.2.5.8., the need for much more comprehensive health care digital data exchange architecture is needed. There is a need for an electronic highway or e-infrastructure in the health care system of Ukraine, as many other state entities can use it. Without this key piece, it shall not be possible for the MISs in medical service providers to connect to the CDB and other databases. Trembita, the electronic highway created in Ukraine, appears to be a solution. It would provide the secure electronic information to transmit data within the Ukraine.

Data quality

- As mentioned in the Section 5.1.2.4, the eHealth system has been introduced in a very tight timeframe, resulting in many redundancies and misspellings in the registration data. Medical institutions now face a number of problems and errors. For example, the provided services were not included in the report of the NHSU for a certain period, respectively, the medical institution will not receive payment for these services. All cases when the NHSU may not include certain medical services in the report are described in the standard contract between the NHSU and the medical institution. There may be some inconsistencies between the health report data and the information contained in the system. Discrepancies between the data of financial and statistical reporting, medical documentation, the original declarations - all this gives grounds for the NHSU to submit objections to the report to the medical institution.
- Typical problems with eHealth system and data transfer to the NHSU central database can be summarized as below:
  - System hanging, interaction with the central database online does not occur.
  - During working hours, the total time of formation of referrals for exams or procedures can take up to 30-40 minutes of working time of the doctor, and the discharge of the patient

from the hospital – up to 50 minutes, and in maternity hospitals – up to 1 hour. This slows down not only the work of doctors, but also the system itself.[274]

- Unclear coding system/code mismatch.
- There is no clear explanation of how to use the system.
- Frequent request to log in to eHealth and change the password.
- There is no understanding of security or data retention in the event of a virus or power outage.
- In the generated report of the NHSU, the number of services does not correspond to the ones provided by the hospital
- Insufficient training base for health professionals to work with electronic data.

Missing systems

- The concept of archiving and communicating medical images is missing. It would be advisable to complement eHealth system with an eHealth modality that would be usable nation-wide to demonstrate medical benefits from eHealth system and to further mobilize stakeholder support. As mentioned in the Section 5.2.5.2., digital images storage is not established in central neither in regional level. There are some private local Picture Archiving and Communication Systems (PACS). Digital imaging has proven its medical efficacy at cost efficient levels. Storage of digital images could be implemented by MISs, if the authorities would be in a position to enforce interoperability and nationwide access to images in all MISs. Universally implemented digital imaging storage system would also serve as the key component to develop nationwide system of Electronic Health Record from system of MISs.

5.3 Potential cooperation for strengthening eHealth system in Ukraine

To begin with, it is useful to briefly review the experiences of eHealth development in other countries. First, the survey team has reviewed the experience of Japan and then those of Estonia and Denmark.

5.3.1 Japan's history of eHealth development and current situation

The Japanese government is currently formulating various strategies for using ICT from the perspective of industrial promotion and other factors. Healthcare is positioned as one of the critical sectors in: 1) Follow-

[274] Recently, the MOH announces in its Facebook that: to stabilize the eHealth system, technological resources have been increased by optimizing certain services. In addition, the text environment (pre-prod) was transferred to another cloud service, which reduced the load on the system. Additional funds were allocated to expand the system's capacity. Thus, the speed of request processing was increased 5 times. Currently, the system receives about 1,700 requests every minute.

up on the Growth Strategy[275]; 2) Declaration to be the World's Most Advanced IT Nation and Basic Plan for the Advancement of Public and Private Sector Data Utilization[276]; and 3) the Status of Implementation of the Health and Medical Care Strategy and Future Initiatives Policy 2019[277]. To achieve these goals, the Japanese government, including the Ministry of Health, Labor, and Welfare (MHLW), is working to promote the use of ICT in healthcare. Against this backdrop, this chapter divides Japan's history of medical information systems into five eras and explains how it has evolved.

Generation 1 to 3 (1970-1999)

The history of the introduction of medical information systems began in the 1970s as the first generation. At that time, it was the introduction of departmental systems and partial efficiency in the hospital. It was at the stage that only specialized systems within individual departments, such as medical accounting systems and laboratory systems, were introduced in order to improve operational efficiency. In the mid-1980s, the order entry system which aimed at interdepartmental collaboration was launched as the second generation. It was called the "total hospital information system" because various medical-related functions were attached to the system for communicating orders (slips) within the hospital network. It was the stage of shifting from the partial efficiency to the total efficiency. In Japan, the term "medical information system" came to be used around this time. In the mid-1990's, the electronic medical record systems started as the third generation. The digitalization of medical records, which had been used in the form of orders or instructions, has made it possible to share information for the realization of team medicine. In the mid-1990s, the development of electronic medical records was promoted in the midst of the increasing possibility of handling multimedia data led by the widespread use of Windows. In 1999, electronic medical records were approved by the notification of medical records' storage in electronic media.[278] This notification by the MHLW allowed medical records to be stored electronically instead of on paper, and after this year, many electronic medical record manufacturers were born. Subsequently, in 2002, 107 facilities were subsidized and promoted to introduce the electronic medical record system[279].

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[275]announced on July 17, 2020, available at https://www.kantei.go.jp/jp/singi/keizaisaisei/pdf/fu2020.pdf (accessed on 30 November 2020)

[276]announced on July 17, 2020, available at https://www.kantei.go.jp/jp/singi/it2/kettei/pdf/20200717/siryou1.pdf (accessed on 30 November 2020)

[277]announced on June 20, 2019, available at https://www.kantei.go.jp/jp/singi/kenkouiryou/suisin/ketteisiryou/dai24/siryou1.pdf (accessed on 30 November 2020)

[278]announced on April 22, 1999, available at https://www.mhlw.go.jp/www1/houdou/1104/h0423-1_10.html (accessed on 30 November 2020)

[279]Introduction to Medical Information Systems 2020. Social Insurance Institute, 2020, pp49.

Generation 4 and 4.5 (2000-Mid-2010s)

Since 2000, the fourth generation has been aimed at developing a system for regional collaboration rather than introducing the system within the hospital. The standardized data exchange environment has enabled regional collaboration. Ministries and agencies have allocated budgets and implemented initiatives such as the MEDIS-DC26 project in 2000 to promote regional collaboration.[280] In the 2010s, the MHLW has been guiding a community-based care system instead of the traditional hospital-based system. In this 4.5 generation, the government formulated a law in 2012 to promote comprehensive medical and nursing care services in the region[281], and the Growth Strategy Council-Investing for the Future,[282] led by the Prime Minister's Office, has been promoted a community-based care system.

Current situation and lessons

Japan's current medical information system is shifting from the traditional "hospital-based" to "community-based" medical care. In other words, there has been a shift from a single hospital providing everything from surgery to rehabilitation and regular post-discharge checkups to a system in which treatment is shared among multiple hospitals and family physicians. The introduction of this system is expected to: 1) realize high quality and efficient medical care by dividing the roles of regional medical institutions according to the conditions of patients, such as the acute and convalescent phases; 2) reduce the disparity in medical care between urban and rural areas through telemedicine; 3) strengthen the emergency medical system (determining the most appropriate medical institution to transport patients according to their condition); and 4) coordinate medical and nursing care.

While Japan is relatively advanced in terms of eHealth and promoting the community-based medical care system, there are lessons drawn from its history. When the medical information systems were introduced for the first time, the purpose was rather to process the administrative tasks more efficiently and the standardization of medical information was not in scope[283]. It is also pointed out that Japanese medical institutions belong to small networks and the information is not shared among different networks[284]. These can make the wide introduction of the community-based medical care system slow.

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[280] Introduction to Medical Information Systems 2020. Social Insurance Institute, 2020, Ibid, pp49.

[281] available at https://www.mhlw.go.jp/stf/shingi/0000057500.html (accessed on 30 November 2020)

[282] Future Investment Strategy 2018, available at https://www.kantei.go.jp/jp/singi/keizaisaisei/pdf/miraitousi2018_zentai.pdf, pp41 (accessed on 30 November 2020)

[283] Hashimoto, Y. *Situation and prospects of standardization of health information in Japan and abroad.* Joho Kanri 2017. 12. Vol.60. No.9 619-628.

[284] *Nihon no Iryo-renkei ni miru kadai to intersystems no solution.* Intersystems. Available at https://www.intersystems.com/wp-content/uploads/sites/6/WP_connected-health_Japan_1704.pdf Accessed on 1 February, 2021.

5.3.2 Lessons of the advanced countries in eHealth: Cases of Finland, Estonia and Denmark

Some countries have made significant progress towards modern eHealth infrastructure. Most advanced eHealth countries led other countries with policy implementation and activities. Although eHealth adoption in each country depends on multiple factors and development history differs accordingly, useful implications with main drivers of and barriers to eHealth adoption in advanced countries can be drawn for Ukraine.

5.3.2.1 Finland

Finland is known as an early adaptor and one of the most advanced countries in eHealth. The development history of a nationwide eHealth infrastructure has been taking over 20 years in Finland. From 1996 onwards, the Ministry of Social Affairs and Health has consistently implemented the deployment of eHealth. Nowadays, healthcare providers in every level use the same healthcare and medical treatment guidelines and patient documentation policies. The comprehensive national health and social system named Kanta was implemented and adopted step-by-step from 2010. The Kanta service provides integrated, interoperable health information from electronic medical record (EMR), electronic health record (EHR), personal health record (PHR) and social welfare sources, which benefits nations, healthcare providers and policymakers. However, its evolution was not a rapid one. There was flexibility and the development started from a localized approach and eventually shifted towards a more nationwide approach to benefit local ownership. In the early stage of the development, the strategy and the system were much more technology-centered and service providers and professionals faced difficulties. It must be remarked that Finland introduced digital documentation quite early and healthcare system quickly became paperless. Most importantly, the country has the strategy with openness, trust, and transparency for its governance. This setting supports developing eHealth systems.

5.3.2.2 Estonia

eHealth of Estonia was evolved with the whole e-government system. The history of development started after Estonia's independence. It was closely related to the activities and influence of the ICT strategy as an opportunity to develop the economy and politics in the country. Since Estonia didn't have legacy software and its information technology was underdeveloped in the Soviet era, the utilization and deployment of technology evolved rapidly during the early years of independence in all domains, including healthcare. From 1990, hospitals, general practitioners, and other health providers started developing their information systems and introducing electronic health records. Several small-and-medium-sized software companies, focusing on the development of healthcare systems, were founded at that time. However, these EHRs are not mutually compatible and cannot exchange information. The preparation of eHealth project by the

government started in 2003 and eHealth system was launched in 2005. Estonian eHealth record provides electronic health record, digital registration, digital image, digital prescription, e-consultations, e-referral letters, and e-ambulance. The development and adoption were driven by secured finance, clear governance and legal clarity. For the Estonian case, mature ecosystem for e-service and established ID system were also key drivers for eHealth aligned with other government strategies. On the other hand, there were some barriers: semantic interoperability, quality and security of data, consideration for user interface and people's satisfaction. In addition, the healthcare provider must change their custom to fill out medical files towards more uniform language. Some of them were resolved by adoption, yet some of them remain for improvement.

5.3.2.3 Denmark

Since the late 1990s, Denmark tried to transform into ICT driven society with national ICT strategies to create roadmaps to deliver high-quality healthcare services. In 2004, EMR systems became mandatory for use. Denmark has also empowered patients to choose their GP and hospital and ensured access to their own health records using the internet. Denmark does not provide nationwide EMRs but multiple providers of software do. The Danish Health Data Network (Medcom) plays the role to integrate data to ensure interoperability. However, exchanging the electronic records between the different systems is still a challenge. Danish law acknowledges that patients should profit from the opportunities provided by the technological development. Previous rules, which allowed health care professionals to refuse access by patients in special situations, had to be abandoned. There are no restrictions on patients' right to access his/her health data in the current legislation. This may be one of the significant practical achievements of the establishment of system called sundhed.dk platform for EHR, E-journalen (E-record), P-journalen (P-record) and Shared Medication Record (SMR). Despite the complexity of accessing EMR, the introduction of the platform decreases barriers of patients while the patient's right to self-determination was acknowledged.

Table 5-10 Comparison of eHealth country profiles and country context

	Year	Finland	Estonia	Denmark	Ukraine
0. Country context[1]					
Population (000s)	2019	5,520	1,327	5,819	44,385
GNI per capita (PPP Int $)	2019	51,210	38,010	61,410	13,750
Physician density (per 10 000 population)	2014	34	34	39	30

Nurse & midwife density (per 10 000 population)	2014	14.7	6.1	10.2	6.7
Hospital bed density (per 10 000 population)	2013	49	50	31	88
Life expectancy at birth (years)	2018	81.7	78.2	81	71.6
Total health expenditure (% GDP)	2017	9.2	6.4	10.1	7
ICT Development Index rank	2017	22	17	4	79
Mobile-cellular subscriptions (% population)	2019	129.24	147.18	125.5	130.63
Internet users (% population)	2019	89.61	89.53	98.05	58.89
1. eHealth foundations[2]					
National policies or strategies		Country response			
		Year adopted			
National universal health coverage policy or strategy		Yes	Yes	Yes	Yes
		1972	2008	N/A	1993
National eHealth policy or strategy		Yes	Yes	Yes	Yes
		1995	2003	N/A	2013
National health information system (HIS) policy or strategy		Yes	Yes	No	Yes
		2007	2014	N/A	2012
National telehealth policy or strategy		No	No	Yes	No
Funding sources for eHealth		Country response			
		Funding source			
Public funding		Yes	Yes	Yes	Yes
		>75%	>75%	>75%	<25%
Private or commercial funding		No	No	Yes	Yes
				<25%	<25%
Development partner/non-public funding		No	Yes	No	Yes
			<25%		<25%
Public-private partnerships		Yes	No	Yes	Yes
		<25%		<25%	N/A
Multilingualism in eHealth		Country response			
		Year adopted			
Policy or strategy on multilingualism		Yes	No	No	Yes
		1917			2012
Government-supported Internet sites in multiple languages		Yes	Yes	Yes	No
eHealth capacity building		Country Response			
		Proportion			
		Yes	Yes	Yes	Yes

% of Health sciences students who receive pre-service training in eHealth	25-50%	25-50%	25-50%	25-50%
% of Health professionals who receive in-service training in eHealth	Yes	Yes	Yes	Yes
	25-50%	<25%	>75%	>75%
2. Legal frameworks for eHealth[2]				
Policy or legislation – purpose				
Defines medical jurisdiction, liability or reimbursement of eHealth services such as telehealth	Yes	No	No	No
Addresses patient safety and quality of care based on data quality, data transmission standards or clinical competency criteria	Yes	Yes	Yes	No
Protects the privacy of personally identifiable data of individuals irrespective of whether it is in paper or digital format	Yes	Yes	Yes	Yes
Protects the privacy of individuals' health-related data held in electronic format in an EHR	Yes	Yes	Yes	Yes
Governs the sharing of digital data between health professionals in other health services in the same country through the use of an EHR	Yes	Yes	Yes	No
Governs the sharing of digital data between health professionals in health services in other countries through the use of an EHR	Yes	Yes	No	No
Governs the sharing of personal and health data between research entities	Yes	Yes	Yes	No
Allows individuals electronic access to their own health-related data when held in an EHR	Yes	Yes	No	No
Allows individuals to demand their own health-related data be corrected when held in an EHR if it is known to be inaccurate	Yes	Yes	Yes	No
Allows individuals to demand the deletion of health-related data from their HER	No	Yes	Yes	No
Allows individuals to specify which health-related data from their EHR can be shared with health professionals of their choice	Yes	Yes	Yes	No
Governs civil registration and vital statistics	Yes	Yes	Yes	No
Governs national identification management systems	Yes	Yes s	Yes	No
3. Electronic HealthRecords (EHRs)[2]				
Country Response				
Year Adopted				
National EHR system	Yes	Yes	Yes	No
	2007	2007	N/A	
Legislation governing the use of the national EHR system	Yes	Yes	No	N/A
Health facilities with HER	Country Response			
	Facilities with EHR %**			
Primary care facilities (e.g. clinics and health care centers	Yes	Yes	No	N/A
	>75%	>75%		
Secondary care facilities (e.g. hospitals, emergency care)	Yes	Yes	Yes	N/A
	>75%	>75%	N/A	
Tertiary care facilities (e.g. specialized care, referral from primary/secondary care)	Yes	Yes	No	N/A
	>75%	>75%		
Other electronic systems	Country response			

Laboratory information systems	Yes	No	Yes	N/A
Pathology information systems	Yes	No	Yes	N/A
Pharmacy information systems	Yes	Yes	Yes	N/A
PACS	Yes	Yes	Yes	N/A
Automatic vaccination alerting system	No	No	No	N/A
ICT-assisted functions	Country response			
Electronic medical billing systems	Yes	Yes	Yes	Yes
Supply chain management information systems	Yes	Yes	Yes	Yes
Human resources for health information systems	Yes	Yes	N/A	Yes

Source: 1.World Bank's World Development Indicators and ITU ICT data portal

2.Abstracted from WHO eHealth country profiles, 2015 /Global Observatory for eHealth[285]

These most advanced eHealth adopted countries have still barriers and are still on the way to mature their system. Hence it follows that there are implications for Ukraine both in their past and in their progress. Interoperability of data, collaboration between central government and local government, patient/users-centered approach can be found common challenges, while contexts vary among these countries. Ukraine can apply the lessons learned in these challenges in the early stage of adoption of eHealth.

5.3.3 Potential areas of cooperation

5.3.3.1 Assessment of digital health environment in Ukraine

The survey team has assessed the digital health environment in Ukraine based on the information collected by partially applying the existing framework and guideline provided by the UN agencies and international development organizations such as WHO[286] and ITU[287]

There are eight categories i.e. "leadership & governance", "strategy & investment", "service & application", "infrastructure", "standard & interoperability", "legislation, policy & compliance", "human resources" and "business environment" each of which has corresponding capacity components. The result of the assessment is shown in Table 5-11.

Table 5-11 Analysis of the digital health environment in Ukraine

Category	● Capacity Components	Current Status and Challenges	Reference

[285] available at https://www.who.int/goe/publications/atlas/2015/en/ (accessed on 30 November 2020)

[286] available at https://www.who.int/publications/i/item/9789241550505 (Accessed on 28 September 2021)

[287] available at https://www.itu.int/dms_pub/itu-d/opb/str/D-STR-E_HEALTH.05-2012-PDF-E.pdf (Accessed on 28 September 2021)

Leadership & Governance	• Organization and responsibility • Policy and program management	• Responsible organizations are: MoH, NHSU and SE Electronic Health • "National Health Reform Strategy for Ukraine 2015-2020" mentions eHealth in one part. The revised concept of eHealth was approved in December 2020. • Challenge: Action plan is yet to be developed.	1.2.1
	• Stakeholder engagement (reference group, public consultation and communication strategy to develop national digital health environment etc.)	• Technical group was formed, international development partners and professional associations were involved in the review process of the concept.	2.5.1
	• Monitoring and evaluation of digital health program (outcome identification, assessment)	• No information	
	• Clinical safety (hazard identification, development of safety and mitigation controls and procedures)	• No information	
Strategy & Investment	• Strategy and planning to develop digital health environment	• The revised concept of eHealth was approved in December 2020. • Challenge: Action plan is yet to be developed.	1.2.1
	• Funding and investment management	• Funding is not sufficient though continuous efforts are being made by MoH.	2.1
Service & Application	• Individual electronic health information (EHR, EMR, PHR etc.)	• Some information system is introduced e.g. eBaby • Challenge: Person-oriented model of system development, i.e. storing and sharing person´s longitudinal health, health care and social care data with Electronic Health Record (EHR) system is missing.	1.2.3
	• Health care communication and collaboration (sharing information)	• Tele-medicine is partially introduced. • More to be specified in the upcoming road map.	1.3.2 2.5.2

	● Heath care service delivery tools in making diagnosis, treatment decision and individual delivery (medication management, tele-medicine etc.)	● Tele-medicine is partially introduced. ● e-Prescription is in place. ● More to be specified in the upcoming road map.	1.2.1 1.2.6 1.3.2
	● Health information and knowledge (knowledge sources of consumer and health care provider, peer group etc.)	● No information	2.5.2
	● Health care management (compliance monitoring, operation and facility management etc.)	● Payment and reimbursement functions are in place	1.2.2 1.2.6
Infrastructure	● High-speed data connectivity (4G, mobile coverage etc.)	● Satisfactory connection	2.5.8
	● Spread of ICT devices (PCs, mobile phone, server infrastructure etc.)	● Needs substantial improvement of ICT equipment. ● Challenge: Lack of fund	1.2.6
	● Identification and authentication services (message transmission protocols, privacy and confidentiality etc.)	● Must ensure e-identification, logging etc. ● Challenge: Regulation for protection of privacy is in place but not well implemented	2.5.3
	● Information system used by health care providers ● Health information database	● Central database (CDB) and electronic medical information systems (MISs) ● Challenge: Database is not standardized	1.2.4 2.5.2
	● Electricity (stable supply)	● Stable in the urban areas ● Challenge: Not very stable in some regions	
Standard & Interoperability	● Data exchange technique (electronic documentation system etc.)	● Challenge: Much more comprehensive health care digital data exchange architecture is needed.	2.5.8
	● Data structure standards (standards of health datasets like EHR, care plans, prescription etc.)	● Usage of unified standards for exchange of medical information, approved by the MoH	2.5.3 2.5.6
	● Common terminologies (clinical coding standards etc.) ● Health information messaging standards (e.g. HL7, DICOM)	● Preparing digital document exchange standards based on international experience, including HL7 and DICOM but the progress is slow	2.5.6

Legislation, Policy & Compliance	• Privacy legislation of personal health information • Access and consent legislation to personal health information use • Usage and disclosure legislation including secondary use • Computer access security	• The Law "On Personal Data Protection" and “Protection of Information in Information and Telecommunication System “in place but not sufficiently enforced • General legislation in place	2.2
	• Record legislation	• The law of medical records which is related to information on medical care or results of patient. • Challenge: Regulatory framework is missing.	2.2
	• Storage and retention legislation	• Storage system is established. • Challenge: Regulatory framework is missing.	2.5.3 2.5.9
	• Audit and complaint legislation	• General legislation in place	
	• Licensing regimes for private operators	• Requirements for MISs are specified by NHSU and managed by Electronic Health. • Challenge: MISs are not standardized.	
	• National legislation for electronic signatures	• The health care institution can get qualified electronic signature (QES) for employees.	2.5.4
	• Data exchange legislation	• The law of electronic health care system – information and telecommunication system. • Challenge: Regulatory framework is missing.	2.2
	• Telemedicine legislation	• General legislation in place	
	• Public policy to develop a national eHealth environment (Health and Non-health sector)	• In the broader eGovernment policy, eHealth is promoted. • Challenge: Coordination among the concerned ministries is not sufficient.	
	• Digital health specific policy (policies on medical jurisdiction, digital health services, data integrity, quality of care etc.)	• Related by-laws and policies are in place. • Challenge: Not fully implemented as shown in the table in the Section 5.2.5.1.	Missing
Human Resources	• Health workforce (e.g. doctors, pharmacist,	• ITC literacy of health workforce is generally not strong enough.	1.2.3

	laboratory scientists, social workers etc.)	● Training courses are available but the quality needs to be assessed.	
	● Health ICT workforce (e.g. system engineers, operating staffs of medical system etc.) ● ICT workforce development (university, digital health institute)	● Trainings are provided but the contents need to be reviewed ● Overall strategy and systematic approach are missing	2.5.8 2.5.9 Weak point
Business Environment	● Entrepreneur encouragement (incubation center, financial support, accelaretor program etc.)	● The start-up ecosystem in Ukraine was already grown up as much as to foster companies. ● Those specialized in eHealth need to be further investigated.	
	● Local health-tech business	● Private developers of MISs exist. ● Challenge: MISs are not standardized, making the inter hospital sharing of data difficult.	2.5.7
	● Financial sector development (commercial banks, VCs)	● Plentiful stakeholders such as entrepreneurs, start-ups, Venture Capitals, Platformers, and Universities.	
	● FDI restrictions	● Rarely exist	
	● Business practices and cultural acceptability	● Business practices similar to those of the US i.e. define details in the contract at the beginning.	

5.3.3.2 Potential cooperation

Based on the analyses of the information collected by desk-top reviews and online interviews of related parties, as well as the assessment in the 5.3.3.1, the survey team has identified the following areas for potential cooperation.

Health status

More than 90% of deaths are attributed to NCDs, particularly to ischemic heart disease (IHD) and stroke. The main reasons for NCDs are linked to behavioral risks and metabolic factors. The infectious diseases are generally in downward trends, but the disease burden of tuberculosis, especially Ukraine is designated by WHO as a high-burden country of multi-drug resistant tuberculosis.

Considering the above situation, the survey team proposes Proposals 3 & 4 of Tables 5-14 and 5-15

respectively.

Infrastructure

Since the estimated level of computerization of the public health care facilities remains only about 60%, upgrading the facilities and equipment which correspond to the requirement by the NHSU to make agreement and maximize the merit of eHealth system is one option. In addition, given the NHSU's intention to introduce PACS in the year 2022, digital testing equipment, which is a precondition for PACS, needs to be in place by then. The package of the Japanese digital testing equipment and PACS technologies could be a cost-effective investment especially since they utilize the cloud system. Upgrading of ICT infrastructure in hospitals should be planned by considering the development and specialization of the whole institution. In general, the repair and maintenance of medical equipment has low priority compared to the importance of equipment purchasing. Big hospitals and local governments allocate money for this on a regular basis.

Another option may be to support augmenting the capacity of the data center which could process the growing amount of data quickly enough since the typical complaints include eHealth system is not connected with the CDB online. However, detailed information is yet to be collected.

Finally, to improve the connectivity of the eHealth system and the Trembita, budget and human resource should be secured.

Considering the above situation, the survey team proposes Proposals 4 of Table 5-15.

Human resources

It is important to strengthen the capacity of NHSU staff and policy makers so that they can analyze the data from the eHealth system -- anonymized and/or aggregated health data -- and to assess the trends in population health so as to devise effective and cost-efficient policy interventions to improve health outcomes.

It is also repeatedly told that in general the health and medical staff are not equipped with good ICT literacy, and their capacity building should be urgently done so that they could properly use the eHealth system introduced in their facilities. Given that information systems are now extremely complex and in constant development, the users need regular updates of their knowledge. In subjective estimates, only about 20% of the health and medical staff have a sufficient level of computer literacy. The training courses provided by the NHSU are available, but the contents should be reviewed to be more effective. There has been no strategy for the development of this entire area, so all decisions are situational and there is no systematic approach.

Therefore, technical assistance for capacity building for the health and medical staff and administrators at the central level can be considered as possible area of cooperation.

Considering the above situation, the survey team proposes Proposal 1 and 2 of Tables 5-12 and 5-13 respectively. In addition, the activity of Proposal 4 of Table 5-15 (collaboration of Ukrainian and Japanese doctors) can contribute to upgrading the skills of the physicians.

Information system

Among different systems, PACS which is the basic and easy-to-implement system can be introduced in an earlier stage. It enhances work efficiency and enables comparison with the past data of the same patient or data of similar cases. PACS can be the base of the Electronic Health Record in the longer run for monitoring person's longitudinal health data which can be shared among the health care institutions. To introduce PACS, analogue equipment must be replaced by the digital ones as mentioned in the infrastructure section. It is logical to create regional systems if the regional leadership is ready. One PACS should serve either one tertiary hospital (more than 1000 beds) or a group of hospitals covering a bigger region. Smaller PACS could be installed in large clinics such as regional hospitals, diagnostic centers, specialized clinics and institutes with modern diagnostic equipment.

Considering the above situation, the survey team proposes Proposal 4 of Table 5-15.

Taking the above analyses into consideration, the survey team proposes 4 potential cooperation ideas as summarized below.

Table 5-12 Proposal 1

Title	Strengthening the capacity for Evidence Based Policy Making (EBPM) and Evidence Based Medicine (EBM)
Type of cooperation	Technical cooperation
Background	Decision makers (e.g. the officers of the Ministry of Health and NHSU) need to be able to analyze the anonymized and aggregated data from the eHealth system and to assess the trends in population health so as to devise effective and cost-efficient policy interventions to improve health outcomes.
Outline	Overall goal: Effective and cost-efficient policy interventions are made Purpose: EBPM and EBM are introduced at the central level Outputs: Importance of EBPM and EBM are understood at the central level
Site	Ministry of Health, National Health Service of Ukraine (NHSU)
Activities	● Creating guidelines of EBPM and EBM ● Training for the planning and statistical divisions of the MOH and NHSU ● Revision of the dashboard function of the eHealth system ● Providing general advices such as standardization of MISs.

Implementation schedule	2023-2025 at the central level
Estimate cost	JPY 50 million
Implementing agency	Ministry of Health
Related information	● It needs further explanation and discussion with MoH about this type of cooperation as MoH is not accustomed with JICA's TC. ● It is necessary to consider supporting the regional departments to introduce EBPM and EBM in a later phase.

Table 5-13 Proposal 2

Title	Improving the eHealth literacy of the frontline health personnel
Type of cooperation	Public-private partnerships or private investment
Background	In general the health and medical staff are not equipped with good ICT literacy, and their capacity building should be done so that they could properly use the eHealth system introduced in their facilities. It is also an issue that there is no strategy for the development of training in this entire area, so all decisions are situational and there is no systematic approach.
Outline	Overall goal: Data registration becomes timely, accurate and complete Purpose: Facility staff become confident to use the eHealth system Outputs: Training for the health and medical staff is carried out in accordance with the strategy.
Site	All healthcare facilities where eHealth has been introduced
Activities	● Conducting survey and baseline study of the ICT literacy of the health and medical staff ● Supporting to create the eHealth training strategy for the health and medical staff ● Creating the digital educational material and Apps for health and medical staff ● Health and medical staff training
Implementation schedule	2023-2025
Estimate cost	JPY 100 million
Implementing agency	SOE Electronic Health
Related information	● User friendliness of eHealth may need to be improved simultaneously. ● For this cooperation, the solution of company A in the Table 5-16 may be introduced.

Table 5-14 Proposal 3

Title	Upgrading the digital health capacity for tuberculosis diagnostics and treatment
Type of cooperation	Grant, Public-private partnerships, individual trainings
Background	In Ukraine, approximately 11,000 MDR TB infections (18/100,000) are reported (WHO, 2019) and the infection rates are higher in Mykolaivska (41), Dnipropetrovsk (31.2), Khersonska (30.5), and Odeska (30.1) (MOH, 2017). At healthcare facilities, information is often managed paper-base which makes it difficult to detect MDR TB early. The number of skilled radiologists and radiographers is not enough. In addition, X-ray image for TB test are normally films and digital is rare. CT Scan is rarely available as well as rehabilitation of facilities.
Outline	Overall goal: The number of MDR TB infected in the high-burden areas is reduced Purpose: MDR TB infected are detected early in their infection and diagnosed accurately Outputs: Radiographers, radiologiests and CT system technicians become confident in diagnosing MDR TB infected
Site	Core scale hospitals in Mykolaivska, Dnipropetrovsk, Khersonska, and Odeska
Activities	● Introduction of Digital X-ray diagnostic imaging system and CT system (grant) ● Training for radiographers (Individual training) ● Training for radiologists (Individual training) ● Training for CT system technicians (Individual training) ● Introducing remote diagnostics imaging services (PPP)
Implementation schedule	2023-2025
Estimate cost	JPY 1,000 million
Implementing agency	Ministry of Health
Related information	● In general, repair and maintenance of medical equipment has low priority compared to the importance of equipment purchasing. Large scale hospitals and local governments allocate money for this on a regular basis. It may be worth consideration to formulate a training course on maintenance of medical equipment for Ukraine as well as nonboring countries that have similar needs.

	● Digital X-ray diagnostic imaging system can be also used for COVID-19 diagnostics. ● It should be noted that the detailed information of existing digital equipment in public healthcare facilities needs to be further investigated for deciding the target facilities. ● For this cooperation, the solution of companies B and C in the Table 5-16 may be introduced. Company E provides patient monitoring system of COVID-19, PHR App for emergency care, PCR Digital Certificate and Vaccination Digital Certificate.

Table 5-15 Proposal 4

Title	Upgrading the digital health capacity for NCDs diagnostics and treatment
Type of cooperation	Grant, Public-private partnerships, individual training
Background	While NCDs impose a major burden of disease in the country (NCDs account for 91% of deaths, 5 major NCDs (heart diseases, diabetics, cancers, chronic respiratory diseases and mental health) account for 84% of deaths.), the health services provided are not sufficient both in quantity and quality. NHSU has an intention to introduce PACS in the year 2022 but there are only a few public and private facilities which are equipped with a digital diagnostic equipment, which is a precondition for PACS. PACS enhances the work efficiency, enables the comparison of the past images, reduces human errors and enhances regional collaboration. The package of the Japanese digital diagnostic equipment such as Ultrasonic diagnostic equipment CT system, MRI etc. and PACS technologies could be a cost-effective investment especially since they utilize the cloud system.
Outline	Overall goal: Enhancing the regional collaboration for better medicine, especially NCDs Purpose: PACS system is introduced in the core scale hospitals in the region Outputs: Capacity of the facility staff to diagnose NCDs is enhanced
Site	TBD
Activities	● Introduction of digital diagnostic equipment (grant) ● Introduction of PACS system (PPP)

	● Training for the facility staff (PPP or TA) ● Collaboration of Ukrainian and Japanese doctors (PPP) ● Introduction of NCD prevention Apps and doctor-to-doctor communication App (PPP)
Implementation schedule	2024-2026
Estimate cost	JPY 500-1,000 million
Implementing agency	Ministry of Health
Related information	● In general, repair and maintenance of medical equipment has low priority compared to the importance of equipment purchasing. Large scale hospitals and local governments allocate money for this on a regular basis. It may be worth consideration to formulate a training course on maintenance of medical equipment for Ukraine as well as neighboring countries that have similar needs. ● For this cooperation, the solution of companies B, C and E in the Table 5-16 may be introduced.

Finally, the survey team studied the Japanese solutions in the potential cooperation ideas and worked on matching with Japanese companies in MURC's network as shown in Table 5-16. The MoH has expressed their interest in the solutions of companies A, B and D while companies C and E expressed their interest in further discussion with Ukrainian counterparts for exploring future collaboration. As of September 2021, the survey team is arranging the individual meetings for the Ukrainian counterparts and the Japanese companies.

Table 5-16 Japanese Solutions expected to be introduced

Solutions with Japanese technologies

Challenges/Needs	Solutions
Low quality of education, insufficient skills and knowledge and ICT literacy of health personnel	Company A ■ eLearning system for health personnel using smartphones ■ Need to identify what contents should be covered by such eLearning system
Tuberculosis, COVID-19 Breast cancer	Company B ■ Digital mobile X-ray unit which uses AI to indicate abnormality score ■ Mobile visiting car ■ Digital mammography
PACS is planned to be introduced in 2022 but the digital equipment and the PACS system are costly	Company C ■ PACS ■ Provides support for remote imaging diagnosis of large hospitals, university hospitals, and small and medium-sized hospitals in rural areas where there is a shortage of doctors, and to improve the uniformity of regional medical care
Low quality of education, insufficient skills and knowledge and ICT literacy of health personnel	Company D ■ Provides visual reality software that enhances medical treatments, procedure planning and education
NCDs account for major part of deaths while the services are not sufficiently provided	Company E ■ A communication app designed for physicians and other medical professionals to share clinical medical information in order to achieve greater diagnostic precision and better patient care ■ Targets acute care such as stroke, myocardial infarction as well as trauma and cancer
--	Company F ■ VoIP app for smartphone which enables communication and payment

Summary

As it has been revealed from this survey, Ukraine faces challenges of high disease burden of NCDs and MDR-TB as well as those related to the health systems. The health reform has been underway to achieve UHC by overcoming such challenges with the support of eHealth system. However, introduction of eHealth system has not been smooth, on the one hand due to its implementation (i.e. frequent changes in leadership, absence of action plan and insufficient financial and technical resources), on the other hand due to the insufficient capacity for effective utilization. To address and solve such challenges, the survey team elaborated and presented to the Ministry of Health the above proposals with the Japanese solutions as shown in the Table 5-16. The MoH has expressed virtually non-objection and looked forward to the future collaboration with the Japanese technologies.

6 Trends in Japan

6.1 Policy, Legal System, and Efforts

6.1.1 Vision

In the Fifth Science and Technology Basic Plan, the Japanese government formulated a policy vision known as "Society 5.0." It refers to a new society that follows the hunting society (Society 1.0), the agricultural society (Society 2.0), the industrial society (Society 3.0), and the information society (Society 4.0). It was proposed a future society that Japan should pursue. Instead of focusing on conventional technology, it aims to create a human-centered society that balances economic development and solving social issues by integrating virtual space and real space at an advanced level.[288]

6.1.2 Policy and related laws

In December 2016, the Japanese government enacted the Basic Law for the Promotion of Utilization of Public-Private Data, which obligates the government to promote various measures that contribute to the utilization of public-private data, including the development of a data-sharing environment and the adoption of the principle of online use of administrative procedures. [289] In May 2017, the "Basic Plan for the Promotion of the Utilization of Public-Private Data and the Declaration to be the World's Most Advanced Digital Nation" was formulated to embody the law. [290]Concerning initiatives in the field of e-government, the "Policy for the Promotion of Digital Government" was formulated in May 2017, and it was decided to fundamentally review the modality of administration based on digital premises to realize e-government. [291] The Digital Government Action Plan was formulated in January 2018 as a plan to concretize the direction outlined in the Digital Government Promotion Policy. Subsequently, in December 2019, the Digital Procedures Law was promulgated to update various existing laws related to e-government. [292]This law stipulates the "Basic Principles for the Promotion of Administration Utilizing Information and Communications Technology," which consists of "Digital First," "Once-Only," and "Connected One-Stop." The government is also about to restructure its system for e-government. The Basic Law for the Formation of a Digital Society to be enforced in September 2021 stipulates the establishment of the Digital Agency and the formulation of a priority policy program. [293] It is a new agency established to overcome the

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[288] 内閣府、Society 5.0 とは https://www8.cao.go.jp/cstp/society5_0/ (accessed on 20 August 2021)
[289] 内閣府、官民データ活用推進基本法 https://www.kantei.go.jp/jp/singi/it2/hourei/pdf/detakatsuyo_gaiyou.pdf(accessed on 20 August 2021)
[290] 政府 CIO ポータル、世界最先端デジタル国家創造宣言・官民データ活用推進基本計画 https://cio.go.jp/data-basis(accessed on 20 August 2021)
[291] 高度情報通信ネットワーク社会推進戦略本部・官民データ活用推進戦略会議、デジタル・ガバメント推進方針 https://www.kantei.go.jp/jp/singi/it2/kettei/pdf/20170530/suisinhosin.pdf (accessed on 20 August 2021)
[292] 内閣官房 IT 総合戦略室、デジタル手続法（デジタル行政推進法関係）に基づく政省令及び情報システム整備計画の策定について https://www.kantei.go.jp/jp/singi/it2/senmon_bunka/dejigaba/dai7/siryou3.pdf(accessed on 20 August 2021)
[293] 内閣官房、デジタル社会形成基本法案の概要 https://www.cas.go.jp/jp/houan/210209_1/siryou1.pdf (accessed on 20 August 2021)

traditional vertical structure and promote the creation of a cross-ministry electronic government. It implements policies based on the Digital Minister and the Chief Digital Officer. To introduce the latest digital technology, a large number of external human resources from the private sector is appointed.[294] The first Digital Minister is Takuya Hirai, and The first Chief Digital Officer is Ishikura Yoko.[295]

6.1.3 Initiatives

6.1.3.1 Infrastructure ID

The Government Common Platform has been in operation since 2013 as a common IT resource for ministry-wide systems and small and medium-sized information systems in the Government of Japan. [296] In October 2020, the "Second Government Common Platform" utilizing cloud services was launched, and Amazon Web Service is being utilized.[297]

The Japanese government operates the Basic Resident Registration Network System (Residential Basic Network) and the “My Number” (Social Security and Tax Number System), respectively, for the Family Registration Database and ID, which form the basis of e-government. The Residential Basic Network is a system that links local governments throughout the country with national data centers via dedicated lines, enabling the digitization and networking of "identity confirmation information" such as names and birth dates. [298] The "My Number" is the 12-digit national ID designed to enhance convenience by linking information such as taxes, in addition to identity confirmation information. [299] Because the "My Number Card" linked to the My Number can be set as well as the user's identity, an electronic signature can be optionally set, and it is expected to be utilized in various administrative procedures such as filing tax returns.

6.1.3.2 Open data[300]

The Basic Law for the Promotion of Utilization of Public-Private Data, enacted in December 2016, obligates local governments to take measures for open data. The types of open data to be disclosed are summarized in the "Recommended Data Set", and the status of efforts by local governments is tabulated and disclosed. In addition, as an initiative to support the disclosure of open data by local governments, the Ministry has been dispatching experts as open data missionaries to prepare guidelines and guidebooks and provide training on open data.

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[294] デジタル庁 Website https://www.digital.go.jp/ (accessed on 20 August 2021)
[295] デジタル庁 Website https://www.digital.go.jp/about/member (accessed on 13 September 2021)
[296] 総務省、政府共通的な情報システムの整備 https://www.soumu.go.jp/main_sosiki/gyoukan/kanri/a_01-03.html (accessed on 20 August 2021)
[297] Amazon、第二期政府共通プラットフォームが AWS 上で運用を開始、 行政サービスのデジタルトランスフォーメーションを加速 https://aws.amazon.com/jp/about-aws/whats-new/2020/10/japan-government-common-platform-launches-on-aws-to-accelerate-digital-transformation-of-citizen-services/ (accessed on 20 August 2021)
[298] 総務省、「住基ネット」って何？ https://www.soumu.go.jp/main_sosiki/jichi_gyousei/c-gyousei/daityo/juuki01.html (accessed on 20 August 2021)
[299] 内閣府、マイナンバー（社会保障・税番号制度） https://www.cao.go.jp/bangouseido/(accessed on 20 August 2021)
[300] 政府 CIO ポータル、オープンデータ https://cio.go.jp/policy-opendata (accessed on 20 August 2021)

6.1.3.3 Trends in Smart Cities and Individual Sectors

Smart cities are being actively promoted in various parts of Japan to improve resident services using ICT.[301][302][303][304] As various forms of smart city implementation have started to be implemented in different cities, the national government has created a common design chart for smart city implementation and has publicized it as the "Smart City Reference Architecture."[305]

In recent years, a variety of ICT technologies have been introduced as tools for smart cities, and "urban operating systems" have attracted particular attention. Urban operating systems are the service infrastructure for reusing and horizontally deploying individual smart city services, utilizing inter-disciplinary data, and facilitating scalability.[306]

In light of the inadequate legal system for the rapid development of ICT, the national government announced the "Super City" initiative as a framework for integrating the provision of advanced smart city services and regulatory reform. [307] Local governments selected for this project are expected to be able to provide cross-sectoral and advanced services that would have been difficult to achieve under the existing laws and regulations by carrying out regulatory reform in cooperation with the central government.

In addition, to promote digital transformation in local governments, the Local Government DX Promotion Plan was announced. In this plan, the content of the priority measures to be taken by local governments is specified and the support measures, etc. of relevant ministries and agencies are also compiled.[308]

Efforts in the field of e-Health are described in Chapter 5 of this report.

6.2 Japanese companies

The following is a summary of the Japanese companies that were interested in Ukraine and cooperated in this survey among the Japanese companies that are developing their business in the fields of e-government and e-Health. We sorted out the business of each company, interest in Ukraine, and issues related to Ukraine's expansion.

Many of the Japanese companies interviewed were interested in Ukraine. On the other hand, many companies feel that they have issues for the expansion into Ukraine. These problems can be divided into "Insufficient Information," "Public-Private Support," "Legal System," and "Cultural and Political

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[301] 会津若松市、「スマートシティ会津若松」の実現に向けた取組について
https://www.city.aizuwakamatsu.fukushima.jp/docs/2013101500018/
[302] 高松市、スマートシティたかまつ
http://www.city.takamatsu.kagawa.jp/kurashi/shinotorikumi/machidukuri/smartcity/index.html
[303] 浜松市、デジタル・スマートシティの推進　https://www.city.hamamatsu.shizuoka.jp/digitalsmartcity/
[304] 福岡市、FUKUOKA Smart EAST https://smartcity.fukuoka.jp/
[305] 内閣府、スマートシティリファレンスアーキテクチャーの使い方　導入ガイドブック
https://www8.cao.go.jp/cstp/stmain/a-guidebook1_200331.pdf
[306] 内閣府、SIP サイバー/アーキテクチャ構築及び実証研究の成果公表
https://www8.cao.go.jp/cstp/stmain/20200318siparchitecture.html
[307] 内閣府、スーパーシティ　https://www.chisou.go.jp/tiiki/kokusentoc/supercity/openlabo/supercitycontents.html
[308] 総務省、自治体 DX 推進計画概要　https://www.soumu.go.jp/main_content/000727133.pdf (accessed on 20 August 2021)

Background in Ukraine."

As for the insufficient information, it was pointed out that there was insufficient information on whether the technology possessed by Ukraine matched the needs of Ukraine, and on the dissemination and use of information in the field. Therefore, it is important to continuously disseminate information from public institutions such as JICA, JETRO, and diplomatic missions abroad.

Concerning public and private sector support, some pointed out the necessity of cooperation with other stakeholders, such as intermediaries with Ukraine and companies that cooperate with Ukraine in their projects, which have a good understanding of Japanese companies. Some companies assumed JICA's support scheme would be utilized, while others worried that the scheme would take long time to begin.

Regarding the legal system, there were concerns about the revision of the Pharmaceutical and Machinery Law, which restrict the use of ICT infrastructure. It is necessary to continue to gather information on these issues.

Regarding the cultural and political background of Ukraine, some companies expressed concerns about issues regarding Ukrainian and Russian language responses and country risks based on the diplomatic relationships between Russia and Ukraine.

6.2.1 Information of Interviewed Japanese companies (e-Government sector)

- Rakuten Europe is a group company of Rakuten. It provides approximately 80 services in Japan, mainly Internet-related services such as e-commerce, Fintech, digital content, and communications. It operates in 30 countries worldwide, with over 1.5 billion people using it. Rakuten Europe operates in Europe and provides about 10 services, including e-commerce, video distribution, and payment-related services.
- Yokogawa Solution Service is a subsidiary of Yokogawa Electric Co., Ltd., the largest specialized manufacturer of industrial instruments and process controls in Japan with operations in 80 countries, and provides factory and infrastructure management solutions. It has a 20% share of the domestic water purification plant. As for assistance to developing countries, Japan has a track record in delivering systems through its ODA water business for JICA and provided assistance in Nigeria, Egypt, Montenegro, Jordan, Palestine, the Philippines, and India. The CIS Headquarters is located in Russia, and there is a system to provide services to Ukraine.
- Water Supply Technical Service Co., Ltd. is a company specializing in the survey of water leaks and the maintenance and management of water supply systems. It provides services and products for detecting and monitoring water leaks using ultrasonic observation technology. In FY2013, JICA completed a feasibility study and demonstration project in India, and in

December 2017, it concluded a direct contract with the city of Bangalore to develop human resources to detect water leaks.

- NICS is a Sothwarehouse headquartered in Okayama Prefecture. Contracted development of various types of software, development of software packages, sales, etc. In addition to being involved in the design and development of container terminal management systems provided by the Mitsui E&S Machinery Co., Ltd., the Company also provides general educational support systems and RPA solutions as products.
- Techno-Fujita is a company in Aichi Prefecture that develops infrastructure such as electrical and power generation facilities. The company is also engaged in the IT solutions business and is developing services to improve the efficiency of construction work.

6.2.2 Information of Interviewed Japanese companies (e-Health sector)

- FUJIFILM Corporation is one of the leading precision device manufacturers in Japan, and in recent years it has also focused on the healthcare field of pharmaceuticals and medical devices. Introduce healthcare IT solutions worldwide, including medical imaging equipment such as X-rays, mammography, CT, MRI, and endoscopes, as well as PACS, which utilizes image data linked from these equipment. JICA Private Sector Partnership Programs are implemented in Indonesia, Brazil, and Kenya.
- Allm is a medical ICT company that develops communication apps between medical professionals, such as "Join" and PHR apps. A demonstration project to build a remote medical care system using the above-mentioned products has been developed in Rwanda (JICA), Russia (Ministry of Internal Affairs and Communications), Malaysia (JETRO), etc.
- LEBER is a start-up company established in 2017 at the University of Tsukuba that provides "LEBER Medical Consultation Applications," a service that enables doctors to consult with doctors 24 hours a day, 365 days a year, anytime, anywhere. Aim to control medical expenses by solving problems in daily medical care and promoting self-medication by physicians. It has been established as a medical consultation platform, and by promoting cooperation with wearable terminals, etc., it is expected to develop not only medical consultation but also daily health management and simple examinations.
- Holoeyes delivers HoloeyesXR Service, visual communication that solves information asymmetries in the medical field. Through this service, applications of 3D Virtual Reality (VR) and Mixed Reality (MR) can be generated from patient CT scan data and MRI data. It is a company selected in 2018 by the Ministry of Economy, Trade, and Industry.
- Castalia is a start-up company that offers new learning methods through cutting-edge technologies, such as the e-learning system Goocus, which specializes in mobile communications. In Tanzania, a PHR app specializing in pregnancy and childbirth called

Taarifa za Mama (Mama's Record) was developed. The database containing medical checkup information was made accessible by two apps: one for midwives and the other for pregnant women, thereby contributing to the reduction of maternal and neonatal deaths.

- PSP develops PACS for storage servers and interpretive viewers. Efforts are being made to improve operational efficiency by introducing PACS in Cambodia and to improve the quality of education by linking large hospitals with medical and technical schools.
- ViewSend ICT Co., Ltd. develops, manufactures, and sells PACS, a medical image information management system. The project has contributed to providing support for remote imaging diagnosis of large hospitals, university hospitals, and small and medium-sized hospitals in rural areas where there is a shortage of doctors, and to improve the uniformity of regional medical care.

6.2.3 Business seminars in Japan

On 25 January 2021, the Survey Team held a 2-hour business seminar online for Japanese companies to inform them of the development challenges and business opportunities in Ukraine. The seminar was attended by 68 people from companies in diverse industries such as healthcare, ICT, food, electronics and logistics.

From 29 July to 4 August 2021, the Survey Team held a series of webinar online for Japanese companies in participation of several stakeholders in Ukraine as presenter (see next table).

Table 6-1 Presenters of Webinar held in Summer 2021

Name	Title	Organization
Alexander Dudchenko	Deputy Minister	MCTD
Mstyslav Banik	Director	MoDT
Yaroslav Kucher	Previous Deputy Minister	MoH
Jamets Alexander	Head	Electric Health
Olena Hunko	Head of IT office	Lviv City Council
Natalia Mitrofanova	Vice President	IT Ukraine Association
Yaroslav Siryi	Senior Managing Partner	CIET
Hannes Astok	Executive Director	e-Governance Academy (Estonia)
Peeter Ross	e-Health Specialist/ Radiologist	e-Governance Academy (Estonia)

The total number of attendants of the seminar was 58 from companies in diverse industries such as healthcare, ICT, food, electronics and logistics.

Videos of the webinar were uploaded to YouTube with the aim of providing information about Ukraine to

Japanese companies.[309]

Table 6-2 Number of Attendants of Webinar held in Summer 2021

	29th Jul.	30th Jul.	2nd Aug.	3rd Aug.	4th Aug.
Attendants	23	8	11	9	7

6.3 Summary

This chapter introduces Japan's efforts toward e-government and the trend of Japanese companies. In recent years, Japan has made rapid progress toward e-government, and the Digital First, One Only, and Connected One-Stops principles of the Digital Procedures Act have been proclaimed, prompting the establishment of a Digital Office to strongly promote the national DX. In addition, the introduction of government clouds and the popularization of the "My Number" has been advancing. In recent years, smart city-related initiatives have been implemented by local governments nationwide. Regarding the opinions of Japanese companies regarding Ukraine's expansion into Ukraine, while many Japanese companies are positive about their expansion into Ukraine, there are also issues concerning the insufficient information, public and private support, legal system, and Ukrainian culture and political background. It is necessary to continue providing information and dialogue on these issues.

[309] YouTube, https://www.youtube.com/channel/UCtcDF3-yCnyYgY-kbxByxPQ

7 ANNEX

7.1 ANNEX 1

Programme of Action of the Cabinet of Ministers of Ukraine (MODT Part)

2. Ministry of Digital Transformation (Deputy Prime Minister)

2.1. Development of administrative services and their digitalization

- Achieve digital transformation in priority sectors and areas of public life.
- Ensure access of citizens and business to quality and convenient public services, free from corruption risks.
- Ensure conversion of most frequently requested public services in the electronic form.
- Ensure speedy and convenient delivery of public services at administrative services centres, optimize delivery procedure of public services.
- Develop and expand the network of administrative services centres and increase the number of services provide through such centres.
- Regulate fees and charges for administrative services by introducing a common framework for determining the amounts of administrative fees, payment procedure and use of the fees paid.
- Introduce a system for monitoring and evaluation of quality of public services delivery.
- Develop and optimize public electronic registries, centralize support, build basic public electronic registries and implement electronic interaction.
- Ensure reliable protection of information contained in public electronic registries and create effective system to counteract cyberthreats, ensure personal data protection, in line with the European standards.
- Develop e-democracy tools, in particular an online platform for interaction between public administration and civil society, put in place a mechanism for electronic voting to elect public councils at central and local executive bodies.
- Develop means of electronic identification, new mechanisms for qualified electronic signature and opening of data sets.
- Raise citizens' awareness on available public services, in particular those accessible electronically.

Expected results and indicators:

- the rules governing interaction between the state, on the one hand, and citizens and business, on the other hand, in the context of performance of public administration functions are transparent and compatible with the European principles of good governance;
- increased number of administrative services are provided in the electronic form;
- at least 200 government services are accessible online;
- 60% of Ukrainians use online services;
- 90% of Ukrainians who have used public services at administrative services centres or online are satisfied with their quality;
- the number of generated qualified certificates of signatures and seals of users of electronic trust services has increased by 35% (versus 2019);
- the number of established administrative services centres (local branches, remote work stations of administrators, mobile administrative services centres) has increased by 30%;
- the number of services provided at administrative services centres has increased by 35%.

2.2. Informatization of society

- Develop the Internet access network, create conditions for mobile technologies of fourth and fifth generation.

- Ensure access of social infrastructure institutions, local self-governments and citizens to high-speed Internet.
- Create opportunities for the development of fibre optic networks by improving legislation setting requirements for providers and access to infrastructure.
- Align operational equipment, certification of customer equipment and quality indicators with the European standards regarding radiation norms.
- Carry out monitoring of Internet coverage on Ukraine's territory and quality of broadband Internet access.
- Optimize the use of radio frequency resource.
- Improve management of the national main fibre optic networks.
- Simplify the operational requirements for small and medium telecommunication operators and providers.
- Expand access and opportunities for people regarding safe and effective use of the Internet both for personal enrichment and running own business by improving digital skills.

Expected results and indicators:

- 95% of Ukrainian citizens live in settlements with mobile broadband Internet coverage with speeds of at least 2 Mbit/s.
- 95% of rural households have technical possibility to connect to fixed broadband Internet with speeds of at least 100 Mbit/s.
- 75% of households use fixed broadband Internet with speeds of at least 30 Mbit/s.
- 95% of social infrastructure institutions and local self-governments are connected to fixed broadband Internet with speeds of at least 100 Mbit/s

2.3. Promotion of IT business

- Attract investment capital for the development of IT business and other creative industries by creating accessible tools for investment mobilization and introducing a special legal regime for operations.
- Ukraine to join the Digital Single Market of the EU through granting of the internal market regime with the EU in the area of telecommunication services and gradually integrate with the Digital Single Market of the EU (digital visa-free regime).
- Develop and implement public policy on virtual assets

Expected results and indicators:

- Ukraine has met conditions to be granted the internal market regime with the EU in the area of telecommunication services;
- IT sector accounts for 10% of Ukraine's GDP.

- 2.4. Digital literacy of Ukrainians
  Citizens have access to digital literacy programmes in user-friendly form. Citizens are able to use digital devices and the Internet in the partner network of hubs.
- Digital literacy of mandatory for civil servants and doctors.
- The definition of digital competency for citizens, IT specialists and entrepreneurs has been align with the European standards.
- Possibilities are increased for people to enjoy safe use of the Internet due to improved digital skills, create a system for prevention and response.

Expected results and indicators:

- 6 million Ukrainians have completed a digital literacy programme;
- 5,000 trainers have completed a digital literacy course and train Ukrainians of different

age groups;
- a digital literacy platform is created, with over 3 million registered users.
- a partner network of hubs (up to 2,500) is created with the possibility to access digital devices and the Internet;
- an online platform is created for children, parents and teachers in order to raise awareness and respond to incidents of risks and threats in the Internet.

7.2 ANNEX 2

CABINET OF MINISTERS OF UKRAINE
DECREE

of 25 April 2018 #411 Kyiv

On some issues regarding the e-health system

{With changes made in accordance with the Resolutions of the Cabinet of Ministers
№ 526 dated June 19, 2019
№ 348 dated 15.04.2020}

In accordance with the Article 11 of the Law of Ukraine "On state financial guarantees for medical services provision to the public" the Cabinet of Ministers of Ukraine decrees:

Approve the attached:

Procedure for the functioning of e-health system;

Procedure for publishing information from e-health system by the National Healthcare Service.

Establish, that the functionality of e-health system, foreseen by the Procedure enacted by this Decree, is implemented in accordance with the stages of implementation of state financial guarantees for medical services provision to the public, according to the Law of Ukraine "On state financial guarantees for medical services provision to the public". From the effective date of this Decree functionality of the electronic system of healthcare is gradually implemented for the implementation of state financial guarantees for medical services provision to the public on the level of primary healthcare.

Establish, that until the activation of electronic interaction between the central database of e-health system and state electronic information resources, the managers of such resources are obligated to provide at the request of the Ministry of Health and the National Healthcare Service information in electronic form, which is contained in corresponding state information resources and is necessary for the functioning of e-health, within ten working days from the moment of receiving such requests and in compliance with the Law of Ukraine "On the protection of personal data".

Introduce attached changes into the Decrees of the Cabinet of Ministers of Ukraine.

Declare ineffective the Decree of the Cabinet of Ministers of Ukraine of 06 June 2012 # 546 "On approval of Provisions for electronic registry of patients" (Official Bulletin of Ukraine, 2012, # 47, p. 1832).

The Ministry of Health:

to elaborate full architecture and legal-regulatory acts, necessary for the functioning of e-health within the framework of implementing state financial guarantees for medical services provision to the public on the level of secondary (specialized), tertiary (highly specialized) and other types of healthcare in accordance with the stages of implementation of state financial guarantees for medical services provision to the public according to the Law of Ukraine "On state financial guarantees for medical services provision to the public";

to ensure establishing, functioning and financing of central database for e-health and transfer of ownership rights to central database software to the National Healthcare Service by 1 January 2019;

to ensure the inclusion into e-health central database of data, contained in the electronic medical information interchange system, created on the basis of the Concept for Healthcare System Financing Reform, approved by the Resolution of the Cabinet of Ministers of Ukraine of 30 November 2016 #1013 (Official Bulletin of Ukraine, – 2017, #2, p. 50), and the Action Plan for the Implementation of the Concept for Healthcare System Financing Reform for the period till 2020, approved by the Resolution of the Cabinet of Ministers of Ukraine of 15 November 2017 #821, and the verification of corresponding data;

to ensure the establishment of comprehensive system for data protection with verified compliance of the e-health central database.

Prime Minister of Ukraine V. GROYSMAN

APPROVED
by the Decree of the Cabinet of Ministers of Ukraine of 25 April 2018 #411

PROCEDURE

for the functioning of e-health system

General information

This Procedure defines the mechanism of functioning for e-health system and its components (hereinafter – the System), registration of users, entering and interchange of information and documents in the System in accordance with the Law of Ukraine "On state financial guarantees for medical services provision to the public".

In this Procedure the terms are used in the following meaning:

1) administration of the central database (hereinafter – the administration) – the implementation of

organizational, technical and other measures necessary to ensure the functioning of the central database of the electronic health care system;
2) the owner of the information of the register – the authorized body of state power, which determines the purpose and procedure of data processing in the relevant register of the central database;
3) verification – a set of measures to compare, establish compliance and confirm the information contained in the registers of the central database, with information contained in the same or other registers of the central database or other state information resources, as well as information obtained, in particular by electronic interaction, from public authorities, local governments, enterprises, institutions, organizations that are the owners and / or managers of such information, information obtained as a result of measures to monitor compliance with the terms of contracts and verify NHSU compliance by health care providers with the requirements of the Procedure for using funds provided in the state budget for the implementation of state guarantees of health care and health care contracts population, other data;
4) electronic medical information system (MIS) – information and telecommunication system that allows to automate the work of economic entities in the field of health care, to create, view, exchange information in electronic form, in particular with a central database (in case of connection);

5) electronic portal – a personalized web page or interface through which the user in accordance with his access rights has the opportunity to create, view, exchange information and documents in the electronic health care system in accordance with this Procedure;
6) NHSU information system – a set of information subsystems for concluding and executing contracts, analyzing data, forming analytical and financial reports, exchanging information between users, the purpose of which is to ensure the implementation of functions assigned to NHSU on the implementation of state policy in the fiewld of state financial guarantees of medical care;
7) users – individuals and legal entities that are registered in the electronic health care system and have access rights in accordance with this Procedure;
8) medical information – information about the patient's state of health, his/her diagnosis, information obtained during the medical examination, in particular the relevant medical documents relating to the patient's health;
9) place of medical services – the actual address of the business entity in the field of health care business activities in medical practice, according to which persons covered by state guarantees of medical care in accordance with the Law of Ukraine "On state financial guarantees of medical care ”(Hereinafter - patients), medical services are provided;
10) operator – a legal entity or a natural person – entrepreneur who is the owner of an electronic medical information system or manager of an electronic medical information system with the right to connect such a system to a central database on the basis of an agreement with the owner of an electronic medical

information system;
11) data set – a list of structured information that is processed in the electronic health care system;
12) software module – a service in the electronic health care system, which provides filling and exchange of information between registers, information system of the NHSU;
13) administrator of the register – the authorized body of state power responsible for verification of information in the relevant register of the central database;
14) central database (CDB) – information and telecommunication system, which contains registers, software modules, electronic medical information and analytical system to optimize the work of operational and dispatching services of emergency care and disaster medicine, information system of the NHSU in the part necessary for the implementation of state financial guarantees of medical care, as well as provides the opportunity to create, view, exchange information and documents between registers, state electronic information resources, electronic medical information systems.

Other terms in this Procedure are used in the meanings stipulated by Basic Healthcare Legislation of Ukraine, Laws of Ukraine “On state financial guarantees for medical services provision to the public”, “On information”, “On personal data protection”, “On protection of information in information-telecommunication systems”, “On e-documents and e-document circulation”, On electronic trust services "," On the Unified State Demographic Register and documents confirming the citizenship of Ukraine, identity or special status ", the Procedure for organizing electronic information interaction of state electronic information resources, approved by the resolution of the Cabinet of Ministers of Ukraine of May 10, 2018 № 357 (Official Gazette of Ukraine, 2018, № 41, p. 1450), other legislative acts.

{Item 2 in the wording of the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}.
The electronic health care system includes a central database (CDB) and electronic medical information systems (MISs), between which the automated exchange of information, data and documents through an open software interface (API) is provided.
{Item 4 is excluded on the basis of the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applies from April 1, 2020}.
The owner of the CDB, as well as of property rights to the CDB software, is the state, acting through the NHSU.
The Ministry of Health is the owner of the information of the Register of Medical Specialists, the Register of Business Entities in the Field of Health Care and the Register of Medical Consultations. The administrator of the Register of Medical Specialists, the Register of Business Entities in the Field of Health

Care and the Register of Medical Consultations is the NHSU.

{Paragraph two of item 5 in the wording of the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall be applied from April 1, 2020}

The administrator of other registers and the owner of their information and other information in the central database is the NHSU, unless otherwise provided by law.

The administrator of the central database is the state enterprise “Electronic Health” (hereinafter - the administrator), except for the Information System of the NHSU, the administration of which is provided by the NHSU. The administrator does not process patients' personal data.

{Paragraph 6 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

Purpose and functionality of the Electronic Health Care System (System)

The purpose of the System is to ensure that patients can use electronic services to exercise their rights, in particular under the program of state guarantees of medical care (hereinafter – the program of medical guarantees), automation of medical services and medical information management, introduction of electronic document management in the field of medical care.

{Paragraph 7 in the wording of the Resolution of the Cabinet of Ministers від 348 of 15.04.2020 - shall apply from April 1, 2020}.

Functionality of the System must ensure:

possibility of e-registration of users in the CDB, including such means as e-identification;

delimitation of user access permissions for entering, reviewing, editing and adding information in the CDB (hereinafter — access permissions);

possibility of creating, entering, reviewing and exchanging the declarations on choosing the doctor, who is to provide primary healthcare services (hereinafter – declarations), prescriptions, referrals, medical records, other information and documents via the e-accounts in compliance with the users’ access permissions;

the System’s accessibility for the users with impaired hearing and vision;

possibility for patients (and their legal representatives) to give their consent in written form or in the form that allows concluding that the consent was given, to access their personal data (patient data for patient’s legal representatives), contained in the System, to doctors and other third parties;

possibility for patients to receive information on who requested their personal data from the System;

conducting search and review of information in the CDB in accordance with the users’ access permissions and in compliance with the Law of Ukraine “On the protection of personal data”;

possibility of signing, amending and terminating of contracts for medical services provision to the public,

as well as contracts for reimbursement pursuant to the programme of state medical guarantees (hereinafter – contracts pursuant to the programme of medical guarantees), drawing and submitting e-reports, primary, payment and other documents relating to such contracts (hereinafter – e-reports) via the CDB;
storage, automated backup and restoring of data sent to the CDB, ensuring uninterrupted access to the CDB;
protection of data from unauthorized access, deletion, editing;
logging of operations (entering, reviewing, editing, etc.) with information and documents in the CDB, as well as events in the System, which are related to its security;
possibility to use state classifiers, nomenclatures and directories, approved in accordance with the procedure established by law, for entering and systematization of data in the CDB;
usage of unified standards for exchange of medical information, approved by the MoH;
13^{-1}) connection to the system of electronic interaction of state electronic information resources in the manner prescribed by law;

{Paragraph 8 is supplemented by sub-paragraph 13-1 in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}
compatibility and electronic interaction, in accordance with the procedure established by law, between the CDB and other information systems and state information resources, in particular with:
Unified State Demographic Registry;
Unified State Registry for Legal Entities, Individual Entrepreneurs and Public Organizations;
State Civil Acts Registry;
State Register of Individuals - Taxpayers;

{Subparagraph 14 of paragraph 8 is supplemented by a new paragraph in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}
Information systems of the Ministry of Social Policy;

{Subparagraph 14 of paragraph 8 is supplemented by a new paragraph in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}
Unified State Electronic Database on Education-related Issues;
Unified State Registry of the Ministry of Internal Affairs;

Information and analytical platform for electronic verification and monitoring;

{Sub-item 14 of item 8 is supplemented with a new paragraph in accordance with the Resolution of the

Cabinet of Ministers № 526 of June 19, 2019}

other resources, mentioned in the legal-regulatory acts, regulating the interaction of state electronic information resources;

provision of other electronic services in accordance with the procedure established by the MoH.

Protection of information in the CDB is done in accordance with the legislation on the protection of data in information-communication systems.

Processing of personal data in the System is done in compliance with the requirements of the Law of Ukraine “On the protection of personal data”.

Technical means of the CDB must be located on the territory of Ukraine.

The System must allow for connection with the following modules of the NHSU:

module for data analysis and drawing analytical reports;

module for drawing payment documents, reports and managing the payment processes (module for the interaction with the providers of medical services);

other modules, necessary for the NHSU to be able to fulfil its functions, stipulated by the legislation.

The System interacts with databases and information systems in the sector of healthcare, which function on local levels, in accordance with the procedure established by the MoH.

General requirements to information

and documents within the System

Creation, entering, reviewing and editing of information and documents in the CDB, making changes and additions to them are carried out by users in accordance with the access rights established by this Procedure and regulations governing the maintenance of relevant registers.

{Paragraph 14 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

Information and documents are created and entered into the CDB in Ukrainian language. In case the usage of Ukrainian alphabet results in the distortion of information, Latin alphabet can be used as well as special symbols, in particular for entering Internet addresses and e-mails.

Document circulation within the System is done in accordance with the requirements of legislation on e-documents and e-document circulation. All electronic documents and information entered into the electronic health care system are subject to a qualified electronic signature of the author in accordance with the Law of Ukraine “On Electronic Trust Services”.

{Paragraph 16 as amended by the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}

National and state classifiers, nomenclatures and directories approved in accordance with the procedure established by the legislation, in particular special classifications and lists approved by the Ministry of

Health, are used to enter information and documents into the central database. The administrator provides technical support for the application of such classifications, nomenclatures, directories and lists.

{Paragraph 17 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

Every document and datum, entered into the CDB, gets an automatic unique record in the corresponding registry.

The ID of the individual is a unique number of the record in the Unified State Demographic Registry (if available).

CDB registries

In the CDB such registries are maintained:

Patients Registry, which contains the information on individuals, who are entitled to the guarantees pursuant to the Law of Ukraine “On state financial guarantees for medical services provision to the public”.

This Registry contains the following information about the patient:

unique number of the record in the Unified State Demographic Registry (if available);

registration number of taxpayer's registration card (if available) or the series and number of passport (for individuals, who due to religious beliefs refuse to register for obtaining the registration number of taxpayer's registration card and informed of that the corresponding authority, and who have a corresponding marking in their passport);

surname, name, patronymic;

date and place of birth;

address of the actual place of residence or stay;

series and number (if available) of the document, that identifies the individual (passport of a citizen of Ukraine; temporary ID of a citizen of Ukraine; birth certificate (for individuals under the age of 14); a permanent residence permit in Ukraine; refugee certificate; ID of an individual in need of additional protection), authority that issued the document, date of issue, term of validity;

phone number, e-mail address (hereinafter – contact details) (if provided);

information on the legal representative of the individual (surname, name, patronymic, personal ID and documents identifying them as legal representative according to legislation) (if available);

other data, stipulated by the MoH.

Information from the Patient Registry is the restricted access information.

Registry of Declarations on Choosing the Doctor to provide primary healthcare services contains the information on declarations.This Registry contains such data:

reference to the patient record in the Patients Registry;

reference to the record of the medical worker, who was chosen by the patient (their legal representative) as the doctor to provide PHS, in the Medical Workers Registry;

reference to the record of the medical services provider in the Healthcare Business Entities Registry;
reference to the record on the place of medical services provision, chosen by the patient, in the Healthcare Business Entities Registry;
other data, stipulated by the MoH.
Healthcare Business Entities Registry contains the information on healthcare institutions, individual entrepreneurs licensed for conducting business in the form of practicing medicine and laboratories, who have contracts or plan to apply for drawing contacts pursuant to the programme of medical guarantees or involved into providing medical services by medical services providers (hereinafter – healthcare business entities).
This Registry contains such data:
full and short (if available) company name of the legal entity or the surname, name and patronymic for individual entrepreneur;
code by USREOU or the registration number of taxpayer's registration card (if available) or the series and number of the passport (for individuals, who due to religious beliefs refuse to obtain the registration number of taxpayer's registration card and informed of that the corresponding authority, and who have a corresponding marking in their passport) of the healthcare business entity;
form of ownership (for legal entities);
location;
surname, name, patronymic, position title, contact details of the top manager of the healthcare business entity;
surname, name, patronymic, position title of individuals, who were given by the healthcare business entity the permission to access the System, as foreseen by clause 43 of this Procedure (hereinafter – authorized employees of the business entity), indicating the extent of such access permission;
information on effective and cancelled licenses, accreditation and other permit documentation of a healthcare business entity;
information on places of medical services provision or stand-alone divisions of pharmacy institutions (address, contact details);
other data, stipulated by the MoH.
Medical Specialists Registry, which contains the information on individuals, who obtained education in the field of healthcare (hereinafter – medical specialists
This Registry contains such data:
reference to the medical specialist record in the Patients Registry;
level of qualification and education of the medical specialist;
specialization of the medical specialist;
date of beginning working experience according to specialization and information on periods of time

during which the individual did not work according to specialization;
information on qualification upgrades and retraining of medical specialist;
other data, stipulated by the MoH.
Information is entered into this Registry, in particular, through electronic interaction and exchange of information with the Unified State Electronic Database on Education-related Issues.
Medical Workers Registry, which contains information about professionally trained persons who, in accordance with the law, have the right to provide medical care (hereinafter – medical workers).

{The first paragraph of sub-item 5 of item 20 in the wording of the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - shall be applied from April 1, 2020}.
This Registry contains such data:
reference to the record of the medical worker in the Medical Specialists Registry;
reference to the record of the healthcare business entity in the Healthcare Business Entities Registry;
position title and specialization of the medical worker;
contact details for making an appointment with this medical worker;
other data, stipulated by the MoH.
Registry of Contracts for Medical Services Provision to the Public, which contains the information on contracts for medical services provision to the public, pursuant to the programme of medical guarantees, signed with the NHSU.
This Registry contains such data:
date of signing, validity term of the contract;
reference to the record of the medical services provider in the Healthcare Business Entities Registry;
references to the records of medical workers, who are involved in the provision of medical services under the contract, in the Medical Workers Registry;
references to the records in the Healthcare Business Entities Registry of healthcare business entities (healthcare institutions, individual entrepreneurs licensed to practice medicine, laboratories) who/which are involved by the medical services provider into fulfilling the contract;
references to the records in the Healthcare Business Entities Registry of places for medical services provision, where contracted medical services will be provided;
contact details for making an appointment with the doctor;
medical services, which provider of medical services is obligated to provide under the contract;
information on the equipment of the provider of medical services;
expiration date of the contract;
information on amendments introduced to the contract;
other data, stipulated by the MoH.

Registry of Contracts for Reimbursement, which contains the information on contracts for reimbursement pursuant to the programme of medical guarantees, signed with the NHSU.
This Registry contains such data:
date of signing, validity term of the contract;
reference to the record of a pharmacy institution in the Healthcare Business Entities Registry;
reference to the record of stand-alone divisions of pharmacy institutions, where patients can get prescribed medication, in the Healthcare Business Entities Registry;
information on amendments introduced to the contract;
expiration date of the contract;
other data, stipulated by the MoH.
Register of medical records, referral records and prescriptions.

The following information is included in the specified Register:

entry number in the Register of medical records, referral records and prescriptions;

date and time of entry in the Register of medical records, referral records and prescriptions;

a reference to an entry in the Register of Business Entities in the field of health care about the place of medical services where the patient's medical care was provided, or an indication "at the patient's place of residence";

reference to the entry in the Register of business entities in the field of health care about the business entity that provides medical care;

reference to the entry in the Register of medical workers about the medical worker, under whose qualified electronic signature the entry was made in the system;

link to the entry in the Register of Patients about the patient;

the patient's age;

the sex of the patient;

other information provided by the procedure for maintaining the Register of medical records, referral

records and prescriptions approved by the Ministry of Health;

{Subparagraph 8 of paragraph 20 as amended by the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}

Register of medical consultations.

The following information is included in the specified Register:

link to the record about the patient in the Register of Patients;

reference to the record of the doctor who formed and signed the medical report in the Register of medical workers;

reference to the entry of the business entity in the Register of Business Entities in the field of health care;

date and time of formation and registration of the medical consultation in the Register of medical consultations;

type of medical consultation;

the essence of the doctor's opinion in accordance with the type of medical consultation;

the validity of the medical consultation or indication "indefinitely";

other information provided by the procedures for the formation and issuance of medical certificates of the relevant type, approved by the Ministry of Health;

{Paragraph 20 is supplemented by sub-item 9 in accordance with the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - applicable from April 1, 2020}

Other registers in which the data set is determined by the NHSU. Managers of registers and owners of their information, the list of information entered into them, as well as the procedure for their maintenance are approved by the Ministry of Health.

{Paragraph 20 is supplemented by sub-item 10 in accordance with the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - applicable from April 1, 2020}

20^{-1}. Electronic medical information-analytical system for optimizing the operation of operational and dispatching services of emergency medical centers and disaster medicine operates as part of a central database and is a unified information-analytical dispatching system that operates to collect, process, analyze and exchange information to ensure timely provision of emergency medical care and effective quality control of emergency medical care. The order of functioning of the electronic medical information-analytical system on optimization of work of operative-dispatching services of the centers of emergency medical care and disaster medicine is established by the Ministry of Health.

{The procedure is supplemented by paragraph 20-1 in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}

Peculiarities of maintaining certain registries, including data entered into such registries and users' information access permissions in such registries are approved by the MoH.

The registries are maintained in Ukrainian, except for cases, stipulated in clause 0 of this Procedure.

Personal data in the registries can be processed for the purposes of healthcare, medical diagnostics, ensuring treatment or provision of medical services, functioning of the System. Personal data related to health can be processed if they are processed by the medical professional or another person of a health care institution or a natural person - entrepreneur who has received a license to conduct business in medical practice,, as well as by their employees, who are responsible for ensuring personal data protection and who are subject to the legislation on medical confidentiality, by the NHSU employees, who are responsible for ensuring personal data protection.

Operators of the electronic medical information system process personal data in the presence of legal grounds in accordance with the requirements of the Law of Ukraine "On Personal Data Protection".

{Paragraph 23 is supplemented by a paragraph in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}

Information and documents are entered into the registries by users in accordance with their access permissions, stipulated by this Procedure and regulations governing the procedure for maintaining the relevant registers. Information in the electronic health care system can also be entered as a result of electronic interaction with public information resources.

{Paragraph 24 as amended by the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}.

The Ministry of Justice provides the electronic health care system with information from the State Register

of Civil Status Acts on state registration of births, deaths, marriages or divorces (during which the surname is changed), name change by automated exchange of electronic data between information resources The Ministry of Health and the Ministry of Justice through the system of electronic interaction of state electronic information resources in the prescribed manner with the indication of a unique record number in the Unified State Demographic Register of relevant persons (if any). Based on the obtained data, the NHSU carries out verification measures.

{Paragraph 25 as amended by the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}.

Changes and additions to the information, contained in the CDB, are introduced on request from the user. If within ten working days from the receipt of such request the NHSU has not rejected such a statement due to errors or knowingly inaccurate information, the information in the central database shall be amended accordingly. Information about the user who submitted the application for changes and additions, the date and time of their introduction, as well as the initial content of the information is stored in a central database and is not subject to change or deletion.

{Paragraph 26 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

In order to ensure accuracy and reliability of information in the CDB, the NHSU conducts the verification of compliance with the Law of Ukraine “On the protection of personal data”.

All data in all registers of the central database are subject to verification in order to ensure the management of the relevance of data in the system, in particular the detection of duplication of records, other inaccurate information or incomplete information. Verification of data in the registers of the central database is carried out in accordance with the methods and recommendations defined by the NHSU.

{Paragraph 27 is supplemented by a paragraph in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}

{Paragraph 27 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

IIn case of detection in the process or as a result of verification of discrepancies between the information contained in the registers of the central database and the information contained in the same or other registers of the central database or other state information resources, and also the information received from bodies public authorities, local governments, enterprises, institutions, organizations that are owners and / or managers of such information, NHSU makes appropriate changes to the entries in the registers of the central database, taking into account the functionality of the system.

{Paragraph 28 in the wording of the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}.

In case of systematic entering of inaccurate information into the registries by a certain user, the Administrator or manager of the corresponding registry can temporarily suspend the access of such user to the CDB in accordance with the procedure established by the NHSU. The individual's right to obtaining information about themselves as well as to change them on the basis of a reasoned request, in accordance with the Law of Ukraine "On the protection of personal data", cannot be restricted.

{Paragraph 29 as amended by the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - shall apply from April 1, 2020}

Patient's (or their legal representative's) request for the withdrawal of their consent to the processing of personal data or request to provide third party with access to the information stored in the CDB, must be processed within three working days.

User registration

To provide or receive medical services and medication pursuant to the programme of medical guarantees, users must be registered in the corresponding registries.

Registration of the healthcare business entity and authorized employees of such business entity is done by its top manager or by the individual entrepreneur, who is licensed to practice medicine as business activity.

Registration of patients and medical specialists can be done by themselves or through the healthcare business entity.

Patient's legal representative can register the patient only through the medical services provider, in order to ensure the verification of documents identifying them as authorized legal representative.

During the registration process, the identity of the user must be clearly established (identified), and in case of the registration of healthcare business entity – the corresponding legal entity and its top manager or individual entrepreneur, who is licensed to practice medicine as business activity.

In the case of self-registration, electronic identification of the user is done according to the legislation. A patient has the right to use Bank ID for electronic identification and other means of electronic identification in accordance with the legislation.

During the registration process conducted through the healthcare business entity, the identification of user is done by them showing the document, which identifies the individual according to the Law of Ukraine "On the Unified State Demographic Registry and documents that verify citizenship of Ukraine, identify individual or their special status".

After the user is registered, a record in CDB is automatically created.

{Paragraph 38 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

After the registration, logging into their e-account is done by the user through the authentication according to the legislation.

Permissions for access
to information and documents in the CDB

Users access the information in the CDB through their electronic portals. Electronic portals top managers and authorized employees of healthcare business entities, as well as such of medical workers, function within MISs in compliance with the Law of Ukraine “On the protection of personal data”. Patients' electronic portals can function through electronic medical information systems and websites, web portals or mobile applications of authorized state bodies or enterprises belonging to the scope of their management. The use of websites, web portals or mobile applications for access to the patient's electronic office is carried out during the consent of the person to the processing of personal data in cases provided by the Law of Ukraine "On Personal Data Protection".

{Paragraph 40 as amended by the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from April 1, 2020}

Patient (their legal representative) has the right to:

register oneself (or patient, whom they legally represent) in the CDB, submit requests for editing certain information in the Patients Registry;

enter and review information on oneself (or patient, whom they legally represent);

submit requests for withdrawal of consent to processing of personal data, contained in the CDB;

submit declaration of the choice of doctor to provide primary healthcare services, via the System according to the procedure established by the MoH;

grant permission to medical workers and other users to access the information on oneself (information on the patient, whom they legally represent), which is contained in the CDB;

Top manager of the healthcare business entity and an individual entrepreneur, who is licensed to practice medicine as business activity, have the right to:

register register in the central database of an business entity in the field of health care and authorized persons of such business entity, make changes to the relevant information in the Register of business entities in the field of health care;

{Subparagraph 1 of paragraph 42, as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

act in order to sign, change and terminate contracts pursuant to the programme of medical guarantees;

draw and submit to the NHSU e-reports via the System;

act in order to cancel the permission of authorized employees of healthcare business entities and medical workers to access the CDB.

review the information entered by employees into the electronic health care system, taking into account the requirements of the Law of Ukraine "On Personal Data Protection".

{Paragraph 42 is supplemented by sub-clause 5 in accordance with the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - applicable from April 1, 2020}

Authorized employees of healthcare business entities have the right to:

upon being approached by the patient (their legal representative), register the patient in the Patients Registry, submit requests for editing their information in the Patients Registry;

register medical specialists and medical workers in the corresponding Registries, submit requests for editing their data in the corresponding Registries;

enter into the CDB an electronic copy of declaration, signed by the patient (their legal representative) in its hard copy, according to the Procedure for choosing a doctor to provide primary healthcare services, approved by the MoH.

Medical specialists have the right to register themselves in the CDB, submit requests for editing certain information about them in the Medical Specialists Registry.

Medical workers have the right to:

upon being approached by the patient (their legal representative), register the patient in the Patients Registry, submit requests for editing their information in the Patients Registry;

enter into the CDB an electronic copy of declaration, signed by the patient (their legal representative) in its hard copy, according to the Procedure for choosing a doctor to provide primary healthcare services, approved by the MoH;

create, enter into the CDB the information on prescriptions, referrals, other medical records, as well as review and submit requests for editing documents and information, entered by them into the CDB;

submit requests and obtain permissions to access patient’s data, stored in the CDB, necessary for the purposes of healthcare, medical diagnostics, provision of treatment or medical services, functioning of the System, if such medical worker is responsible for personal data protection and is subject to the legislation on medical confidentiality, under the condition of patient (their legal representative) granting their consent for it, or without such consent in cases foreseen by the law;

Head of the NHSU and authorized employees of the NHSU within the limits of their authority have the right to:

register in the CDB themselves, the NHSU and authorized employees of the NHSU, edit corresponding data;

act in order to sign, change and terminate contracts pursuant to the programme of medical guarantees;

obtain permission to access information on contracts pursuant to the programme of medical guarantees in the Registry of Contracts on Medical Services Provision to the Public and in the Registry of Contracts on

Reimbursement;

obtain permission to access information on the actions of the Administrator, which are related to the System, request and receive from the Administrator the clarifications for actions taken, which relate to the System;

obtain from the Administrator information and documents regarding connection, disconnection, suspension of MIS access to the CDB, information on the results of MIS testing;

submit requests and obtain access to the patient data, stored in the CDB, necessary for the purposes of healthcare, medical diagnostics, provision of treatment or medical services, functioning of the System, if such individual is responsible for personal data protection, under the condition of patient (their legal representative) granting their consent for it, or without such consent in cases foreseen by the law;

create, make, view information and documents in the central database, make changes and additions to them in compliance with the requirements of the Law of Ukraine "On Personal Data Protection";

{Subparagraph 7 of paragraph 46 as amended in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - shall apply from 1 April 2020}

8) register in the central database of authorized officials of the National Anti-Corruption Bureau in the manner prescribed by the protocol of interaction between the National Anti-Corruption Bureau and the National Anti-Corruption Bureau.

{Paragraph 46 is supplemented by sub-item 8 in accordance with the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - applicable from April 1, 2020}

47. The Minister of Health and the officials of the Ministry of Health authorized by him shall, within the limits of their powers, have the right to:

1) register themselves, the Ministry of Health and authorized persons of the Ministry of Health in the central database, make changes to the relevant information;

2) create, enter, review information and documents in the registers managed by the Ministry of Health, make changes and additions to them in compliance with the requirements of the Law of Ukraine "On Personal Data Protection".

47-1. Authorized officials of the National Anti-Corruption Bureau, who have been granted access to the registers of the central database in accordance with the protocol of cooperation between the National Anti-Corruption Bureau, have the right to review information in such registers in accordance with the Law of Ukraine “On the National Anti-Corruption Bureau of Ukraine”.

Authorized officials of the National Anti-Corruption Bureau are not granted access to registers containing information on health, sexual life, biometric or genetic data of persons.

{The procedure is supplemented by paragraph 47-1 in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}

47-2. Users have other rights provided by this Procedure and regulations governing the procedures for maintaining the relevant registers of the electronic health care system.

{The procedure is supplemented by paragraph 47-2 in accordance with the Resolution of the Cabinet of Ministers № 348 of 15.04.2020 - applicable from April 1, 2020}

Users are obliged to ensure the submitting of current and reliable data about themselves into the CDB.
Access to personal data is possible under the condition of personal data object's consent, except for cases foreseen by the law.
Administrator
The Administrator is responsible for:
administration and technical support of the central database in order to ensure the smooth operation of the central database;
decision-making on connection, disconnection and suspension of access of the electronic medical information system to the central database, conclusion and termination of relevant agreements with operators;
providing technical support to operators on connection, disconnection, interaction of the electronic medical information system with the central database, confirms the introduction of new functionalities of the system;
provision of information and consulting services on the electronic health care system;
development and maintenance of technical documentation of the central database.

{Paragraph 50 as amended by the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - shall apply from April 1, 2020}
The Administrator is obliged to provide explanations and documentation in response to the NHSU request within ten working days from the receipt of such request, unless other deadline is specified in the NHSU request.
Technical requirements to MIS
Connection of MIS to the CDB
In order to be connected to the CDB, MIS must meet the technical requirements to MIS, elaborated by the Administrator and approved by the NHSU.
To connect MIS to the CDB, the operator submits a request to the Administrator. To such request must be attached:
information and documents (if available), which confirm the rights to the MIS or to the connection of the MIS to the CDB;
specifications of the MIS;
information on the extent of the MIS functionality for work in the System;
an extract from the Unified State Registry for Legal Entities, Individual Entrepreneurs and Public

Organizations with the information on such operator.

In order to establish the compliance of the MIS with technical requirements, the Administrator conducts the testing of such MIS within thirty calendar days from the date of request submission by the operator. Testing is conducted in accordance to the testing programme, elaborated by the Administrator and approved by the NHSU.

Basing on the results of the testing, the Administrator formulates the conclusion and within three working days sends it to the operator.

If the MIS has proven to be non-compliant with the technical requirements, the conclusion must contain the description of such incompliances and suggestions regarding their elimination. The operator has the right to re-submit a request for connection to the Administrator after the elimination of incompliances.

If the MIS has proven to be compliant with the technical requirements, the Administrator signs the contact with the operator regarding the connection to the CDB for the defined extent of functionality to work within the System.

The Administrator publishes on the System's web-site the information about MISs connected to the CDB and their functional capacities within the System, and about the operators, with whom the administrator has signed the contracts, within five working days from the date of signing the contract.

In the event of changes in the technical requirements to MIS or the submission by the operator of a request for the expansion of MIS functionality for work in the System, such MIS shall be re-tested in accordance with clause 0 of this Procedure. If the specified technical requirements or functionalities require amendments to the agreement on connection to the central database, the relevant changes shall be applied from the date of conclusion of the relevant agreement. In other cases, such changes are applied after the completion of re-testing and establishing the compliance of the electronic medical information system with the technical requirements in the form established by the NHSU.

{Paragraph 58 as amended by the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - shall apply from April 1, 2020}

The Administrator has the right to conduct additional tests of the MIS in order to confirm its compliance with the technical requirements.

In case of transfer of rights to the MIS, which is connected to the CDB, the new operator of the MIS shall have the right, within ten working days from the transfer of such rights, submit a request to the Administrator for signing a new contract. To the request must be attached the same documents that are required to connect the MIS. The re-testing of MIS in this case is not carried out. If the new MIS operator fails to submit a request within the abovementioned time period, the MIS will be disconnected from the System.

Information on changes in technical requirements to MIS is published by the Administrator on the web-

site of the System. Changes in technical requirements to MIS take effect one month after their publication, unless otherwise specified in the Order of the NHSU on the approval of such requirements. During this period, the operators must ensure that their MISs are modified to comply with the new technical requirements.

In order to use MIS, healthcare business entities sign a contract with the operator or an individual who has the right, under the contract with such operator, to grant access to use MIS.

Suspending connection or disconnecting MIS from the CDB

The decision on suspending connection or disconnecting MIS from the CDB is made by the Administrator under at least one of the following conditions:

voluntary submission by the operator of a request for disconnecting MIS from the CDB;

violation by the operator of the data protection requirements, including ensuring the integrity, availability, confidentiality and delimitation of access to data entered into the System;

the State Service for Special Communications and Data Protection finding that the MIS operator violated the requirements of legislation on the cryptographic and technical protection of data;

based on the results of testing, the MIS has proven to be non-compliant with the technical requirements;

the operator has no ownership rights to the MIS or to its connection to the CDB;

MIS users having no access to the CDB for more than 24 hours due to technical problems of the MIS;

violation by the operator of the terms of the contract signed with the Administrator;

new operator's failure to submit the request for contract signing with the Administrator within the time period stipulated by clause 60 of this Procedure.

The list of grounds for disconnecting MIS from the CDB is exhaustive.

In case of suspension of MIS connection to the CDB, such connection is restored by the Administrator after the violations are eliminated.

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PROCEDURE

for publishing information from e-health system by the National Healthcare Service

This Procedure establishes the mechanism and defines the extent to publishing of information from the e-health system by the NHSU.

In this Procedure terms are used in the meanings stipulated by the Basic Healthcare Legislation of Ukraine, the Law of Ukraine “On state financial guarantees for medical services provision to the public”, other legal acts.

The NHSU is obligated to publish:

contracts for medical services provision to the public pursuant to the programme of medical guarantees and contracts for reimbursement pursuant to the programme of medical guarantees, together with all addenda, which do not contain personal data, – within five working days from the date of their signing;

depersonalized information on the range and extent of medical services and medicines provided to patients pursuant to the programme of medical guarantees – quarterly;

other impersonal information from the electronic health care system.

{Item 3 is supplemented by sub-item 3 in accordance with the Resolution of the Cabinet of Ministers № 348 of April 15, 2020 - applicable from April 1, 2020}

Information, mentioned in the clause 3 of this Procedure, is to be published on the official web-site of the NHSU.

The NHSU and the e-health CDB administrator, upon the approval of the NHSU, can provide depersonalized information and data, stored in the CDB, as a general reference or statistical information on a contractual basis. Procedure for the provision of information from the registries of the CDB is approved by the MoH.

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APPROVED

by the Decree of the Cabinet of Ministers of Ukraine of 25 April 2018 #411

AMENDMENTS,

to be introduced into the Decrees of the Cabinet of Ministers of Ukraine

To the Procedure for maintaining the State Civil Acts Registry, approved by the Decree of the Cabinet of Ministers of Ukraine of 22 August 2007 # 1064 (Official Bulletin of Ukraine, 2007, # 65, p. 2516; 2008, # 21, p. 600; 2011, # 84, p. 3078; 2012, # 71, p. 2870, # 90, p. 3651; 2015, # 50, p. 1601, # 69, p. 2276, # 102, p. 3525; 2016, # 28, p. 1113, 2016, # 91, p. 2973), must be added clause 9^2 with the following content:

"9^2. Ministry of Justice provides the NHSU with the data from the Registry about state registration of birth, death, marriage or divorce (which resulted in the change of surname), change of name by means of exchanging electronic messages no later than three working days after the day of receipt of corresponding electronic request from the NHSU.";

In the Decree of the Cabinet of Ministers of Ukraine of 8 September 2016 # 593 "Some issues on provision of information from the Unified State Registry of Legal Entities, Individual Entrepreneurs and Public Organizations" (Official Bulletin of Ukraine, 2016, # 71, p. 2393; 2017, # 43, p. 1344):

into clause 1 to add sub-clause 4 with the following content:

"4) in electronic form with the purpose of integrating information from the Unified State Registry into the e-health system.";

2) paragraph four of clause 2 to be worded in the following edition:

"Information according to sub-clauses 3 and 4 of clause 1 of this Decree to be provided on the free of charge basis.";

Into the addendum of the Decree of the Cabinet of Ministers of Ukraine of 8 September 2016 # 606 (Official Bulletin of Ukraine, 2016, # 73, p. 2455; 2017, # 15, p. 438) to add the following item:

"E-health system".

7.3 ANNEX 3

The list of essential drugs

According to the Order of Ministry of Health of Ukraine “On approval of the Register of medicinal products subject to reimbursement, as of May 28, 2020” and in accordance with the second paragraph of paragraph 10 of the Procedure for determining the amount of reimbursement of medicines, approved by the Cabinet of Ministers of Ukraine dated March 17, 2017 № 152 "On ensuring the availability of medicines" (as amended by the Cabinet of Ministers of Ukraine dated April 15, 2020 № 286) the Register of Medicinal Products Subject to Reimbursement as of May 28, 2020 is as follows:

	International name of active substance of the medicinal product	**Trade name of the drug**	**Form**
1	Аміодарон (Amiodarone)	АРИТМІЛ	Tablets
2	Аміодарон (Amiodarone)	Амідарон	Tablets
3	Аміодарон (Amiodarone)	АМІОДАРОН	Tablets
4	Аміодарон (Amiodarone)	АМІОДАРОН-ДАРНИЦЯ	Tablets
5	Аміодарон (Amiodarone)	Аміокордин®	Tablets
6	Аміодарон (Amiodarone)	Кардіодарон-Здоров'я	Tablets
7	Аміодарон (Amiodarone)	Ротаритміл	Tablets
8	Аміодарон (Amiodarone)	АРИТМІЛ	Tablets
9	Аміодарон (Amiodarone)	Аміокордин®	Tablets
10	Амлодипін (Amlodipine)	АМЛОДИПІН-АСТРАФАРМ	Tablets
11	Амлодипін (Amlodipine)	АМЛОДИПІН-ДАРНИЦЯ	Tablets
12	Амлодипін (Amlodipine)	АМЛОДИПІН-ФАРМАК	Tablets
13	Амлодипін (Amlodipine)	АЛАДИН®-ФАРМАК	Tablets
14	Амлодипін (Amlodipine)	АМЛОДИПІН	Tablets
15	Амлодипін (Amlodipine)	Амлодипін	Tablets
16	Амлодипін (Amlodipine)	АМЛОДИПІН САНДОЗ®	Tablets
17	Амлодипін (Amlodipine)	АМЛОДИПІН-АСТРАФАРМ	Tablets
18	Амлодипін (Amlodipine)	Амлодипін-Здоров'я	Tablets
19	Амлодипін (Amlodipine)	Амлодипін-КВ	Tablets
20	Амлодипін (Amlodipine)	АМЛОДИПІН-ТЕВА	Tablets
21	Амлодипін (Amlodipine)	АМЛОДИПІН-ФІТОФАРМ	Tablets
22	Амлодипін (Amlodipine)	ЕМЛОДИН®	Tablets
23	Амлодипін (Amlodipine)	СТАМЛО	Tablets
24	Амлодипін (Amlodipine)	АЛАДИН®	Tablets
25	Амлодипін (Amlodipine)	АЛАДИН®-ФАРМАК	Tablets
26	Амлодипін (Amlodipine)	Амлодипін	Tablets
27	Амлодипін (Amlodipine)	Амлодипін	Tablets
28	Амлодипін (Amlodipine)	АМЛОДИПІН-АСТРАФАРМ	Tablets
29	Амлодипін (Amlodipine)	АМЛОДИПІН-ДАРНИЦЯ	Tablets
30	Амлодипін (Amlodipine)	АМЛОДИПІН-ФАРМАК	Tablets
31	Амлодипін (Amlodipine)	АЛАДИН®-ФАРМАК	Tablets

32	Амлодипін (Amlodipine)	Амлодипін	Tablets
33	Амлодипін (Amlodipine)	АМЛОДИПІН САНДОЗ®	Tablets
34	Амлодипін (Amlodipine)	АМЛОДИПІН-АСТРАФАРМ	Tablets
35	Амлодипін (Amlodipine)	Амлодипін-Здоров'я	Tablets
36	Амлодипін (Amlodipine)	Амлодипін-КВ	Tablets
37	Амлодипін (Amlodipine)	АМЛОДИПІН-ТЕВА	Tablets
38	Амлодипін (Amlodipine)	ЕМЛОДИН®	Tablets
39	Амлодипін (Amlodipine)	СТАМЛО	Tablets
40	Амлодипін (Amlodipine)	АЛАДИН®-ФАРМАК	Tablets
41	Амлодипін (Amlodipine)	Амлодипін	Tablets
42	Амлодипін (Amlodipine)	Амлодипін	Tablets
43	Атенолол (Atenolol)	Атенолол	Tablets
44	Атенолол (Atenolol)	АТЕНОЛОЛ-АСТРАФАРМ	Tablets
45	Атенолол (Atenolol)	Атенолол-Здоров´я	Tablets
46	Атенолол (Atenolol)	АТЕНОЛОЛ-АСТРАФАРМ	Tablets
47	Беклометазон (Beclometasone)	БЕКЛАЗОН-ЕКО	Inhaler (aerosol)
48	Беклометазон (Beclometasone)	БЕКЛАЗОН-ЕКО	Inhaler (aerosol)
49	Беклометазон (Beclometasone)	БеклофортТМ ЕвохалерТМ	Inhaler (aerosol)
50	Бісопролол (Bisoprolol)	БІПРОЛОЛ-ЗДОРОВ'Я	Tablets
51	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-АСТРАФАРМ	Tablets
52	Бісопролол (Bisoprolol)	БІПРОЛОЛ	Tablets
53	Бісопролол (Bisoprolol)	БІПРОЛОЛ-ЗДОРОВ'Я	Tablets
54	Бісопролол (Bisoprolol)	БІСОПРОЛ®	Tablets
55	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ САНДОЗ®	Tablets
56	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-АСТРАФАРМ	Tablets
57	Бісопролол (Bisoprolol)	Бісопролол-КВ	Tablets
58	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-ТЕВА	Tablets
59	Бісопролол (Bisoprolol)	БІСОПРОЛ®	Tablets
60	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-ТЕВА	Tablets
61	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ САНДОЗ®	Tablets
62	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-АСТРАФАРМ	Tablets
63	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ АУРОБІНДО	Tablets
64	Бісопролол (Bisoprolol)	БІПРОЛОЛ	Tablets
65	Бісопролол (Bisoprolol)	БІПРОЛОЛ-ЗДОРОВ'Я	Tablets
66	Бісопролол (Bisoprolol)	БІСОПРОЛ®	Tablets
67	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ САНДОЗ®	Tablets
68	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-АСТРАФАРМ	Tablets
69	Бісопролол (Bisoprolol)	Бісопролол-КВ	Tablets
70	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-ТЕВА	Tablets

71	Бісопролол (Bisoprolol)	ДОРЕЗ®	Tablets
72	Бісопролол (Bisoprolol)	БІСОПРОЛ®	Tablets
73	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ-ТЕВА	Tablets
74	Бісопролол (Bisoprolol)	КОРОНАЛ® 10	Tablets
75	Бісопролол (Bisoprolol)	БІСОПРОЛОЛ САНДОЗ®	Tablets
76	Будесонід (Budesonide)	БУДЕСОНІД-ІНТЕЛІ НЕБ	Powder for inhalation
77	Будесонід (Budesonide)	Пульмікорт	Powder for inhalation
78	Будесонід (Budesonide)	Пульмікорт Турбухалер	Powder for inhalation
79	Будесонід (Budesonide)	Пульмікорт Турбухалер	Powder for inhalation
80	Будесонід (Budesonide)	Будесонід Ізіхейлер	Powder for inhalation
81	Будесонід (Budesonide)	Будесонід-Інтелі	Suspension (inhaler under pressure)
82	Будесонід (Budesonide)	Новопульмон Е Новолайзер®	Powder for inhalation
83	Верапаміл (Verapamil)	ВЕРАПАМІЛ-ДАРНИЦЯ	Tablets
84	Верапаміл (Verapamil)	Верапамілу гідрохлорид	Tablets
85	Верапаміл (Verapamil)	ВЕРАПАМІЛ-ДАРНИЦЯ	Tablets
86	Верапаміл (Verapamil)	ВЕРАПАМІЛУ ГІДРОХЛОРИД	Tablets
87	Гідроксихлорохін (Hydroxychloroquine)	ПЛАКВЕНІЛ®	Tablets
88	Гідрохлортіазид (Hydrochlorothiazide)	ГІДРОХЛОРТІАЗИД	Tablets
89	Гідрохлортіазид (Hydrochlorothiazide)	ГІПОТІАЗИД®	Tablets
90	Гідрохлортіазид (Hydrochlorothiazide)	ГІПОТІАЗИД®	Tablets
91	Глібенкламід (Glibenclamid)	Глібенкламід	Tablets
92	Глібенкламід (Glibenclamid)	Глібенкламід-Здоров'я	Tablets
93	Глібенкламід (Glibenclamid)	ГЛІБЕНКЛАМІД	Tablets
94	Гліклазид (Gliclazide)	ДІАГЛІЗИД® MR	Tablets
95	Гліклазид (Gliclazide)	ГЛІКЛАДА	Tablets
96	Гліклазид (Gliclazide)	ГЛІКЛАЗИД-ТЕВА	Tablets
97	Гліклазид (Gliclazide)	ДІАБЕТОН® MR 60 мг	Tablets
98	Гліклазид (Gliclazide)	ДІАГЛІЗИД® MR	Tablets
99	Гліклазид (Gliclazide)	Гліклазид-Здоров´я	Tablets
100	Гліклазид (Gliclazide)	ДІАГЛІЗИД®	Tablets
101	Дигоксин (Digoxin)	ДИГОКСИН	Tablets
102	Дигоксин (Digoxin)	Дигоксин-Здоров'я	Tablets
103	Еналаприл (Enalapril)	Еналаприл-Здоров´я	Tablets
104	Еналаприл (Enalapril)	Еналаприл-Здоров´я	Tablets
105	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-ТЕВА	Tablets
106	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets
107	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets
108	Еналаприл (Enalapril)	Еналаприл	Tablets
109	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets

110	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-АСТРАФАРМ	Tablets
111	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-ДАРНИЦЯ	Tablets
112	Еналаприл (Enalapril)	Еналаприл-Здоров´я	Tablets
113	Еналаприл (Enalapril)	ЕНАЛОЗИД® МОНО	Tablets
114	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-ТЕВА	Tablets
115	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets
116	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets
117	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-АСТРАФАРМ	Tablets
118	Еналаприл (Enalapril)	ЕНАЛАПРИЛ	Tablets
119	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-АСТРАФАРМ	Tablets
120	Еналаприл (Enalapril)	Еналаприл-Здоров´я	Tablets
121	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-ТЕВА	Tablets
122	Еналаприл (Enalapril)	ЕНАЛАПРИЛ-АСТРАФАРМ	Tablets
123	Ізосорбіду динітрат (Isosorbide dinitrate)	Ізо-Мік®5мг	Tablets (sublingual)
124	Карведилол (Carvedilol)	ТАЛЛІТОН®	Tablets
125	Карведилол (Carvedilol)	КАРВІУМ	Tablets
126	Карведилол (Carvedilol)	ТАЛЛІТОН®	Tablets
127	Карведилол (Carvedilol)	КАРВЕДИЛОЛ АУРОБІНДО	Tablets
128	Карведилол (Carvedilol)	КАРВЕДИЛОЛ САНДОЗ®	Tablets
129	Карведилол (Carvedilol)	Карведилол-КВ	Tablets
130	Карведилол (Carvedilol)	КАРВІУМ	Tablets
131	Карведилол (Carvedilol)	КОРВАЗАН®	Tablets
132	Карведилол (Carvedilol)	ТАЛЛІТОН®	Tablets
133	Карведилол (Carvedilol)	КАРВЕДИЛОЛ АУРОБІНДО	Tablets
134	Карведилол (Carvedilol)	КАРВЕДИЛОЛ САНДОЗ®	Tablets
135	Карведилол (Carvedilol)	Карведилол-КВ	Tablets
136	Карведилол (Carvedilol)	КАРВІУМ	Tablets
137	Карведилол (Carvedilol)	КОРВАЗАН®	Tablets
138	Клопідогрель (Clopidogrel)	Атерокард	Tablets
139	Клопідогрель (Clopidogrel)	Клопідогрель	Tablets
140	Клопідогрель (Clopidogrel)	ПЛАТОГРІЛ®	Tablets
141	Клопідогрель (Clopidogrel)	Атерокард	Tablets
142	Клопідогрель (Clopidogrel)	АТРОГРЕЛ	Tablets
143	Клопідогрель (Clopidogrel)	КЛОДІЯ	Tablets
144	Клопідогрель (Clopidogrel)	КЛОПІДОГРЕЛ-ТЕВА	Tablets
145	Клопідогрель (Clopidogrel)	Клопідогрель	Tablets
146	Клопідогрель (Clopidogrel)	КЛОПІДОГРЕЛЬ-САНОФІ	Tablets
147	Клопідогрель (Clopidogrel)	Клопідогрель-Фармекс	Tablets
148	Клопідогрель (Clopidogrel)	ЛОПІРЕЛ	Tablets
149	Клопідогрель (Clopidogrel)	МЕДОГРЕЛЬ	Tablets
150	Клопідогрель (Clopidogrel)	ПЛАГРИЛ®	Tablets
151	Клопідогрель (Clopidogrel)	ТРОМБОНЕТ®	Tablets
152	Клопідогрель (Clopidogrel)	ТРОМБОНЕТ®-ФАРМАК	Tablets
153	Клопідогрель (Clopidogrel)	ФЛАМОГРЕЛЬ 75	Tablets

154	Клопідогрель (Clopidogrel)	АТРОГРЕЛ	Tablets
155	Клопідогрель (Clopidogrel)	ТРОМБОНЕТ®	Tablets
156	Клопідогрель (Clopidogrel)	ТРОМБОНЕТ®-ФАРМАК	Tablets
157	Клопідогрель (Clopidogrel)	Атерокард	Tablets
158	Клопідогрель (Clopidogrel)	ПЛАТОГРІЛ®	Tablets
159	Клопідогрель (Clopidogrel)	КЛОДІЯ	Tablets
160	Клопідогрель (Clopidogrel)	КЛОПІДОГРЕЛЬ-САНОФІ	Tablets
161	Клопідогрель (Clopidogrel)	ЛОПІРЕЛ	Tablets
162	Лозартан (Losartan)	ЛОЗАРТАН-ТЕВА	Tablets
163	Лозартан (Losartan)	ПРЕСАРТАН®-50	Tablets
164	Лозартан (Losartan)	Сентор	Tablets
165	Лозартан (Losartan)	ТРОСАН	Tablets
166	Лозартан (Losartan)	КЛОСАРТ®	Tablets
167	Лозартан (Losartan)	ЛОЗАП®	Tablets
168	Лозартан (Losartan)	КЛОСАРТ®	Tablets
169	Лозартан (Losartan)	ЛОЗАП®	Tablets
170	Лозартан (Losartan)	ЛОЗАРТАН-ТЕВА	Tablets
171	Лозартан (Losartan)	ПРЕСАРТАН®-100	Tablets
172	Лозартан (Losartan)	Сентор	Tablets
173	Лозартан (Losartan)	КЛОСАРТ®	Tablets
174	Лозартан (Losartan)	ЛОЗАП®	Tablets
175	Лозартан (Losartan)	КЛОСАРТ®	Tablets
176	Метопролол (Metoprolol)	ЕГІЛОК®	Tablets
177	Метопролол (Metoprolol)	МЕТОПРОЛОЛУ ТАРТРАТ	Tablets
178	Метопролол (Metoprolol)	МЕТОПРОЛОЛ	Tablets
179	Метопролол (Metoprolol)	ЕГІЛОК®	Tablets
180	Метопролол (Metoprolol)	МЕТОПРОЛОЛУ ТАРТРАТ	Tablets
181	Метопролол (Metoprolol)	ЕГІЛОК®	Tablets
182	Метопролол (Metoprolol)	МЕТОПРОЛОЛ	Tablets
183	Метопролол (Metoprolol)	ЕГІЛОК®	Tablets
184	Метформін (Metformin)	ДІАФОРМІН®	Tablets
185	Метформін (Metformin)	МЕТАМІН®	Tablets
186	Метформін (Metformin)	МЕТФОРМІН ІНДАР	Tablets
187	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets
188	Метформін (Metformin)	МЕТФОРМІН-САНОФІ	Tablets
189	Метформін (Metformin)	МЕФАРМІЛ®	Tablets
190	Метформін (Metformin)	ДІАФОРМІН®	Tablets
191	Метформін (Metformin)	МЕТАМІН®	Tablets
192	Метформін (Metformin)	МЕТФОРМІН ІНДАР	Tablets
193	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets
194	Метформін (Metformin)	МЕФАРМІЛ®	Tablets
195	Метформін (Metformin)	МЕТАМІН®	Tablets
196	Метформін (Metformin)	ДІАФОРМІН®	Tablets
197	Метформін (Metformin)	МЕТАМІН®	Tablets
198	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets

199	Метформін (Metformin)	МЕТФОРМІН-САНОФІ	Tablets
200	Метформін (Metformin)	МЕФАРМІЛ®	Tablets
201	Метформін (Metformin)	ДІАФОРМІН®	Tablets
202	Метформін (Metformin)	МЕТАМІН®	Tablets
203	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets
204	Метформін (Metformin)	МЕФАРМІЛ®	Tablets
205	Метформін (Metformin)	МЕТАМІН®	Tablets
206	Метформін (Metformin)	МЕТАМІН®	Tablets
207	Метформін (Metformin)	МЕТФОРМІН ІНДАР	Tablets
208	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets
209	Метформін (Metformin)	МЕТФОРМІН-САНОФІ	Tablets
210	Метформін (Metformin)	МЕТФОРМІН-ТЕВА	Tablets
211	Метформін (Metformin)	ДІАФОРМІН®	Tablets
212	Метформін (Metformin)	ДІАФОРМІН®	Tablets
213	Метформін (Metformin)	МЕТАМІН®	Tablets
214	Метформін (Metformin)	МЕТФОРМІН ІНДАР	Tablets
215	Метформін (Metformin)	МЕТФОРМІН-АСТРАФАРМ	Tablets
216	Метформін (Metformin)	МЕТАМІН®	Tablets
217	Нітрогліцерин (Glyceryltrinitrate)	Нітрогліцерин	Tablets (sublingual)
218	Нітрогліцерин (Glyceryltrinitrate)	Нітрогліцерин	Tablets (sublingual)
219	Нітрогліцерин (Glyceryltrinitrate)	Нітрогліцерин-Здоров'я	Tablets (sublingual)
220	Сальбутамол (Salbutamol)	АСТАЛІН	Inhaler (aerosol)
221	Сальбутамол (Salbutamol)	Сальбутамол	Inhaler (aerosol)
222	Сальбутамол (Salbutamol)	Сальбутамол	Suspension (inhaler under pressure)
223	Сальбутамол (Salbutamol)	Сальбутамол-Інтелі	Suspension (inhaler under pressure)
224	Сальбутамол (Salbutamol)	САЛЬБУТАМОЛ-НЕО	Inhaler (aerosol)
225	Симвастатин (Simvastatin)	Вазостат-Здоров´я	Tablets
226	Симвастатин (Simvastatin)	Вазиліп®	Tablets
227	Симвастатин (Simvastatin)	СИМВАСТАТИН 20 АНАНТА	Tablets
228	Симвастатин (Simvastatin)	АЛЛЕСТА®	Tablets
229	Симвастатин (Simvastatin)	Вазостат-Здоров´я	Tablets
230	Симвастатин (Simvastatin)	СИМВАСТАТИН САНДОЗ®	Tablets
231	Симвастатин (Simvastatin)	Симвастатин-Тева	Tablets
232	Симвастатин (Simvastatin)	Вазиліп®	Tablets
233	Симвастатин (Simvastatin)	СИМВАСТАТИН 40 АНАНТА	Tablets
234	Симвастатин (Simvastatin)	АЛЛЕСТА®	Tablets
235	Симвастатин (Simvastatin)	Вазостат-Здоров´я	Tablets
236	Симвастатин (Simvastatin)	СИМВАСТАТИН САНДОЗ®	Tablets
237	Симвастатин (Simvastatin)	Симвастатин-Тева	Tablets

238	Спіронолактон (Spironolactone)	Верошпірон	Tablets
239	Спіронолактон (Spironolactone)	СПІРОНОЛАКТОН-ДАРНИЦЯ	Tablets
240	Спіронолактон (Spironolactone)	СПІРОНОЛАКТОН САНДОЗ®	Tablets
241	Спіронолактон (Spironolactone)	СПІРОНОЛАКТОН САНДОЗ®	Tablets
242	Спіронолактон (Spironolactone)	СПІРОНОЛАКТОН-ДАРНИЦЯ	Tablets
243	Фуросемід (Furosemide)	ФУРОСЕМІД	Tablets
244	Фуросемід (Furosemide)	ФУРОСЕМІД	Tablets
245	Фуросемід (Furosemide)	Фуросемід	Tablets
246	Фуросемід (Furosemide)	ФУРОСЕМІД-ДАРНИЦЯ	Tablets

7.4 ANNEX 4

Information to be contained in the medical record, referral record and prescription in the Register

Each medical record, referral record and prescription in the Register must contain the following information:

- entry number in the Register;
- date and time of entry in the Register;
- a reference to an entry in the Register of Business Entities in the field of health care about the place of medical services where the patient's medical care was provided, or an indication "at the patient's place of residence";
- reference to the entry in the Register of business entities in the field of health care about the business entity that provides medical care;
- reference to the entry in the Register of medical workers about the medical worker, under whose electronic signature the entry is made in the system;
- link to the entry in the Register of Patients about the patient;
- the patient's age;
- sex of the patient.

Medical records on the provision of consultation or treatment in an outpatient setting, including the results of primary care:

- information about the episode of medical care in which medical care is provided;
- grounds for medical care: declaration on the choice of the doctor who provides primary care, referral (reference to an entry in the Register or details of non-electronic referral, including its date, name and initials of the doctor who prescribed it), delivery of the patient by the team of emergency (ambulance), treatment of the patient on his own initiative;
- method of providing medical services: personal appointment, medical care with the use of telecommunications, etc.;
- reasons for treatment (complaints, symptoms, etc.);
- results of examination and assessment of the patient's condition;
- information on allergic reactions and intolerance to drugs (if any);
- information about diagnoses;
- performed medical procedures (services), surgical operations (if performed);
- medical appointments and recommendations;
- information on the functioning and limitations of health (in the case of rehabilitation);
- information on written prescriptions based on the results of medical care;
- referral information if the patient is referred for further medical care (including transferred to another business entity);
- date and time of the beginning and end of the patient's appointment by the medical worker;

Medical records of vaccination (vaccination, immunization):

- date of vaccination;
- information about the immunobiological drug (code, name, series, expiration date, manufacturer of the medical immunobiological drug, etc.);
- information about the vaccination (vaccination method, dose, area of the body in which the medical immunobiological drug was introduced, reaction, etc.);
- comment (if necessary);

Medical records on the results of laboratory, functional, radiological and other special studies in an outpatient setting:

- grounds for the study: declaration, referral (reference to an entry in the Register or details of a non-electronic referral, including its date, name and initials of the doctor who prescribed it), the patient's request on his own initiative;
- date of the study;
- exam/procedure/test information;
- description of the exam/procedure/test result;
- conclusion (if necessary);
- a link to the location of archiving of the file with detailed information about the results of exam/procedure/test (if appropriate technical capability in the system);

Medical records of hospitalization of the patient:
- grounds for medical care: referral (reference to an entry in the Register or details of a non-electronic referral, including its date, name and initials of the doctor who prescribed it), delivery of the patient by an ambulance, treatment of the patient on his own initiative, transfer a patient from another business entity;
- date and time of application or delivery by the emergency (ambulance) team to the reception department;
- the number of the emergency (ambulance) medical team that delivered the patient;
- reference to the entry in the Register of medical workers about the doctor or paramedic of the emergency (ambulance) team that delivered the patient;
- preliminary diagnosis established by the emergency (ambulance) team that delivered the patient;
- date and time of hospitalization;
- type of hospitalization: urgent or planned;
- assessment according to the assessment scale of simplified acute physiology (in case of hospitalization in an emergency);
- diagnosis at hospitalization;
- birth weight and gestational age (weeks), Apgar score at 1 and 5 minutes (when a child is hospitalized under 28 days of age);
- patient height (in centimeters);
- patient weight at hospitalization (in kilograms);
- information on the functioning and limitations of health according to the International Classification of Functions, Restrictions on Life and Health (in case of rehabilitation);

Medical records at the discharge of the patient from the hospital (including in case of death or unauthorized departure from the hospital):
- date and time of discharge;
- inpatient card number;
- information about the episode of medical care in which medical care was provided;
- reference to the medical record in the Register made during the patient's hospitalization;
- main final clinical diagnosis and additional diagnoses (complications of the main diagnosis, concomitant diseases);
- category of tuberculosis resistance (TB): (sensitive TB - 2, monoresistant TB - 3, multidrug - resistant TB - 4, multidrug - resistant TB - 5, tuberculosis with extended resistance - 6) (in case of appropriate diagnosis);
- duration of stay in the intensive care unit (hours);
- medical procedures and surgical operations were performed;
- information on the procedures of blood transfusion, its components or blood

products;
- information on continuous artificial lung ventilation;
- the patient's condition on the day of discharge (healthy, recovered, condition improved or worsened or unchanged, died (date and time of death));
- assessment according to the assessment scale of simplified acute physiology (in case of hospitalization in an emergency);
- information on the functioning and limitations of health according to the International Classification of Functions, Restrictions on Life and Health (in case of rehabilitation);
- medical appointments and recommendations;
- information on written prescriptions based on the results of medical care;
- referral information if the patient is referred for further medical care (including transferred to another business entity);
- information about the mother: pregnancy number, birth number, history of cesarean section, number of fetuses (including antenatal death after 22 weeks), fetal presentation, gestational age at birth, onset of labor, type of birth, category according to Robson's classification (filled in at discharge women in labor);
- information about the newborn: the child's condition at birth, Apgar score for 1 min, Apgar score for 5 min, the sex of the child, the child's height at birth, the child's weight at birth (to be filled in at the discharge of the newborn);
- patient weight on the day of discharge (in kilograms);
- source of payment for medical services provided (medical guarantee program - 1, patient funds - 2, insurance company - 3, other sources - 4).

Entry records in the Register shall additionally contain the following information:

- medical specialty for which medical care should be provided;
- conditions of provision: outpatient, at the patient's place of residence or in the hospital; or the name of the medical service or services; information on the transfer of the patient to another business entity at the time of discharge from the hospital (for referrals for medical care);
- a list of necessary exam/procedure/test, indicating information about the exam/procedure/test material, purpose and type of exam/procedure/test to be conducted (for referrals to laboratory, instrumental or other exam/procedure/test);
- references in the Register to medical records, information on episodes of medical care that, in the opinion of the initiator of the referral, will be important for the provision of medical services in the referral (results of previous tests, diagnostics, expert opinions, etc.);
- clinically important for the purpose of the study and interpretation of the results information about the patient (if necessary);
- the period of validity of the referral and, in the case of relevant medical indications, the note "immediately (cito; urgent)".
- A separate record of referral according to their classification shall be made for each order of laboratory, instrumental or functional research services.

Prescriptions in the Register shall contain the information provided by the relevant prescription forms of form № 1 (f-1) and special prescription forms of form № 3 (f-3). In the case of dispensing a prescription medicinal product, the authorized persons of the pharmacy institution must enter in the Register information on the registration of the prescription medicinal product dispensing in accordance with the legislation.

7.5 ANNEX 5

#	Name of the Legal Act	Year of enactment	Summary of Purpose (what it regulates)	Comments/Background	Links to the Original Texts
digital identity/digital signature					
1	Law of Ukraine On Electronic Documents and Electronic Documents Circulation	2003. Last update 2017	The law applies to relations arising in the process of creating, sending, transmitting, receiving, storing, processing, using and destroying electronic documents		https://zakon.rada.gov.ua/laws/show/en/851-15#Text
2	Law of Ukraine On Electronic Trust Services	2017. Last update 2020	The law defines the legal and organizational principles of providing electronic trust services, including cross-border, the rights and obligations of legal entities in the field of electronic trust services, the procedure for state supervision (control) over compliance with legislation in the field of electronic trust services, and as well as legal and organizational principles of electronic identification. The purpose of this Law is to regulate relations in the areas of electronic trust		https://zakon.rada.gov.ua/laws/show/2155-19?lang=en#Text

			services and electronic identification.		
3	Cabinet of Ministers of Ukraine Resolution No. 749 of September 19, 2018 “About the statement of the Order of use of electronic trust services in public authorities, local governments, the enterprises, establishments and the organizations of the state form of ownership”	2018	The Order determines the requirements for the use, including receipt, of qualified electronic trust services in public authorities, local governments, enterprises, institutions and organizations of state ownership (hereinafter - state institutions) with the use of qualified electronic signatures by employees of state institutions.		https://zakon.rada.gov.ua/laws/show/en/749-2018-%D0%BF#n12
4	Cabinet of Ministers of Ukraine Resolution No. 992 of November 7, 2018 “About the statement of requirements in the field of electronic trust services and the Procedure for check of observance of requirements of the legislation in the field of electronic trust services”	2018	Requirements determine the organizational, methodological, technical and technological conditions that must be met by a qualified provider of electronic trust services (hereinafter - the provider), its separate registration points when providing qualified electronic trust services to their users		https://zakon.rada.gov.ua/laws/show/992-2018-%D0%BF?lang=uk#Text
5	Cabinet of Ministers of	2018	The Order establishes a mechanism for		https://zakon.rada.gov.ua/laws/show/1215-

	Ukraine Resolution No. 1215 of December 18, 2018 "Order of Compliance Assessment in the Sphere of Trust Electronic Services"		conducting a procedure for assessing compliance with the requirements for qualified providers of electronic trust services and the services they provide. This Order does not apply to the provision of qualified electronic trust services in the banking system and during the transfer of funds.		2018-%D0%BF#Text
6	Cabinet of Ministers of Ukraine Resolution No. 60 of January 23, 2019 "On approval of the Order for mutual recognition of Ukrainian and foreign public key certificates, electronic signatures, as well as the use of information and telecommunication system of the central certification body to ensure recognition in Ukraine of electronic trust services, foreign public key certificates used in providing	2019	The procedure defines the mechanism of mutual recognition of Ukrainian and foreign public key certificates, electronic signatures, as well as the use of information and telecommunication system of the central certification body to ensure recognition in Ukraine of electronic trust services, foreign public key certificates used in providing legally significant electronic services in the process of interaction between the subjects of different states.		https://zakon.rada.gov.ua/laws/show/60-2019-%D0%BF#Text

	legally significant electronic services interaction between the subjects of different states”				
7	Cabinet of Ministers of Ukraine Resolution No. 546 of June 19, 2019 “On approval of the Regulations on the integrated electronic identification system”	2019	The Regulation defines the procedure for assigning, defining the structure, functioning of the integrated electronic identification system, its creation and use.		https://zakon.rada.gov.ua/laws/show/546-2019-%D0%BF#Text
8	Cabinet of Ministers of Ukraine Resolution No. 193 of March 3, 2020 “On the implementation of a pilot project to ensure the use of advanced electronic signatures and seals based on qualified public key certificates”	2020	The requirements specify the technical and technological conditions to be met by qualified electronic trust service providers when providing electronic trust services related to the creation, verification, validation and storage of advanced electronic signatures and seals based on qualified public key certificates.		https://zakon.rada.gov.ua/laws/show/193-2020-%D0%BF#Text
9	Cabinet of Ministers of Ukraine Resolution No. 345 of April 29, 2020 "On the implementation of a pilot	2020	The procedure determines the peculiarities of acquiring and terminating the status of a qualified provider of electronic trust services in the framework		https://www.kmu.gov.ua/npas/pro-realizaciyu-eksperimentalnogo-proektu-shchodo-zabezpechennya-bezperervnogo-nadannya-kvalifikovanih-elektronnih-dovirchih-poslug-

	project to ensure the continuous provision of qualified electronic trust services in case of replacement of the provider of such services"		of a pilot project to ensure the continuous provision of qualified electronic trust services in the event of replacement of the provider of such services.		u-razi-zamini-nadavacha-takih-poslug-345290420
10	Order of the State Agency for e-Government of Ukraine "On Requirements to the Electronic Identification Tools and their Use in eGovernance"	2018	The requirements establish organizational, methodological, technical and technological conditions for the use of electronic identification tools in the field of e-government, depending on the levels of trust in electronic identification tools.		https://zakon.rada.gov.ua/laws/show/z1462-18#Text
data protection					
11	Law of Ukraine On Information	1992. Last update 2020	The law regulates the relations concerning the creation, collection, receipt, storage, use, dissemination, protection, protection of information.		https://zakon.rada.gov.ua/laws/show/en/2657-12#Text
12	Law of Ukraine On Protection of Information in Automated Systems	1994. Last update 2020	The law regulates relations in the field of information protection in information, telecommunication and information-		https://zakon.rada.gov.ua/laws/show/en/80/94-%D0%B2%D1%80#Text

			telecommunication systems		
13	Law of Ukraine On Protection of Personal Data	2010. Last update 2020	This Law regulates legal relations related to the protection and processing of personal data and aims to protect the fundamental rights and freedoms of man and citizen, in particular the right to privacy in connection with the processing of personal data. This Law applies to the processing of personal data, which is carried out in whole or in part using automated means, as well as to the processing of personal data contained in the file or intended for inclusion in the file, using non-automated means.		https://zakon.rada.gov.ua/laws/show/en/2297-17?lang=en#Text
14	Law of Ukraine On Access to Public Information	2011. Last update 2020	The Law determines the procedure for exercising and ensuring the right of everyone to access information held by subjects of power, other managers of public information defined by this Law, and information of public interest.		https://zakon.rada.gov.ua/laws/show/en/2939-17#n35
e-Government					

15	Law of Ukraine On the Concept of the National Informatization Program	1998. Last update 2020	The law defines the general principles of state policy in the field of informatization, the main priorities and directions of informatization, development of ICT.	The Law is irrelevant, does not correspond to the current state of ICT development	https://zakon.rada.gov.ua/laws/show/en/75/98-%D0%B2%D1%80#Text https://zakon.rada.gov.ua/laws/anot/en/75/98-%D0%B2%D1%80
16	Law of Ukraine On the National Informatization Program	1998. Last update 2020	The law defines the strategy for solving the problem of meeting information needs and information support of socio-economic, environmental, scientific and technical, defense, national-cultural and other activities in areas of national importance.	The Law is relevant, but does not correspond to the current state of development e-Gov in Ukraine.	https://zakon.rada.gov.ua/laws/show/en/74/98-%D0%B2%D1%80#Text https://zakon.rada.gov.ua/laws/anot/en/74/98-%D0%B2%D1%80
17	Cabinet of Ministers of Ukraine Resolution of May 27, 2015 № 351 “Some issues of preparation of draft legislation in electronic form”	2015	Begin industrial operation the system of electronic interaction of executive authorities		https://zakon.rada.gov.ua/laws/show/351-2015-%D0%BF#Text
18	Cabinet of Ministers of Ukraine Order dated 20.09.2017 № 649-r “On	2017	The purpose of the Concept is to determine the directions, mechanisms and deadlines for the formation of an		https://zakon.rada.gov.ua/laws/show/649-2017-%D1%80#Text

	approval of the Concept of e-government development in Ukraine”		effective e-government system in Ukraine to meet the interests and needs of individuals and legal entities, improve public administration, increase competitiveness and stimulate socio-economic development. Implementation of the Concept is planned for the period up to 2020 and is designed to support coordination and cooperation of public authorities and local governments to achieve the required level of efficiency and effectiveness of e-government, promote the idea of public administration reform and decentralization based on widespread use of modern information and communication technologies. country, as well as to promote the implementation of the priority priorities set by the Sustainable Development Strategy "Ukraine 2020".		
19	Resolution of the Cabinet of	2018.	Approve the following documents:		https://zakon.rada.gov.ua/laws/show/55-

	Ministers of Ukraine of January 17, 2018 № 55 "Some issues of documenting management activities"	Last update 2020	Standard instructions for documenting management information in electronic form and organization of work with electronic documents in office work, electronic interdepartmental exchange; Standard instruction on office work in ministries, other central and local executive bodies; Regulations for the organization of interaction of executive bodies in electronic form.		2018-%D0%BF#Text
infrastructure					
20	Law of Ukraine On Telecommunications	2004. Last update 2020	This Law establishes the legal basis for activities in the field of telecommunications. The law defines the powers of the state to manage and regulate these activities, as well as the rights, duties and responsibilities of individuals and legal		https://zakon.rada.gov.ua/laws/show/en/1280-15#Text

			entities that participate in these activities or use telecommunications services.		
21	Law of Ukraine On the Single State Demographic Register and the Documents that Confirm the Citizenship of Ukraine, Identify a Person or its Special Status	2013. Last update 2020	The law determines the legal and organizational basis for the establishment and operation of the Unified State Demographic Register and the issuance of identity documents, citizenship or special status of the person, as well as the rights and obligations of persons in whose name such documents are issued.		https://zakon.rada.gov.ua/laws/show/5492-17?lang=en#Text
22	Cabinet of Ministers of Ukraine Resolution of September 8, 2016 No. 606 “Some Issues of Electronic Interaction of State Electronic Information Resources”	2016 Last update 2020	The Regulation defines the general principles for the exchange of electronic data, except for information constituting a state secret, between the subjects of power of state electronic information resources during the provision of administrative services and the exercise of other powers in accordance with their tasks.		https://zakon.rada.gov.ua/laws/show/606-2016-%D0%BF#Text
23	Cabinet of Ministers of Ukraine Resolution of May 10, 2018 № 357 “Some issues of organizing the electronic	2018 Last update 2020	Approved The Procedure determines the mechanism of organization of electronic information interaction of state electronic information resources.		https://zakon.rada.gov.ua/laws/show/357-2018-%D0%BF#Text

	interaction system ”				
administrative services					
24	Law of Ukraine On administrative services	2013. Last update 2019	The law defines the legal basis for the exercise of rights, freedoms and legitimate interests of individuals and legal entities in the provision of administrative services.		https://zakon.rada.gov.ua/laws/show/5203-17?lang=en#Text
25	Cabinet of Ministers of Ukraine Resolution No. 13 of January 3, 2013 “On approval of the Procedure for maintaining the Unified State Portal of Administrative Services”	2013	The procedure determines the mechanism of maintaining the Unified State Portal of Administrative Services.		https://zakon.rada.gov.ua/laws/show/13-2013-%D0%BF#Text
26	Cabinet of Ministers of Ukraine Resolution No. 1137 of December , 2019 “Issues of the Unified State Web Portal of Electronic Services and the Unified State Portal of Administrative Services”	2019	The Regulation defines the purpose, main tasks, functional capabilities and subjects of the Unified State Web Portal of Electronic Services "Action Portal" (hereinafter - the Action Portal), the content of information on it and the procedure for its submission, as well as other issues of the web portal.		https://zakon.rada.gov.ua/laws/show/1137-2019-%D0%BF#n15
digital identity/digital signature					

27	*Law of Ukraine On State Financial Guarantees of Public Medical Services*	2017	The Law defines the state financial guarantees for the provision of necessary medical services (medical services) and medicines of proper quality to patients at the expense of the State Budget of Ukraine under the program of medical guarantees.	Defines Electronic Health Care System and its basic functions	https://zakon.rada.gov.ua/laws/show/2168-19#Text
28	Decree of Cabinet of Ministers of Ukraine of 25 April 2018 #411 Kyiv „On some issues regarding the e-health system“	2018	Defines the mechanism of functioning for e-health system and its components, registration of users, entering and interchange of information and documents in the e-health system in accordance with the Law of Ukraine “On state financial guarantees for medical services provision to the public”.	Changes made in accordance with the Resolutions of the Cabinet of Ministers № 526 dated June 19, 2019 and № 348 dated 15.04.2020	https://zakon.rada.gov.ua/laws/show/411-2018-%D0%BF#Text
29	Order of the Ministry of Health of Ukraine February 28, 2020 № 587 PROCEDURE for maintaining the Register of medical records, referral	2020	The order determines the list of information to be entered in the Register of medical records, referral records and prescriptions in the electronic health care system.		https://zakon.rada.gov.ua/laws/show/z0236-20#n23

	records and prescriptions in the electronic health care system.				
30	Resolution of Cabinet of Ministers of Ukraine On approval of the Regulation on the Ministry of Health of Ukraine	2015	Defines the responsibility areas and functions of MoH.		https://zakon.rada.gov.ua/laws/show/267-2015-%D0%BF#Text
31	Decree of Cabinet of Ministers of Ukraine On approval of the Technical Regulation on medical devices	2013	Establishes requirements for medical devices to be placed on the market and/or into service.		https://zakon.rada.gov.ua/laws/show/753-2013-%D0%BF#Text
32	Order of the Ministry of Health of Ukraine dated 14.12.2017 №1597 "On the establishment of the State Enterprise" Electronic Health ""	2017	To ensure the proper performance of the functions assigned to the MoH and the implementation of measures for the effective functioning and development of information and telecommunications systems and databases created in the field of health.		https://moz.gov.ua/article/ministry-mandates/nakaz-moz-ukraini-vid-14122017-1597-pro-utvorennja-derzhavnogo-pidpriemstva-elektronne-zdorovja
33	Decree of Cabinet of Ministers of Ukraine “ Some issues of implementation of	2020	Procedure for the implementation of the program of state guarantees of medical care in 2020.		https://zakon.rada.gov.ua/laws/show/65-2020-%D0%BF#Text

	the program of state guarantees of medical care in 2020”				

7.6 ANNEX 6

	Estonia 2021				Ukraine 2021			
	Availability	**Comment**	**Future plans**	**Link**	**Availability**	**Comment**	**Future plans**	**Link**
Vision and roadmap	yes	Current roadmap until 2020	The new roadmap 2021-2030	https://www.mkm.ee/sites/default/files/eesti_infouhiskonna_arengukava.pdf	No	93 Projects of Digital transformation. No strategy document available.	Implementation 100% state projects	https://plan2.diia.gov.ua/projects
Legal framework	yes	All necessary isses are covered with legal framework	Development according to the emerging needs	The key law is: Public Information Act https://www.riigiteataja.ee/en/eli/529032019012/consolide	yes	Laws and bylaws about informatisation		http://w1.c1.rada.gov.ua/pls/zweb2/webproc6_current?id=&pid069=248
Infrastructure								
Data exchange platform	yes	Data exchange platform x-road form 2002	Currently version 6, further cooperation to set up data exchange with	https://www.x-tee.ee/home	yes	System of Electronical Interconnection of State Electronical Information Resources	Implementation Trembita 2.0 version with Security Personal Data Modul	trembita.gov.ua https://directory-prod.trembita.gov.ua:8443/members

			other EU countries			"Trembita"		
Digital Identity	yes	Currently in use eID card (1st national document), Mobile ID(based on SIM card) and software application SmartID	Mainly security improvements	https://e-estonia.com/solutions/e-identity/id-card/	yes	Integration System of Electronical Identity	Implementation approach of the eIDAS standard	id.gov.ua
Portal	yes	The protal is consolidating most of the goveernment servicees	Better usability development	www.eesti.ee	yes	State Portal of e-services "Diia"	Publication 100 % e-services	diia.gov.ua
Mobile application	no	Separate mobila application not available, the protal is adjusting to mobile screen	Better usability development	www.eesti.ee	yes	Diia	Development e-services	https://play.google.com/store/apps/details?id=ua.gov.diia.app

Base registries	yes	Civic registry, Business registry, Land registry, immovables registry, state property registry	Data is in digitaly format and availablee by x-road	See table below	yes	State Registry of Civil Acts; State Registry of Companies; State Registry of Properties; Unified State Demographic Registry; State Registry Tax Payers; State Registry of Court Decisions.	Development e-services based on registries interconnections	

Cyber Security Measures	yes	Cyber Seecurity Strtategy 2019-2022	The responsibilities are divided between various institutions	https://www.mkm.ee/sites/default/files/kuberturvalisuse_strateegia_2019-2022.pdf	yes	Draft strategy available. National Cyber Security Centre was opened	Draft of the National Cyber Security Strategy	https://ua30.gov.ua/ https://www.rnbo.gov.ua/files/2021/STRATEGIYA%20KYBERBEZPEKI/proekt%20strategii_kyberbezpeki_Ukr.pdf
E-services								
Cabinet sessions online	yes	From 2000	n/A	https://e-estonia.com/solutions/e-governance/e-cabinet	yes	IS "Plan of agendas of Government meetings"	IT system for support of Government meetings	https://amrita-cs.com/projects/stvorennya-ta-vprovadzhennya/
Citizens personal cabinet	yes	From 2000	n/A	www.eesti.ee	yes	Citizen's Cabinet on Diia Portal	Integration all information from State Registries	https://id.diia.gov.ua/

Online voting	yes	From 2005	Further security improvements	https://www.valimised.ee/en/internet-voting-estonia	no		Studying of approach of other countries	
E-tax declarations	yes	From 1997	ca 98% of tax declarations submitted online	https://maasikas.emta.ee/v1/login?authst=RMcIcZAiHF	yes	Implemenated to Diia Application, Tax Cabinet.	100% public services will are an e-services	https://cabinet.tax.gov.ua/
E-customs services	yes	From ca 2000	Most of the custom declarations submitted online	https://e-estonia.com/solutions/business-and-finance/e-tax/	yes	Developed separate customs e-services	Develping of a comprehensive system	https://cabinet.customs.gov.ua/login
Electronic consumer complaints	yes	From ca 2010	Most of the complaints submitted online	https://www.ttja.ee/en/private-client/consumer-rights/consumer-rights-and-obligations/consumer-claims	yes	State Service of Ukraine on Food Safety and Consumer protection	Further automatization of services	https://ukc.gov.ua/appeal/?
E-land register	yes	From ca 2010	Official source of land information	https://geoportaal.maaamet.ee/eng/Spatial-Data/Cadastral-Data-p310.html	yes	Developed a public cadastr map	Development e-services	https://e.land.gov.ua/services

Electronic business register (electronic establishment of a company, information on companies, etc)	yes	From ca 1997	Officiasl source of businesses	https://ariregister.rik.ee/	yes	e-service automatic registration of individual enterpreneur is in Diia portal and Diia Application		https://diia.gov.ua/services/reyestraciya-fop
Electronic population data management and related services (registration of birth, application for passport / national identity card,	yes	From 1996	Official source for population	https://www.rahvastikuregister.ee/	yes	Comprehensive e-service "e-Baby" which includes 10 services. The Unified state demographic registry. The State Civil Acts Registry.	Further automatization of services	https://diia.gov.ua/services/yemalyatko https://zakon.rada.gov.ua/laws/show/5492-17#Text https://regdracs.minjust.gov.ua/

change of place of residence, certificate of citizenship, etc.)								
E-visa	no	As stonia is Part of the EU Schengeen visa system, no separatee e-visa system		—	yes	Posted in MFA portal		https://mfa.gov.ua/en/e-visa
Electronic register of legal acts	yes	From 1998	Official source of legal acts	www.riigiteataja.ee	yes	System of the Verkhovna Rada of Ukraine	Official source of legal acts	https://zakon.rada.gov.ua/laws/main/index
E-notary	yes	From 2005	Official workplace for notaries	https://www.rik.ee/en/other-services/e-notary	no		Under construction	

E-judiciary system	yes	From ca 2000	Official system for the court filings	https://www.kohus.ee/en	yes	The unified judicial information and telecommunication system.	Official system for the court filings	https://cabinet.court.gov.ua/login
E-police	yes	From ca 2000	Various polic relatd servicees	https://www.politsei.ee/en	no	Unified Electronic System of the Ministry of Internal Affairs is only internal use. But this system connected only to Trembita system.	Further automatization of services by Trembita system	
E-health records, e-prescriptions	yes	From ca 2001	Patient portal, behind it various other e-healt services and databases	https://www.digilugu.ee/login?locale=en	yes	e-Health system.	Further automatization of services	https://ehealth.gov.ua/
E-school, electronic education records, electronic	yes	From ca 2000	Various e-school solutions	https://www.ekool.eu/#/en/	yes	Electronic system of external independent evaluation for admission to hight school	Further automatization of services	https://testportal.gov.ua/

exam results, etc.								
Electronic road administration services (registrations and licenses)	yes	From 2010	Various vechicles and driving licences related services	https://eteenindus.mnt.ee/main.jsf?lang=en	yes	Drivers Cabinet		https://e-transport.gov.ua/
Electronic procurement register	yes	From 2011	Fully online procurement environment	https://riigihanked.riik.ee/rhr-web/#/	yes	Electronic procurement register		https://prozorro.gov.ua/
Certificate on the absence of a criminal record	yes	From 2011	Official database for criminal records	https://www.rik.ee/en/criminal-records-database	yes	e-Service of Unified Electronic System of the Ministry of Internal Affairs		https://dpvs.hsc.gov.ua/
Online social services	yes	From 2011	Variety of services by national and local governments	https://iseteenindus.sotsiaalkindlustusamet.ee/dashboard/portal/login?url=%2Fdashboard%2Fpor	yes	on Diia Portal and Diia Application	Further automatization of services	

				tal				
Electronic work permit, renewal of professional licenses	yes	From 2015	Registration of short term working permit	https://etaotlus.politsei.ee/ltr/#/login	no			
Electronic building permit	yes	Available in various municipalities from various years starting from 2005	Issued by the municipalities, various sites	https://www.eesti.ee/en/housing-and-environment/finding-a-place-to-live/construction/	yes	on Diia Portal		https://diia.gov.ua/services/categories/gromadyanam/zemlya-budivnictvo-neruhomist
E-banking	yes	From 1995	Various banks		yes	Various banks		
Payment gateway	yes	From ca 200	Embeded into services, standardizd with commercial		yes	International and national system		https://www.ipay.ua/en

			banks					
Open data portal	yes	Relaunced 2018	789 datasets	https://avaandmed.eesti.ee/	yes	State Open Data Portal		https://data.gov.ua/
Declaration of economic interests for officials	yes	From 2012	Every governmeent entity collects and stores independently		yes	National Agency on Corruption Prevention		https://public.nazk.gov.ua/
Register of government officials	no				yes	HRMIS		https://public.nads.gov.ua/
Electronic system of Government meetings					yes	IS "Plan of agendas of Government meetings"	IT system for support of Government meetings	https://amrita-cs.com/projects/stvorennya-ta-vprovadzhennya/
Initiatives								

E-participation platforms/services (fighting corruption, e-participation, notifying and giving feedback to government, etc.)	yes	From 2012	Draft laws and regulations portal	https://eelnoud.valitsus.ee/main#EFr99RZi	yes	e-petition		https://petition.president.gov.ua/
E-residency	yes	From 2014		https://e-estonia.com/solutions/e-identity/e-residency	no		Under construction	
Base registries								
Population registry	https://www.rahvasti					https://zakon.rada.gov.ua/laws/show/5492-17#Text		

	kuregister.ee/							
Business registry	https://ariregister.rik.ee/					https://usr.minjust.gov.ua/content/free-search		
Land registry	https://geoportaal.maaamet.ee/eng/Spatial-Data/Cadastral-Data-p310.html					https://map.land.gov.ua/		
Real estate registry	https://www.rik.ee/en/e-land-					https://e-construction.gov.ua/reestri		

	register							
State property registry	https://riigivara.fin.ee/kvr/					https://kap.minjust.gov.ua/services?product_id=1		