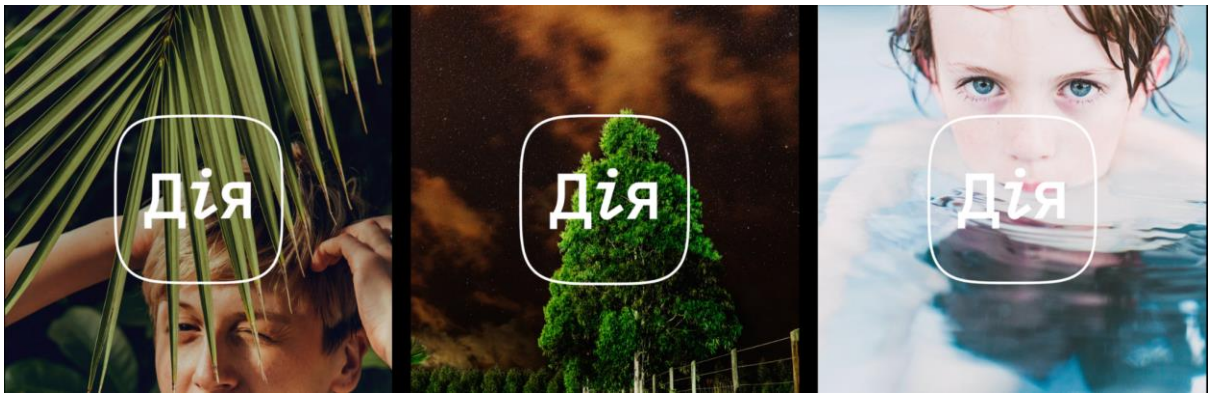

DIGITAL SKILLS DEVELOPMENT UKRAINE

GOOD PRACTICE CASE STUDY

ITU November 2021

Table of Contents

Acknowledgments

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Foreword

The goal of Ukraine's Ministry of Digital Transformation is to build the most convenient, people-centred state possible – a country without queues, corruption, and bureaucracy, to lay the foundation for building a digital state.

"Our Ministry has set four main goals for the next three years:

- *Transfer 100% of services online – so if a service is not online, it simply doesn't exist.*
- *Ensure 95% coverage of transport infrastructure and settlements across the country with high-speed Internet.*
- *Reach six million Ukrainians with a digital skills development programme.*
- *Boost the share of information and communication technologies (ICTs) in the country's gross domestic product (GDP) to 10%".*

H.E. Mykhailo Fedorov,

Deputy Prime Minister, Minister of Digital Transformation, Ukraine

"The development of citizens' digital skills is one of the strategic priorities of the Ministry of Digital Transformation in Ukraine, as mastering digital skills is a basic vital necessity of every person, especially in the context of the extremely rapid digital changes of today caused by the coronavirus pandemic.

We have already managed to reach 1 million + Ukrainians with training within the framework of the Diia.Digital Education project and much more to be achieved ahead, as we set the ambition goal to reach 6 million citizens in 3 years and thus to support other strategic goals in digital transformation of economy and society in our country.

We believe that all our efforts will improve the life of Ukrainian people, make e-services easy and comfortable, government-citizen communication transparent and efficient…..

We are changing the regulatory framework, building the digital infrastructure, creating the digital education system, and promoting digital literacy.

It could not be possible without key stakeholders' partnership and support. The synergy in digital skills development on the national level is a must which fuels and speeds up the whole process.

We are grateful for the countries which go ahead of us in digital skills development, as their experience is very valuable and enlightening. Still, taking into consideration our national and cultural specifics, we do a lot from scratch, on our own.

We believe our experience will also be valuable and informative for other countries, those who are looking for new solutions or only starting their journey in digital skills development in their respective countries".

H.E. Valeria Ionan,
Deputy Minister European integration,
Ministry of Digital Transformation, Ukraine

1. Executive Summary

ITU has conducted this case study to document and disseminate one of the diverse approaches, the national experience in digital skills policy development and implementation aiming to empower citizens and different professional groups with relevant digital skills and thus to accelerate/speed up the development of the digital economy and society in one specific country - Ukraine.

This case study consists of the general background to showcase the digital transition led by the Ministry of Digital Transformation in Ukraine, including policy and legislation, as well as the local practices on DigComp Frameworks adaptation, implementation and integration into the professional standards and education curriculums, the unique experience of the national online platform for raising awareness among population and supporting different target audiences with e-services, relevant information, training courses and the assessment tools.

This country's experience showcases the synergy and partnership, the leadership which encompasses different groups of experts to rethink, review the legislation, to determine the general and professional digital skills frameworks, as well as to inspire and support the development of new projects and initiatives related to the subject area.

As a result, the second survey conducted in 2021 showed a gradual increase in the level of digital skills in comparison to 2019. Thus, the share of Ukrainians whose digital skills are below the "basic level" mark has decreased by 5.2% or 1.42 million people and now stands at 47.8% (which is lower than previous year). At the same time, the share of Ukrainians who do not have any digital skills ("No skills") decreased by 4% or 1.09 million people.

It is suggested that there's no "one-size-fits-all" solutions in developing, reskilling and upskilling digital competences, so countries and organizations that plan to employ/ implement the approaches featured in this publication are recommended to closely consider their own ways and policy development processes, infrastructure/platform developments depending on the current citizens' and employees' digital readiness and the real status of digital transitions in order to design a contextually relevant approaches for digital skills development in each specific respectful country.

This case study is to serve as a model and inspire other countries and create new partnerships among countries and organizations aiming to empower international cooperation and to exchange experiences among Ministries, expert groups and networks that take different journeys to a common goal.

List of tables and figures

[1] *https://plan2.diia.gov.ua/m*

2. Introduction

The purpose of this introduction is to provide readers with some background information, show the big picture and general context of digital transformation in Ukraine, a retrospective on how eSkills development in Ukraine began, where Ukraine is now, who the key drivers are, and overview of some successful digital transformation projects.

Digital Technologies are shaping the lives of people worldwide. They are changing economies, societies, businesses, processes, and lifestyles. To accelerate and channel these changes for the benefit of communities in any country, it is essential to create synergy and synchronize the efforts of various stakeholders at all levels. Sharing experiences and good practices is also necessary to ensure more efficient and productive digital transformation processes.

This paper highlights good practices of digital reforms in Ukraine, with a particular focus on a systematic approach to digital skills development, strategic and tactical efforts, and success stories. This paper can play an instrumental guiding role for other member states and experts seeking to develop their citizens' digital skills and re-skill or upskill the workforce at national level.

2.1. Ministry as the Key Driver of Digital Transformations in Ukraine

Since 2019 the key driver of digital transition in Ukraine has been the Ministry of Digital Transformation, which directs and engages other ministries, strategic stakeholders, business partners and individuals. Its Statut regulates the structure and the key responsibilities of the Ministry of Digital Transformation.[2]

The Ministry of Digital Transformation is the main body that ensures the formation and implementation of state policy: in the areas of digitalization, digital development, digital economy, digital innovation and technology, e-government and e-democracy, information society development, informatization; in the field of implementation of electronic document management; in the field of citizens' digital skills and digital rights development; in the areas of open data, development of national electronic information resources and interoperability, development of broadband Internet and telecommunications infrastructure, e-commerce and business; in the field of electronic and administrative services; in the areas of electronic trust services and electronic identification; in the development of the IT industry.[3]

2.1.1. Background Information

This chapter presents the general context of digital transformation in Ukraine, including the development of eSkills, an overview of successful projects, and an analysis of digital reforms.

[2] Cabinet of Ministers of Ukraine, *Law on Ministry of Digital Transformation of Ukraine*, 18 September 2019. https://zakon.rada.gov.ua/laws/show/856-2019-п#Text

[3] https://thedigital.gov.ua/

Until 2018, there was no clear vision on digital transformation at the government level. Some programmes were initiated by international IT companies and local IT businesses. Several strategic documents had been issued by the government, but without a key driver, nothing significant happened, and all the efforts were mainly segmented, and unsystematic. Political instability also had a negative impact on digital transformation processes, only worsening and impairing the situation.

To launch and accelerate the process, more than 100 IT experts, united under the Ukrainian non-governmental organization the "HiTech Office", came together to work on the Concept Paper on Digital Society and Digital Economy development and identify the first steps to be taken. In close collaboration with the Cabinet of Ministers, the Coordination Council was created, which included the governmental officials and the leaders of the expert groups mentioned above, to start the digital transformation processes in the country. As a result of these joint efforts, in January 2018, the Government approved and issued the strategic document, the Concept Paper of Digital Economy and Digital Society Development in Ukraine for the period of 2018 - 2020.[4]

The documents set-out the fundamental principles and goals, identified critical areas and projects of digitalization in Ukraine:

- Bridging the digital divide through the development of digital infrastructures.
- Development of digital competencies.
- Implementation of the concept of digital workplaces.
- Digitization of all the sectors of the economy.
- Implementation of digital transformation projects in the fields of public security, Education, Healthcare, Tourism, eDemocracy, Ecology and Environmental Protection, Life of cities, Cashless payments, Harmonization with European and world scientific initiatives,
- eSkills development,
- e-Governance, including eServices and Interoperability, eID, Open data, etc.

It was the first significant step towards the digital transformation in Ukrainian society to stimulate domestic markets for consumption, implementation, and production of digital technologies. It presented a vision of the transformation of the economy from traditional to efficient digital, identified the priority steps for the implementation of appropriate incentives and conditions for digitalization in the economy, society, the development of digital infrastructures, the acquisition of digital competencies by citizens, and identified critical areas and projects of digitalization of the country.

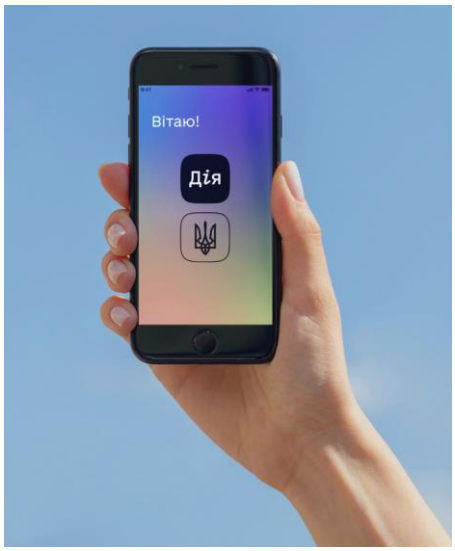
[4] Cabinet of Ministers of Ukraine, *Order on approval of the Concept of development of the digital economy and society of Ukraine for 2018-2020 and approval of the action plan for its implementation*, 17 January 2018 https://zakon.rada.gov.ua/laws/show/67-2018-p#Text

2.1.2. Current State

In 2019, the newly elected President of Ukraine announced the "State in a Smartphone" nationwide initiative. A month after, the newly appointed Minister of Digital Transformation presented a plan for implementing the initiative. It was supposed to digitize all state services in three years, introducing the smart ID and reducing communication with the state to a button in a smartphone.

The Ministry of Digital Transformation set the following goals to be achieved by 2024:

- 100% of public services should be available to citizens and businesses online;
- 95% of transport infrastructure, settlements and their social facilities must have access to high-speed Internet.
- 6 million Ukrainians should be involved in the digital skills development programme.
- the share of IT-industry in the country's GDP should be at least 10%.



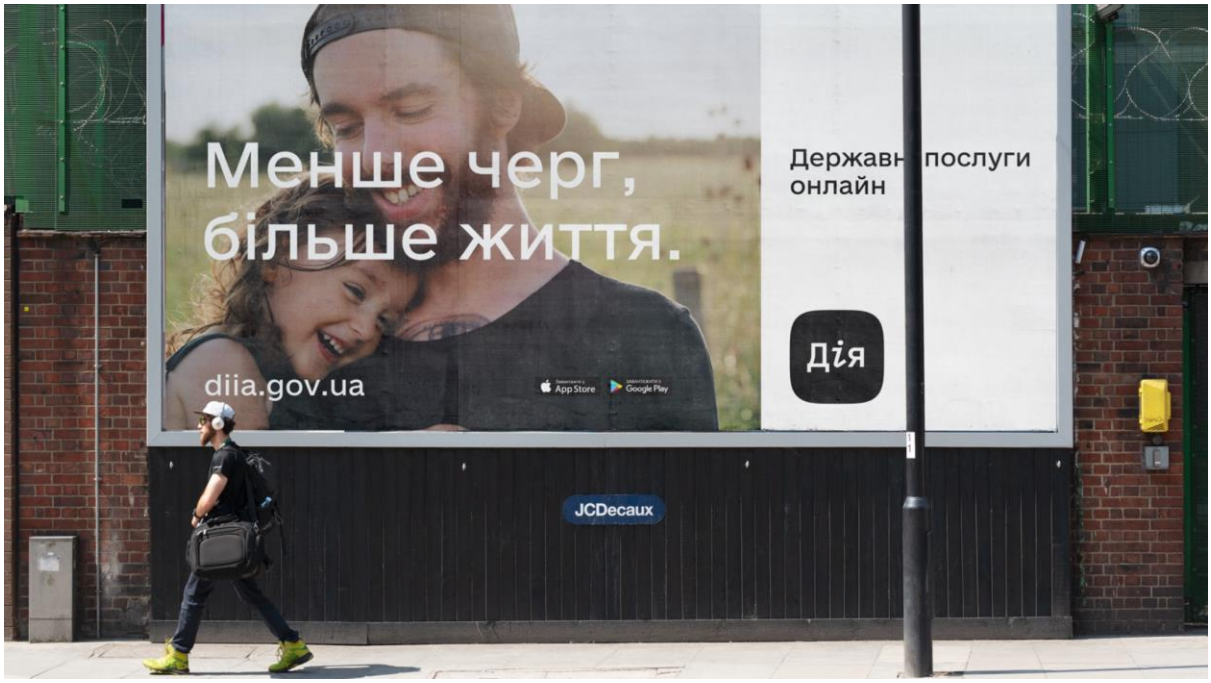
The first steps included adopting a legal framework for basic digital rights for citizens, including the right to access broadband Internet and making technology more accessible to consumers by reducing the cost of software, computers, and other equipment.

The list of the 94 digital transformation projects in various areas of Ukrainian economy and society is provided in Annex III. Some projects have already been successfully implemented, others are scheduled to be launched by the end of 2021, some are in their initial stage and will be implemented in 2022. The list showcases that digital transformation is taking place across the country in various aspects of the economy and society.[5] Its implementation is carried out by different ministries and other legal bodies under the overall leadership of the Ministry of Digital Transformation. It is an example of a productive collaboration and synergy in achieving joint goals of making the lives of Ukrainians more innovative, business processes more accessible and e-services more efficient and productive.[6]

Today, many public-sector organisations have combined cyber and physical systems; carefully balancing the old and the new. They optimise processes, establish new business models and offer new services tailored to individual user needs.

[5] *https://diia.gov.ua/services*

[6] https://plan2.diia.gov.ua/projects



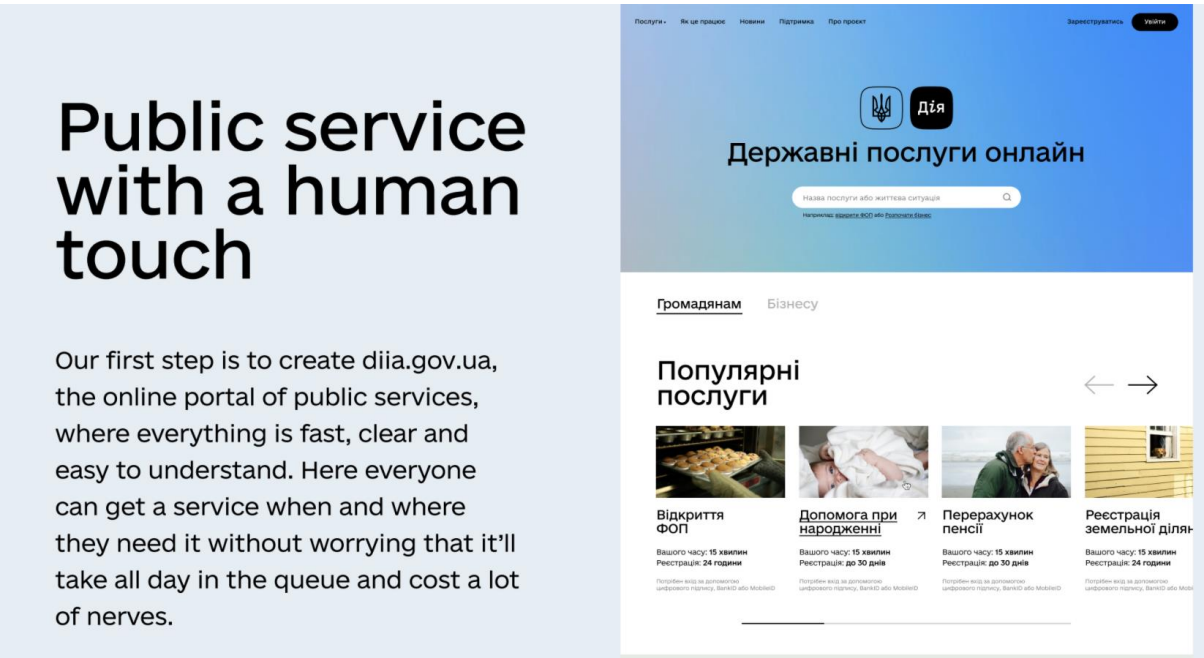
Public services cover a wide range of e-services provided by public authorities to their citizens – ranging from justice and law enforcement, healthcare, and education to welfare benefits payments, and the maintenance of public order. Depending on the nature of each specific public service, the digital transformation process is different. In some areas, internal and procedural processes are reengineered to run automatically, as a background task or zero-touch technology, without any day-to-day human involvement. Ideally, if the system is efficient, it should anticipate users' demands and act independently to deliver the necessary services, without the citizen's request. The goal is to reach 100% of all possible public services on-line, with high levels of automation and efficiency.

2.1.3. Policy Making & Legislation

The prerequisites for advancing Ukraine's digital agenda is the previously developed legislation on the digital economy and telecommunications, digital infrastructure, achievements in the field of cashless economy - the development of e-commerce (e-Trade), e-protection (e-Trust), and cybersecurity (Cybersecurity). Furthermore, the Smart City initiative, launched by the Ministry of Digital Transformation, demonstrates the authorities' confidence in the existing legislative and institutional framework to implement comprehensive initiatives to build an ICT ecosystem at local level.

Digital transformation in Ukraine means transferring public services online and digitizing all state processes. The idea is to provide full-fledged digital services and enhance e-communication of citizens with the state, among themselves and with businesses. Therefore, an essential task of the government is to train people in digital literacy, so they understand and effectively use the public online services and beyond.

2.2. Digital transformation. Projects. Success Stories



@Ministry of Digital Transformation, 2021

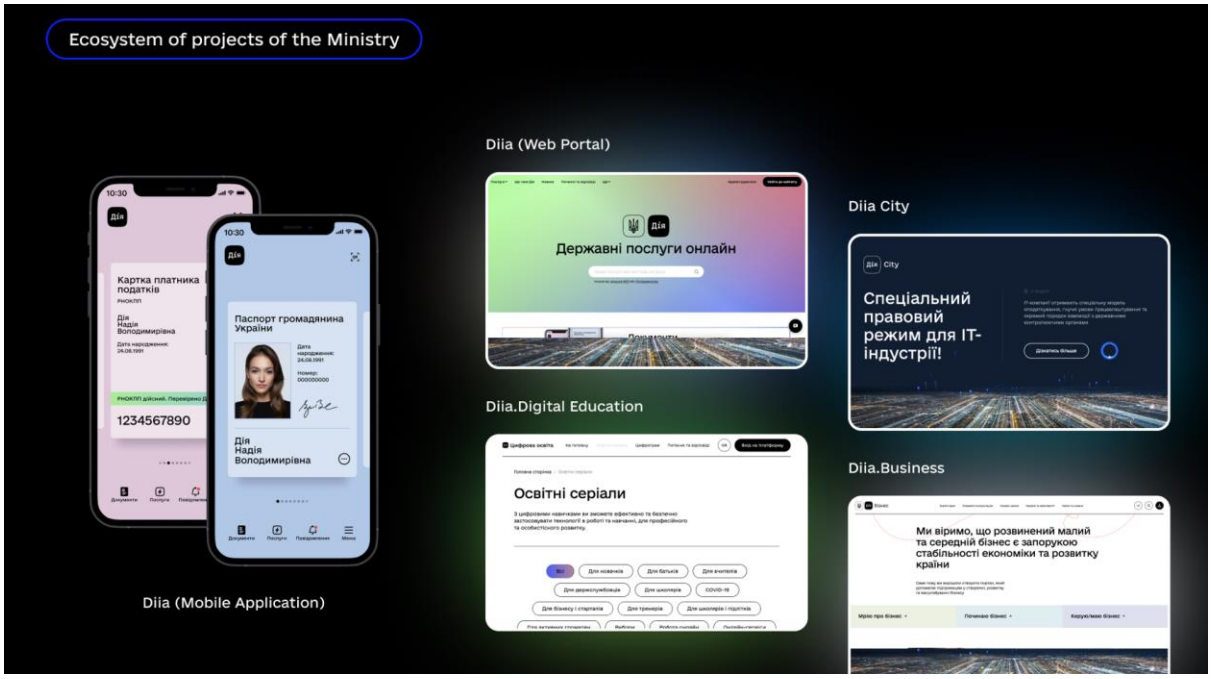
The development of "Diia", the national program and the online platform, preceded the concept of the digital state as a national brand. "Diia" means "action" in Ukrainian; it is also an acronym for Ukrainian "'state and me", and is based on the modern idea of simple, clear and fast interaction between individuals and government.[7]

It is a web portal, a mobile application, and the brand of e-governance in Ukraine. The Ministry initially launched the Diia Portal on February 6, 2020, and introduced version 2.0 on October 5, 2020, during the Diia Summit, where the government presented the first major update to the application and web portal under "Diia 2.0" brand.

In this way, the government helps its citizens to receive services quickly and the officials to do their job reasonably. The launch of the digital state platform Diia brought together all agencies into one effective tool so that everyone could receive digital services quickly, and clearly, providing public services in a straightforward and clear manner, where everyone can get a service when and where they need it.[8]

As of May 2020, three months after launch, the Diia Portal had already more than 2.3 million users, in August 2021, the number of active users exceeded 6 million (as of 17.08.2021), in November 2021 - 9,5 million active users.[9]

[7] https://egap.in.ua/en/projects/diia-digital-state/
[8] https://drive.google.com/drive/folders/1hTRaYKB9Y2GD5GF7LrVP4-K41FmKoAiL
[9] https://hubs.ua/news/kolichestvo-pol-zovatelej-diya-pereshagnulo-za-6-millionov-fedorov-243681.html



In November 2021, when this paper was published, the total number of registered users at Diia: over 9,5 million citizens.

Table 1.

Diia Platform[10] Structure	
Diia Portal	Fast access to online public services.
Diia Application	A mobile application with e-documents and personal data from different registers available 24/7 anytime in any place.
Diia Education	Online education courses: digital literacy, resources for teachers and parents, e.g., "Online child safety" and many more.
Diia Business	Online services for small and medium businesses + Network of Support Centres for Entrepreneurs
Centre Diia	Online administrative services for all country
Diia City	A special legal regime for IT industry

Platform DIIA is also presented in several social media:
Diia https://plan2.diia.gov.ua/
Diia YouTube https://www.youtube.com/channel/UCjLS7GX5NxMBMwT-eY-GdrA/videos
Diia Instagram https://www.instagram.com/diia.gov.ua/
Diia Facebook https://www.facebook.com/diia.gov.ua/
Diia Telegram https://t.me/diia_gov

[10] *https://plan2.diia.gov.ua/*

2.2.1. Diia.Business

Diia Business aims to increase national exports, support enterprises entering new markets, and assist foreign companies in importing goods and services from Ukraine and building partnerships.[11]

Table 2.

Diia Business Structure	
Online Consulting for Entrepreneurs	• Types of entrepreneurships • Tax payment instructions • Sales system and financing guidelines • Free online and offline consultations and recommendations from the leading experts
Online school	• Free educational series for entrepreneurs on business development
Services and opportunities	• A catalogue of services and documents for entrepreneurs
Self-assessment for entrepreneurs	• Self-assessment tools for entrepreneurs
Handbook	• A set of useful articles on entrepreneurship and financial management
Support centres	• References on available services • Online support and offline centres
Exhibitions	• Overview of events and exhibitions for entrepreneurs • Contact details of organizers
Infrastructure map	• Contact details of organizations supporting entrepreneurs
Find an idea	• List of 100+ high-demand business ideas with minimal start-up capital • List of required documents
The entrepreneur path	• Development stages and possible challenges at each stage
Manifesto	• Entrepreneurship conditions and obligations
Cases and news	• Current news and success stories
Partnership	• Partnership and collaboration opportunities • Contact information
Business without Barriers	• Barrier-free business and inclusive working environment

[11] https://business.diia.gov.ua/en

360 Tech Ecosystem Overview	• An online platform for business information on IT-ecosystem: IT companies, people, investors, universities, startup-accelerators, techno hubs, etc.

E-residency is an online service for foreigners that gives them the opportunity to remotely access public services and do business in Ukraine from abroad. E-residents will be able to open a visa or bank account under a simplified procedure and even without leaving home.

2.2.2. Diia City

Diia City is a unique legal framework for the IT industry that aims to create the most powerful IT hub in Central and Eastern Europe, with unlimited investment prospects, job opportunities and brand-new technologies. Ukrainians and entrepreneurs from all over the world will be able to implement the most ambitious innovative and business ideas here quickly and effectively. This is an opportunity to attract international IT companies such as Google, Amazon or Apple, ect., to the country and prevent brain drain by creating favourable conditions for the employment of IT specialists. Diia City will be open to both Ukrainian and foreign enterprises on equal terms and will be governed by special rules established by the Ministry of Digital Transformation.

Table 3.

Diia City Structure	
ACTIVITIES	BENEFITS
• Software development and testing • Software publishing and distribution • Tutoring • Digital marketing and ads • R&D in IT and Telecom • Cybersecurity • Robotics	• Special taxation framework • Special employment conditions • IP protection guarantees • Foreign venture capital investment • Security protection

The Key **Goals to be achieved by 2025:** 450 000+ new jobs and $16,5+ Bln growth of the IT industry.[12]

2.2.3. Center. Diia for Administrative Services

In September 2021, the Ministry of Digital Transformation, and the United Nations Development Programme (UNDP) in Ukraine launched the National Diia Centres Web Platform for Centres of Administrative Services (CASPs).[13]

The web platform provides citizens with comprehensive information about both online and administrative services, assess the quality of services, including feedback, complaints, ideas,

[12] https://city.diia.gov.ua/en/
[13] https://www.ua.undp.org/content/ukraine/en/home/presscenter/pressreleases/2021/digital-transformation-ministry-and-undp-present-a-national-web-platform-for-diia-centres.html

or suggestions, broadcast news about CASRs activities and schedules, store addresses, contact information, and interactive calendar of events, and job opportunities.[14]

In addition, the platform is beneficial for CASPs employees where they can conduct administrative functions and participate in online trainings, get clarifications and guidance on their work, access various resources, and learn best practices.

2.2.4. Digital Passports. Paperless Approach

Ukraine is the first country in the world to fully legalize digital passports in smartphones.

> *"Ukraine is the first country in the world to launch digital passports and legally equate them to ordinary documents. Diia users will no longer face situations when the digital passport is not accepted. This is not just a milestone event in the history of modern Ukraine, it's a big step towards the introduction of the "paperless" regime. This is a unique global case that we can and should be proud of,"* Mykhailo Fedorov, Deputy Prime Minister, Minister of Digital Transformation

Digital passports are available to use for various public and private services. For example, CASPs accept digital passports for the provision of public services, government agencies and courts. Citizens can use digital passports to obtain delivery services in the post offices, to confirm age in supermarkets, to verify identity and cash transactions or open online accounts in banks. In addition, digital passports allow travelling to Ukraine by airplane or train, register in hotels, etc.

The Parliament of Ukraine adopted the bill №4355 "On the Unified State Demographic Register and documents confirming the citizenship of Ukraine, identity or special status" on digital passports.[15] The bill was developed with the assistance of the EGAP Programme, funded by the Swiss government and implemented by the East Europe Foundation, SURGe with the support of the Government of Canada.[16]

Additional security measures are in place to prevent forgery or loss of the digital passport. It can be checked on the Diia platform via a QR-code. It is the people-to-people principle that the Ministry of Digital Transformation implements. To expand the functionality of digital passports, the Ministry of Education and Science has launched document sharing. This will allow replacing paper documents.[17]

2.2.5. Digital Covid-19 Certificate

The Cabinet of Ministers of Ukraine has approved the introduction of digital COVID-certificates, a digital document that confirms the status of a citizen's vaccination, the negative

[14] https://center.diia.gov.ua/
[15] http://w1.c1.rada.gov.ua/pls/zweb2/webproc4_1?pf3511=70393
[16] https://www.kmu.gov.ua/en/news/mihajlo-fedorov-ukrayina-persha-derzhava-svitu-v-yakij-cifrovi-pasporti-u-smartfoni-stali-povnimi-yuridichnimi-analogami-zvichajnih-dokumentiv https://www.kmu.gov.ua/en/news/elektronni-pasporti-u-diyi-uryad-shvaliv-postanovu
[17] https://diia.gov.ua/news/pershij-etap-rezhimu-bez-paperiv-z-23-serpnya-pochav-diyati-zakon-pro-cifrovi-pasporti-v-diyi

result of the PCR tests and the status confirming that the person has recovered from COVID-19.

From September 2021, an international COVID vaccination certificate is available in the Diia application. To obtain a certificate, one needs an electronic signature. The COVID certificate is valid for 365 days. The EU officially recognizes Ukrainian COVID certificates in Diia.[18]

The development and technical implementation of COVID-certificates were jointly carried out by the Ministry of Digital Transformation, the Ministry of Health, the National Health Service of Ukraine, the Ministry of Foreign Affairs, and the State Tax Service. The document is developed considering international requirements - EU Digital COVID Certificate of the European Commission.

Regarding to World Health Organization (WHO), digital documentation of COVID-19 certificates, vaccination status, technical specifications and implementation guidance were published on August 27, 2021.[19]

In Ukraine all relevant patient data is included into the electronic healthcare system. The document can be generated in the Diia application or on the Diia Portal. And then also get a paper certificate from the doctor, if needed.

The Diia app sends a request to the electronic healthcare system then the E-health system transfers medical data for the COVID-certificate to the Diia app. and a certificate is generated in PDF format. It can be printed out or be saved to the file on the mobile phone or other device and can be seen through the QR code on the screen.

COVID certificates can be used like other official documents in the Diia. One can check if the certificate is valid by QR-code, which is convenient, because there's no need to introduce additional special equipment for checking.

The regulations may be (and most probably will be) changed within time, still the key point is that digital technologies do support the online access to the COVID certificates from mobiles or any other type of digital devices anytime in Ukraine.

2.2.6. All-Ukrainian School Online

The online platform "All-Ukrainian School Online '' was launched in December 2020 by the Ministry of Education and Science of Ukraine in close collaboration with the Ministry of Digital Transformation and public association "Osvitoria" to support and organize distance learning for school children. The platform helps manage high-quality distance learning and guarantees equal access to educational materials for students across the country and abroad.

Currently, there are over 640 000 platform users, 216 079 of them are registered, among them 157 542 (73%) of schoolchildren, 47 196 (22%) of teachers, and 11 332 (5%) of other participants. In addition, almost 2 million users have visited the platform and conducted almost 11 million interactions.

[18]Commission Implementing Decision (EU) 2021/1380 of 19 August 2021 establishing the equivalence, for the purpose of facilitating the right of free movement/ transportation within the EU, of COVID-19 certificates issued by Ukraine to the certificates issued in accordance with Regulation (EU) 2021/953 of the European Parliament and of the Council (Text with EEA relevance) C/2021/6170 https://eur-lex.europa.eu/eli/dec_impl/2021/1380/oj

[19] https://www.who.int/publications/i/item/WHO-2019-nCoV-Digital_certificates-vaccination-2021.1

All-Ukrainian School Online is a modern online resource for mixed and distance learning students in grade 5-11 with teaching and learning materials aligned to the state curriculum. The platform contains lessons in 18 basic subjects, which are structured according to the principle of microlearning. They consist of videos, a compilation of lectures, and tests. Besides, students can track their learning progress.

Registration on the platform is free and allows users to subscribe to courses, review materials and track their progress. Once an account is activated, users can select the required courses for training.

3. Digital skills development: System approach

To introduce the digital skills development process on the national level in Ukraine, this report showcases legislative changes made in different sectors (education, medicine, public services, entrepreneurship, regional development, etc.), followed by adaptation and implementation of Digital Competence Framework for Citizens (DigComp 2.0, 2.1), and the establishment of a national online platform for assessing and developing digital skills.

The starting point was the “Concept Paper on Digital Skills for Ukrainian Citizens” developed by the Ministry of Digital Transformation and approved by the Cabinet of Ministers in March 2021. It raised the issue of the low level of digital skills among working professionals and other target audiences, showcasing the key principles, approaches, objectives, and actions to improve the situation.

3.1. Concept Paper on Digital Skills Development as the Starting Point for Policy Makers

Due to numerous implementations of innovative solutions and the rapid growth of the role of digital technologies in all spheres of peoples’ lives, there is a need to upskill and reskill the workforce’s digital competences, ensure the quality of training, and create opportunities to modernize the country's digital economy following new technological requirements. Moreover, digital skills are important not only for working citizens; they also make life more accessible and comfortable for the elderly and people with disabilities and offer better opportunities for education, personal development, communication, and security in the digital world for children and young people.

The Framework Program for Updated Key Competences for Lifelong Learning (2018 / C 189/01), adopted by the European Parliament and the Council of the European Union on 22 May 2018, recognizes digital competence as one of the eight key competencies for the entire life and work of EU citizens. Furthermore, the experience of European countries shows a significant impact of the measures taken for the population's digital competencies development on their economies and competitiveness in the EU and at the international level.

At the state level, the importance of developing the digital skills of citizens was first recognized in the Concept of the Digital Economy and Society Development in Ukraine for 2018-2020 (№ 67p), approved by the Cabinet of Ministers on January 17, 2018. It identified the need to launch national training programmes to develop general and professional digital competencies as one of its priorities. It was also supposed to accelerate the development of the digital economy. However, due to political instability, significant changes did not take place until 2021.

The lack of conceptual foundation for the formation of state policy in the field of digital skills hindered digitization processes in all spheres of public life and the economy; reducing the efficiency of public e-services created by the government for the people. The State Strategy for Regional Development for 2021-2027 (approved by the Cabinet of Ministers of Ukraine Decree No. 695 of August 5, 2020), identified a low level of digitalization of regions, low digital awareness, and low digital skills, among other national challenges impeding the development of regions and the state.

3.1.1. Key Goals and Objectives

Legal regulation of digital skills can be initiated through a Concept Paper or Strategy. In Ukraine, the initial intent was to create a Digital Skills Strategy, but it was decided to develop a Concept Paper first for several reasons. Among them are the lack of data on digital skills, lack of indicators for measurements, low or no awareness in the society and among policy makers regarding the strategic importance of digital skills development, poor understanding of the need for training, upskill and reskill of the workforce in the field of digital skills.

The Concept Paper aims to raise public awareness and understanding in the society, to ensure Ukraine has the relevant, appropriate digital skills it needs to be a successful global economic force. This document is a part of the policy, together with other legislation documents to follow.

3.1.2. Digital Skills Concept Paper Structure

The structure of the Concept Paper on Digital Skills in Ukraine follows the tradition of such kinds of documents and looks as follows:

I. Introduction
II. Challenges to be solved
III. Purpose and terms of realization/implementation
IV. Key Goals
V. Ways and proposed solutions
VI. Actions to be taken
VII. Forecast of Impact on key stakeholders' Interests
VIII. Expected outcomes
IX. Resources needed

Problems to be solved

The Concept Paper identified the following main challenges related to the development of digital competencies:

- Lack of legal regulation of the development of digital competencies - there is no defined terminology, no officially recognized framework of digital competencies, no descriptors, no specific requirements for the levels of digital skills in professional standards for various categories of professionals. And, accordingly, there are no common requirements for digital competencies either in educational standards, or in educational programs and curricula. In addition, there is no system of certification of digital competencies, etc.
- Employees are not properly trained in digital skills and must be re-trained or upskilled immediately upon hire to meet the job requirements.

- Absence of clear indicator systems to monitor the state of digital skills development, and as a result, no data for analysis, reasoning and decision making. Without monitoring and lack of any data for analytics in place, there was no reason to focus on digital skills, upgrade training programmes, or invest into the workforce's digital skills development.
- Lack of coordination between ministries regarding new workforce requirements and training programmes to meet the needs of the digital economy, lack of collaboration between executive bodies and local self-governing councils on citizens' digital skills development.

The above has created issues related to digital skills requirements in training, certification, and recruitment systems. And, consequently, the low level of digital skills in society has slowed down the development of the digital economy and digital society. It has also increased the level of cybercrime and risks faced by citizens and employees in the digital world. Hence, the lack of regulations has led to no or very little progress.

Purpose and terms of realization of the Concept

The key goal of the Concept Paper is to identify the priorities and primary objectives for the development of digital competence policy in the country, increasing the level of digital literacy of the population, including the elderly adults, low-income families, people with disabilities, and other vulnerable groups in Ukraine.

The main objectives set by the Concept Paper

To solve the above-described challenges and improve current situation, the Concept Paper sets out the following objectives:

- ➔ Raise awareness of the role of digital skills in the society, both as for personal wellbeing and for the economic growth of the country.
- ➔ Provide legal regulation of public policy in the field of digital competencies.
- ➔ Define terminology related to digital education and digital skills.
- ➔ Create and adapt existing EU DigComp Frameworks, and tailor them to professional and educational standards.
- ➔ Establish descriptors and requirements for different levels of dig.comp (for citizens, as well as for different categories of professionals);
- ➔ Ensure coordination between state executive authorities and structures.
- ➔ Define indicators, measurements, and monitoring approaches of the status of digital skills development in the society.
- ➔ Raise public awareness of the risks of the Internet, as well as of human rights in the digital society.
- ➔ Address digital illiteracy and increase the digital competencies of citizens.

Forecast of the impact on the key interests of stakeholders

The formation and implementation of public policy on the development of citizens' digital skills and digital competencies impacts the key interests of citizens, business entities, and executive authorities.

The implementation of the Concept has a positive impact on ensuring legal regulation aimed at the development of digital skills and digital competencies, defining the directions and main objectives in this area, increasing digital literacy, improving the use of digital technologies and electronic services, enhancing digital security, and accelerating digital transformation processes in the economy and society. Thus, it contributes to the development of the digital economy and the country's competitiveness as a whole.

Expected results

The Implementation of the Concept Paper regulations allows:

- Accelerate the processes of digital transformation in Ukraine.
- Significantly increase the level of digital skills and digital competencies in the society, as well as the level of state competitiveness and the quality of human capital.
- Increase the competitiveness of employees by mastering new digital skills and digital competencies.
- Increase the level of accessibility to public e-services for the elderly, people with disabilities, low-income families, and other vulnerable groups.
- Significantly reduce the risks on the Internet.
- Introduce legal regulations of the formation of public policy in the field of development of digital skills competencies of citizens.
- Develop comprehensive legislative changes that ensure the definition of digital education, digital skills, and digital competencies in spheres of public life.
- Define a system and description of digital competence components (digital competence framework), as well as the requirements for the level of mastery of digital skills and digital competencies of different categories of employees, in particular in professional standards.
- Ensure coordination of actions at the level of executive authorities for the development of digital skills and digital competencies.
- Establish indicators for monitoring the development of digital skills and digital competencies.

The Concept Paper was created through the joint efforts of various experts in the field of digital competencies, IT specialists and scientists. In Ukraine, there is a network of eSkills experts within the EU4Digital programme for EaP countries, who actively participated in creating the Concept Paper. Such collaboration at the initial conceptual stage laid the foundation for further partnership during the implementation phase.

3.1.3. Action Plan

The Concept Action Plan aims to launch the key processes (legislative, informational, scientific, methodological, and organizational) for the further development of digital competencies across the country. All actions have to comply with the SMART-goal approach, being specific, measurable, achievable, realistic and time-bound. The steps identified in the Concept Paper, should be completed by 2025. This short time frame results from rapid global technological change, expected changes in workforce requirements in the digital economy,

etc. Thus, a different conceptual approach or a more specific digital skills development strategy may be needed five years from now. Nevertheless, a five-year period is long enough to launch the processes and achieve significant changes.

At the initial stage to implement the Action Plan, it was necessary to provide regulatory and legal support. Therefore, the provisions of the Concept Paper included collaboration between the Ministry of Digital Transformation, Ministry of Education and Science, Ministry of Culture and Information Policy, Ministry of Justice, National Academy of Sciences to enable legal regulation of public policy on the digital skills and competencies based on the EU experience and international experience.

3.1.4. Implementation

After the approval of the Concept Paper on Digital Competencies by the Cabinet of Ministers of Ukraine in March 2021, some important steps were made to initiate its implementation. At the approving stage, collaboration between various ministries and expert groups commenced. As a key driver of digital skills development in Ukraine, the Ministry of Digital Transformation coordinated all the processes stated in the Concept Paper. In addition, the Ministry of Digital Transformation was working on adapting the Digital Skills Framework for citizens. (See more details in Chapter 2.2.1.)

Furthermore, the Ministry of Digital Transformation collaborated with the Ministry of Education and Science to develop education legislation. Also, the Ministry of Education and Science launched the DigComp Framework for Educators, which required adaptation of the European DigCompEdu Framework. As a result, the Ministry of Education and Science added digital skills descriptors to new professional standards the Professional Standard for Teachers K12 and the Professional Standards for School Headmasters. Then, based on DigCompEdu, Ministry of Education and Science, together with the Ministry of Digital Transformation and the Ukrainian Institute for Education Development designed the typical In-Service teacher professional programme on digital skills and included digital skills development in the Strategy for Digitalization of Education.

The National Agency of Qualifications (NAQ) signed the Memorandum with the Ministry of Digital Transformation and worked on harmonization of professional standards with the DigComp Framework.

The National Agency of Ukraine on Civil Service (NAUCS) signed the Memorandum with the Ministry of Digital Transformation and developed DigComp for Public Officers. However, legislation in the public sector required several changes. First, the NAUCS had to recognize digital competencies as mandatory for public officers' professional development and training. Then, the recruitment process had to be adapted. With the EU support, seven weekly workshops were organized to analyze the selection and enrolment process and make it more technologically.

Nowadays, a new initiative on cyber hygiene was launched to test and train about 10 000 public servants each year in cybersecurity, information security, cyber hygiene, wellbeing, and safety, etc. [20]

[20] https://pdp.nacs.gov.ua/courses/osnovy-kiberhihiieny?course_enrollment_id=1770

The State Service for Special Communications and Information Protection of Ukraine (DSSZII) was inspired by the Ministry of Digital Transformation Concept Paper and started preparing the Cyber Hygiene Concept Paper.

The Ministry of Economy has expressed interest in further collaboration related to the development of DigComp for SME entrepreneurs, as well as to Job Profiles for new Professions in SMEs.

To support the processes of regional digital transformation carried out in collaboration with the **Ministry of Regional development**, the Ministry of Digital Transformation has introduced the approach of regional concept papers on digital competence to be implemented on the regional and local levels. The number of regions, urban municipalities, and local communities that have already adopted this conceptual approach and started implementing their local action plans to develop citizens' digital skills, launch social initiatives, and information campaigns, is growing rapidly, enabling the Concept Paper to be implemented nationwide.

The Ministry of Culture and Information Policy initiated the programme "*Filter" on media literacy*.[21]

To change societal perceptions, the government has initiated information campaigns to promote digital technologies and digital competences among the population at national, regional, and local levels. In addition, communication channels, including on-line support, dashboards, PR, and visibility of this initiative, have been created to ensure its guidance.

Program Implementation on the national level. Table 4.

Key Steps to set eSkills development programme in Ukraine
● Analyse the status of digital skills (conduct surveys, polls, evaluation, assessment, anything which can showcase the real status in the society or in certain groups/ target audiences. ● Assess challenges, needs and level of level of skills of each specific target audience ● Develop a concept paper or a strategy ● Develop/ Adapt/ DigComp Frameworks ● Develop the Action Plan ● Raise awareness in the society ● Engage partners ● Develop training content, courses, free online resources ● Consider needs and motivation ● Train the trainers, if needed ● Develop online platform to support the program ● Create coalition or expert networks ● Develop the communication plan, including key messages for relevant target audiences, communication channels and expected outcomes ● Launch information and media campaigns, like All Digital Week, Girls in ICT, Digital Ambassadors, Digital Skills month etc. ● Engage partners, key stakeholders, end users

[21] https://filter.mkip.gov.ua/

- Integrate eSkills development into the existing training system, attestation, certification system where possible, etc.
- Stimulate reskilling and upskilling the workforce and citizens of different target groups
- Monitor and evaluate the progress made, set KPIs
- Make Comparative analysis
- Update the Action Plan, allocate resources when needed.
- Raise awareness on progress made through success stories, dashboard, case studies, etc.

3.2. DigComp Framework for Citizens in Ukraine

The European Digital Competence Framework, also known as DigComp, offers a tool to improve citizen's digital competence. Today, being digitally competent means that people need to have competences in all areas of DigComp. DigComp 2.1 provides a holistic approach for digital skills assessment and development, it showcases the spheres, descriptors, levels of digital skills. It's the reference for policymakers, professional standard developers, educators, HRs, etc. and citizens on what to teach and how to assess digital skills. Without it, there's no clear understanding of what skills to develop and what to assess.

Based on the analysis, as well as taking into account the results of several projects and research on the status of development of digital competencies in the EU and in Ukraine, in particular - MoPED, the Digital Competence Framework for Citizens of Ukraine (DigComp UA) was proposed. DigComp UA for Citizens is based on the conceptual reference model DigComp 2.0 and the updated European framework DigComp 2.1, which are adapted to the national, cultural, educational, and economic features of Ukraine.

DigComp Framework for Citizens in Ukraine is the reference for citizens, professionals, experts, and decision makers in the country.

3.2.1. Adaptation

The first DigComp Framework demonstrated a holistic approach, a so-called benchmark conceptual model that could be adapted to many areas of life: education, employment, active citizenship, and social inclusion. The updated version, the DigComp Framework 2.1 defined eight proficiency levels for five competence areas along three dimensions: task complexity, autonomy, and cognitive domain. To date, the latest version, the DigComp 2.2. was presented at the All-Digital Summit on October 7-8, 2021. It was prepared based on the expertise and feedback of international experts from different organizations.

Changes are inevitable and necessary to keep the DigComp framework up-to-date and relevant. Therefore, it is updated every 2-4 years based on the latest scientific research and stakeholder feedback to minimise any undue efforts required to implement or adopt the DigComp framework in each specific field or country.

Table 5

#	**The Structure of DigComp 2.1. Framework.**	**Module**
1	Information and Data Literacy	DC 2.1 M1
2	Communication and Collaboration	DC 2.1 M2
3	Digital Content Creation	DC 2.1 M3
4	Safety	DC 2.1 M4
5	Problem Solving	DC 2.1 M5

At the European level, there are unified DigComp Frameworks for all participating countries, but in Ukraine, the analysis of the current state of citizens' digital skills has made experts rethink the framework and adapt it to the country's needs.

When implementing DigComp in the national context, the Ministry of Digital Transformation of Ukraine, together with experts from the EU4Digital eSkills network, decided to adapt the Digital skills framework for citizens. It was a synergetic effort. Several years before, the Erasmus+ project had been working on adapting the European DigComp 2.0 to the Ukrainian needs, so this document was used as the basis for further development. The transformation of DigComp into a practical tool took place with the active participation of representatives from the education and training sectors, labour market and social partners, and industry (including the ICT industry). Different groups of experts also contributed to the adaptation process.

The purpose of the framework is to equip citizens with the tools to assess personal digital skills, identify gaps and improve them to be safe Internet users, to use digital technologies for communication and collaboration, for personal development and lifelong learning, for work and leisure, to improve business and to build a culture of safe and efficient digital users.

In 2019, the Ministry of Digital Transformation conducted a survey in partnership with the United Nations Development Programme (UNDP) and several other organizations. The survey results, conceptually based on DigComp 2.1., showed that 37,9% of the Ukrainian population (ages 18–70) have low basic e-skills, and over 15,1% have no e-skills at all. It means, in total, 53% of the population needs to develop digital skills or upskill 48% of Ukrainians would like to upgrade their digital competencies.[22]

The key changes made during the adaptation referred to the following areas:

- computer literacy and lifelong learning

[22] https://osvita.diia.gov.ua/research

- cyber hygiene and cybersecurity competence
- personal self-development with digital technologies and innovations
- creativity and innovations in the digital world

In addition, the new framework included 6 levels, which is two levels less than the previous one.

Table 6

#	The Structure of the DigComp UA Framework	Module
0	**Computer Literacy** (PC, h/w, s/w, application, Internet, digital identity)	DC UA M0
1	Information and Data Literacy	DC UA M1
2	Communication and Collaboration	DC UA M2
3	Digital Content Creation	DC UA 1M3
4	Safety	DC UA M4
5	Problem Solving	DC UA M5

The adaptation process started with an analysis of the surveys and the actual situation. Then, a group of experts worked on the adaptation and proposed an adjusted version to a broader expert network (EU4Digital national eSkills network, the experts of National Coalition of Digital Transformation, etc.) for comments and improvements. In each case, professionals and end-users were also involved in providing feedback. Finally, after expert discussion, the DigComp Frameworks were presented to the public and afterwards recommended for larger use, integration into the education system, adaptation to national qualifications frameworks, for self-development, digital skills assessment, attestation and certification, and recruitment process.

3.3. DigComp Frameworks for Professionals

The DigComp framework for citizens has been used as a basis for the development of context-specific digital competency frameworks, the so-called DigComp derivatives. In Ukraine, several derivative frameworks for different professions have recently been developed:

- DigComp framework for Educators in collaboration with the Ministry of Education and Science, national experts from the IT Committee at MoES, and Erasmus + program participants (Projects: MOPED & DigCompFra).

- DigComp framework for Public Officers in collaboration with National Agency of Public Service.
- DigComp framework for Entrepreneurs in collaboration with experts in the field of entrepreneurship training and development.
- DigComp framework for doctors in collaboration with the Ministry of Health Defence (to be published in 2022).

When creating DigComp Frameworks for different professional groups, new competencies, or even entire areas, were added, or excluded. For example, the DigComp framework for public officers, while based on the DigComp for Citizens, has 5 areas instead of 6, and some new skills have been added due to their specific responsibilities and duties.

The role of DigComp frameworks for professionals in the implementation process

Development of the professional DigComp frameworks in Ukraine aims to provide the instruments which could help different target audiences to benefit from them:

- for professionals it can help with self-evaluation, setting learning goals, identifying gaps, and training opportunities, facilitating job search.
- for policy makers - it can help to monitor professional digital skills and to support curricula development, as well as to measure human capital which is needed to take advantage of the possibilities offered by a digital society.
- for HR - it's a tool to set qualifications needed in terms of digital skills.
- for educators - *it can be used to plan and design education and training offers.*

Table 7: Comparison between the processes of digital skills development of citizens and professionals. Support & Tools provided

Citizens's Digital Skills Development	**Tools**	**Professionals' Digital Skills Development**
Develop and legalize the Concept Paper on Digital Skills as the first step for policy development		
Raise awareness among population	Communication Plan	Raise awareness among educators, employers, HR and working professionals
Adapt the DigComp Framework (FW) for Citizens as the concept model	Frameworks	**Develop the DigComp Framework (FW) for Professionals**
Stimulate Regional/ Local DigComp Concept Papers/ Action Plans development	Recommendations	Provide Recommendations reg. qualifications & training curriculum to match the FW
Take actions: Introduce Social Initiatives acc. to regional strategies and Action Plans	Recommendations	Take actions: Harmonize DigComp w/ National Qualification Framework (NQF) and Sectoral Qualification Frameworks (SQF)

		Customize DigComp with Educational Programs for Pre-Service professional training & In-Service continuous professional development (CPD), as well as w/ attestation and certification
Support w/ DigComp self-assessment tools to identify gaps/ needs	Tests/ Digigrams	Support w/ tests or assessment tools to identify gaps/ needs acc. to the professional DigComp frameworks
Provide education resources and training opportunities (Diia. Digital Education) via social initiatives in cities & villages at public libraries or training centres	Teaching and learning resources	Provide Training Opportunities online or at workplace via distance learning
Stimulate upskilling	Communication policy/plan	Motivate upskilling/ reskilling via analysis if the assessment results, support w/recommendations, communication campaigns, success stories, etc.
Introduce the badge system to motive upskilling	Motivation tool	Integrate DigComp Certification (ICDL, ECDL, National Certification System, etc,)
Support with open online resources	Online Platforms and resources	Support with Dig. Platforms, MOOCs
Identify Indicators and Measurements to evaluate the status	Tools	Identify Criteria to Assess the level of Digital Competences development & integrate into attestation/ certification processes
Monitor and evaluate the progress by regions, by fields, by target audiences to take timely actions and improve the Action Plan to reach better results on the system level.		

3.4. DigComp Communication and Media-campaigns

A communication plan is a prerequisite for the support and implementation of public policies on Digital Competencies. It may or may not be supported by a communication strategy; nevertheless, whether it is comprehensive or narrow, conceptual, or strategic, it has to exist to complement digital skills development policies in any country or region to reach all the target groups in a timely and accurate manner.

Ukraine has developed a communication framework. This is an internal document of the Ministry of Digital Transformation; however, it is well-structured and communicated to all stakeholders.

Table 8

Structure of the DigComp Communication Framework	
I.	The Key Information - the subject area (DigComps, Actuality, Objectives, Research Results, Action Planning, etc.)
II.	The Goal and Expected Outcomes of the Communication Plan
III.	Key Target Groups - Audiences
IV.	Key General Messages for Each Specific Target Group
V.	Key Steps of the Communication Plan
VI.	Key Channels of Communication (TV, Radio, Massmedia Channels, like FB, Twitter, Instagram, Telegram, etc,)
VII.	Key Instruments of Communication (webinars, press-releases, presentations, videos, social campaigns, case studies, success stories, distribution lists,
VIII.	Key Speakers (policy makers, experts, celebrities, end users, etc.)
IX.	Qs&As (to predict possible clarification questions and timely provide answers)

A Communications Plan should be developed early in the project cycle to identify communication needs and prepare an action plan to address those needs. The Communications Plan identifies the users of information, the types of information, the frequency and means of communication, and the parties responsible for providing, consolidating, and disseminating the information. Implementing a structured plan ensures that each stakeholder receives the necessary information in a timely manner.

In addition, various media campaigns have been initiated by the Ministry of Digital Transformation and other public entities to raise awareness and promote digital skills tools (see Annex V).

4. Online Platform Diia. Digital Education

This innovative online platform is Ukrainian know-how. It provides opportunities to assess and develop digital skills through microlearning, entertainment in the format of micro-series on specific areas for different target audiences such as the elderly, teachers, parents, young people, government officials, entrepreneurs, etc. All the above aims to lead people from the

analog to the digital world and improve their digital skills. In general, for the first year of its existence, there's almost 1 million platform users.

In January 2020, to reach the goal of educating at least 6 million Ukrainians in digital skills by 2023, the Ukrainian government launched the National Digital Literacy Program "Diia. Digital Education", which has two components:

1. **An on-line platform** with different categories of digital skills training courses and self-assessment tests for different target groups, so-called Digigrams, which are free, and available to everyone anytime, anywhere in the edutainment format.
2. **An off-line network of Digital Skills Centers** with a programme to bridge the digital divide. Partnerships with CASPs, libraries, the private sector, schools and universities have been established for this purpose.

At the beginning of 2020, the Ministry of Digital Transformation of Ukraine launched the first three training courses under the Swiss-Ukrainian E-Governance for Accountability and Participation Programme (EGAP), implemented by the "East Europe Foundation" (EEF), in collaboration with other international and local partners.

The first three online courses:

1. "Basic digital literacy for citizens"
2. "Digital literacy for teachers"
3. "Online safety of children for parents".

Partnerships are critical for the development of the national online platform. Overall, the online courses have been developed by more than 17 production teams with the support of international and national companies and foundations, such as East Europe Foundation, UNDP, Google, Microsoft, OSCE, CISCO, Osvitoria, etc. Subsequently, the online platform offers continuing education courses in various specializations, career transition courses, lifestyle courses, and courses in new digital professions.

The key target groups of the platform:

- Older people who lack digital competence. The first basic courses and guest courses in mobile literacy were developed for this target group.
- Parents and children. Courses are focused on Internet safety.
- Adults with basic digital competence. Specialized and advanced courses help them stay competitive on the labour market or learn new professions.
- Young people, both schoolchildren and students, and young professionals. For the latter, courses in new digital professions are available.

Furthermore, user can find various educational series on the Diia.Digital Education platform, for example:

- Basic digital skills (first, second and third seasons) for Citizens
- "Online safety for kids", a serial for Parents
- Digital skills for Teachers
- Training for Trainers and Coaches

- Digital literacy for Civil Servants
- E-democracy Stars
- Digital Skills for Medical Professionals
- Digital skills for Entrepreneurs
- Digital skills for Militarymen
- Digital Technologies for People with Disabilities

Also, there are different types of online courses for employability or better understanding of digital technologies and digital professions:

- Modern resumes for employment
- Artificial Intelligence
- Artificial intelligence for pupils
- New digital professions
- e-Election
- Online services
- Online security
- Work Online
- Barrier-free
- Digital finance

All educational serials are free. In addition, new specialized courses for business professionals, lifestyle courses, and new digital careers courses will be released almost every month on the online platform. At the end of each course, attendees can take a final test and receive a certificate confirming successful completion.

As of 1 January 2021, the Diia.Digital Education platform had 400,000 users taking eSkills courses.

As of November 2021, ten months later, Diia.Digital Education has more than 1 million active participants: 833 000 in Digital Education[23] and 208 000 in All Ukrainian School Online, as a part of Diia.Digital Education project.[24] The total number of Diia. Digital Education visitors is above 1.7 million Ukrainians.

4.1. Conceptual approach

The Diia. Digital Education Platform guides Ukrainians in raising awareness and developing basic digital skills that can be efficiently and safely applied to work, studies, and everyday social life. The Platform helps citizens take their first steps in acquiring digital skills and informs them about how digital skills can benefit their professional and personal development. Furthermore, they can use a wide range of other available online courses (MOOCs) such as Prometheus, EdEra, or specific training on their needs and demand.

[23] https://osvita.diia.gov.ua/en
[24] https://lms.e-school.net.ua/

To make the registration process easier for new users, a short 1.5-minute video tutorial is offered. It provides detailed instructions on how to create a personal profile. Also, a list of all available educational Courses is provided to facilitate navigation through the Platform.[25]

Methodology

In developing the courses, the experts relied on pan-European standards for teaching and assessing digital competence. In particular, the basic digital literacy course is based on the Digital Competence Framework for Citizens (DigComp 2.1) adapted to Ukrainian needs. The Digital Literacy Course for Teachers is based on the European Digital Competence Framework for Educators (DigComp Edu.)

Educational series differ according to their level of independence, difficulty, and comprehension. Each educational series has three seasons: for beginners (DigComp A1 & A2), intermediate users (DigComp B1 & B2) and more advanced users (DigComp C 1 & C2). Each series can have from four to twenty-five or more episodes, and at the end there is a short reflection test that is designed to keep learners more focused and motivated.

To guide the learners and help them assess their level of digital skills, there are Digigrams. See chapter 4.3. below for more information.

4.2 Online Trainings and Series

The survey results showed that many people, especially elderly ones, who have zero or low digital skills, watch TV series, and need to be walked through from analog to digital world in the familiar format. Motivation for each target audience was also considered.

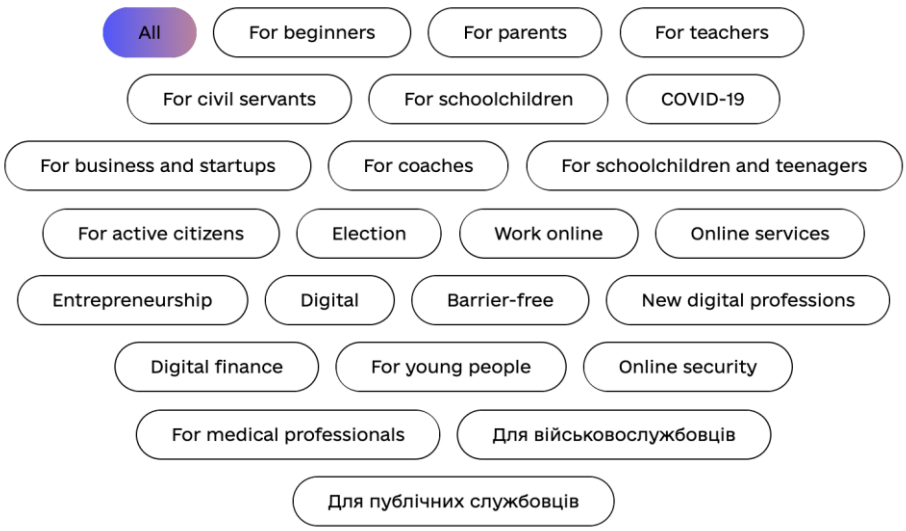
Therefore, the training courses take place in a unique format of edutainment - a combination of serious, deeply analytical information from qualified experts and entertaining content from celebrities. Instead of levels, there are seasons, and instead of lessons, there are educational series with the experts and celebrities.

The first ambassadors of digital education were famous Ukrainian TV and theatre stars, TV anchor women, actors, and other film industry representatives. With time, more celebrities and IT experts joined as Digital Skills ambassadors. As of November 2021, there are 70 on-line training courses with over 200 series.

An innovative format of the educational “series'' was chosen to make learning exciting and interesting and provide a more flexible way to develop digital skills. In addition, the teaming of professional instructors and Ukrainian celebrities makes the learning process easier and more engaging for participants. They are able to move from analog television to online digital learning, explore the opportunities of the digital world and become part of the digital society together with their favorite actors and singers.

[25] https://osvita.diia.gov.ua/en/courses

Image 1: Diia. Digital Education Series



4.3 Digigrams. Digital Skills Assessment Online

It is recommended to start developing digital skills with the Digigram test. It allows users to assess the level of proficiency, identify strengths and weaknesses, and begin to build an individual learning trajectory. Users can take the test after registering on the Platform.[26]

Initially, a single Digigram was created for all. It was structured according to an adapted version of the DigCompUA framework. It included more than 90 questions organized in six spheres, divided into five sub-competencies each. It took almost 30-40 minutes to complete the test. At the end of the test, users who completed the test could get the results with a detailed explanation of their level in each specific DigComp area. The test was popular and, and more than 187,334 Ukrainian citizens took it overall. However, judging by the feedback, it was too long, so it was decided to create shorter tests and separate them into different target and professional groups.

There were introduced several professional Digigrams:

- Digigram for Educators
- Digigram for Public Servants
- Digigram for Doctors
- Digigram for Entrepreneurs

In addition, in August 2021 the International Certificate of Digital Literacy (ICDL) "Digital Citizen" test component became available online and in three months 3,782 citizens

[26] https://osvita.diia.gov.ua/en

successfully passed it.

Table 9.

Digigram Statistics Dashboard in Ukraine (Nov.2021)						
Test Title	**April'21**	**June'21**	**Aug.'21**	**Sept'21**	**Oct.'21**	**Nov.'21**
Digigram 1.0	150 000	162 060	175 212	178 420	182 614	186 891
Digigram 2.0	0	11 777	36 686	43 506	51 760	59 291
Digigram for Educators	0	21 670	72 051	82 129	95 057	102 741
Digigram for Public Servants	0	6 583	30 520	35 880	40 353	43 749
Digigram for Doctors	0	508	21 040	25 799	29 137	30 833
ICDL	0	0	515	1 434	2 535	3 782

4.4 Chatbots. Microlearning Approach

A Chatbot on Cyber Hygiene was launched in March 2021, within the national policy on digital skills development of the Ministry of Digital Transformation of Ukraine. This initiative is implemented in partnership with several key stakeholders:

- Ministry of Digital Transformation of Ukraine;
- OSCE Project Coordinator in Ukraine (OSCE PCU) in the framework of the project "Strengthening Ukrainian State Authorities' Cyber Hygiene and Cybersecurity Capacity" with the financial support of the Ministry of Foreign Affairs and Commonwealth of Great Britain and the Ministry of Foreign Affairs of the Federal Republic of Germany;
- The International Foundation for Electoral Systems (IFES) with the support of the United States Agency for International Development (USAID), the Department of International Affairs of Canada and British assistance from the British government;

- Vodafone Ukraine.

The purpose of the Chatbot is to raise awareness of Internet threats and educate users how to avoid them in their daily lives. It also helps citizens improve their digital skills and learn about online, so they feel more comfortable and safer in the digital society.

Also, this format provides easy and free access to digital literacy microlearning, allowing citizens to use modern digital technologies effectively and safely at work and at study, for professional or personal development. In addition, Chatbot offers mobile users mini-training sessions to test their digital literacy. This quiz-type microlearning helps raise awareness about cybersecurity and cyber hygiene and allows people to quickly test their digital literacy level and gain new knowledge, as it includes explanations for each question prepared by experts. Users can contact the administrator of the Chatbot, share it with colleagues, friends and much more.

The first test was related to general knowledge on cyber hygiene and included only seven questions from different areas: Internet safety, social networks, instant messengers safety, information validation, mobile fraud, and general information protection. New tests and contents are regularly added to the chatbot. Tests are updated monthly. Today, the following chatbot tests are available:

- General knowledge
- Social Networks and Messengers
- Social Engineering
- Mobile Fraud[27]
- Malicious software (malware)
- Device Security
- Passwords Usage Models. Protection
- Digital Etiquette

The test takes about 5 minutes to complete. Anyone can take it on the way to work on the bus, in line at the doctor's office, or sitting at home with the family. Users receive immediate feedback on the correctness of the answers and some additional information explaining why they are correct or not. If the Chatbot test score is very low, the user is directed to more detailed resources available on the DIIA.Digital Education platform, where anyone can learn for free in the format of educational series.

[27] https://www.youtube.com/watch?v=sG86XxicNH8

There are useful educational materials and series that help better understand the subject matter, for example, educational series "Cyber Hygiene Essentials" on the Diia.Digital Education platform.[28] It is a training that consists of nine series lasting 4-7 minutes. It allows users to understand the essence of social engineering and psychology of influence; to learn about the safe use of the browsers and Wi-Fi networks in general; to distinguish between the use of personal and business mailboxes; to get acquainted with the role of physical security in the cyber defense; and, to understand the types of manipulation of information in the cybersphere.

Another example is an express test for digital literacy, which is a few short questions that will help anyone assess the level of digital skills and learn new facts about online safety.[29] Finally, the educational series "Cyber" shows users how to minimize the risk of losing private, sensitive information, how to prevent cyberattacks or cyber fraud, and how to recover if they occur.[30] Thus, the chatbot, Digigrams and online serials on Diia.Digital Education are linked, a test on Mobile Fraud is available on the Chatbox and the on the Diia:Digital Education.[31]

Statistical analysis of cyberattacks and other threats by security experts helps classify threat levels and guides Chatbot developers on priority topics for further advancement:

- Lower-level threats (94% of all types out of threats in 2020 in Ukraine) - information related to COVID-19 fishing sites, fraud related to the delivery of goods and services, fraud calls involving bank security services, and card data extraction are needed.
- Middle-level threats (5%) - require clarification about ransomware attacks targeting mainly corporate users, such as gas stations chains, medical services, etc.
- Top-level threats (about 1%) - information needed to raise public awareness of the most complex and precisely targeted attacks.

The trends analysis is also useful for preventive purposes.

To motivate the Chatbot users to be more active, it has been announced that they can not only test themselves, learn and share the information but also create their questions for the next tests. It is a kind of crowd sourcing and peer-to-peer learning initiative. The winners who submitted the most validated questions were awarded valuable prizes from the project partners.

Now, there are more than 3,600 Chatbot users, and the number is constantly growing. The Cyber Hygiene Chatbot has proven to be an effective model of microlearning and micro education in an easy and efficient way.

5. DigSkills HUB Network

Some Ukrainian citizens still do not have access to the Internet at home; this leads to the need to provide them with such access in the hubs and help them develop digital skills. In addition,

[28] https://osvita.diia.gov.ua/courses/cyber-hygiene
[29] https://t.me/digigram_ua_bot
[30] https://osvita.diia.gov.ua/courses/cybernanny
[31] https://www.youtube.com/watch?v=sG86XxicNH8

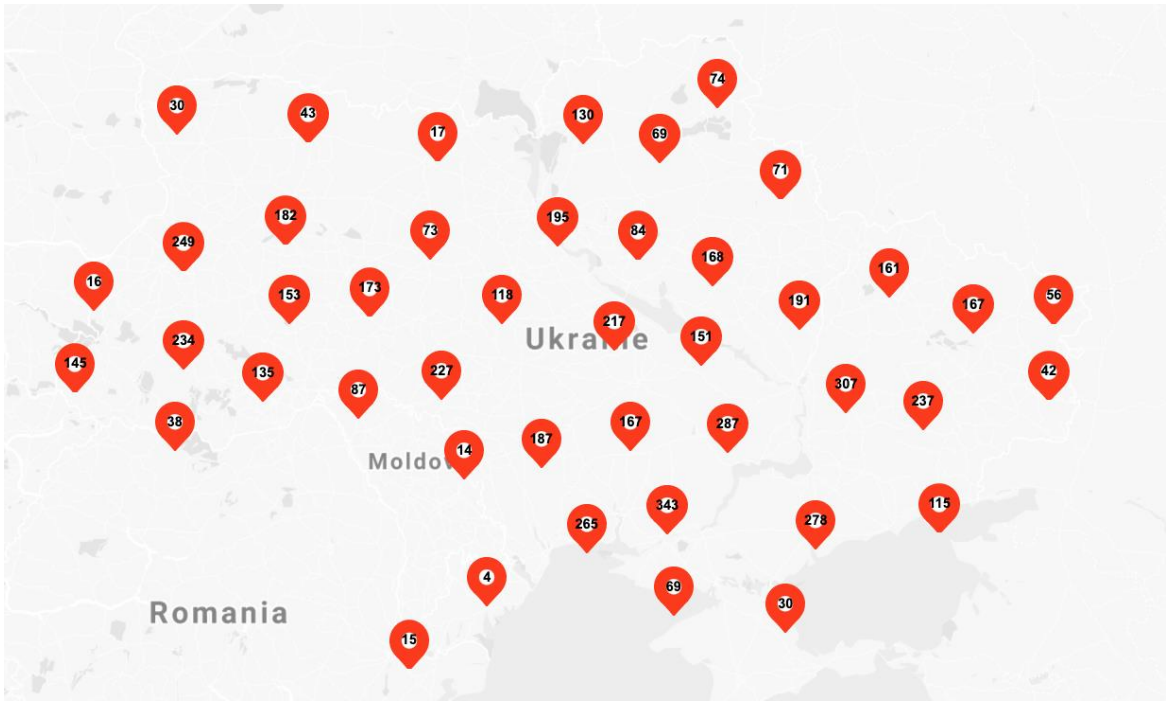
the digital education platform offers many digital skills courses, so offline hubs can be used to provide access to these courses for those who would like to learn.

5.1. Offline Educational Hubs

The Digital Skills Hubs are public centers where every citizen can get free access to the Diia.Digital Education platform and receive digital literacy training. These are mainly libraries, schools, universities, private companies, IT organizations, administrative centers CNAPs, or non-profit organizations. Anyone can register at the hup; the application process is simple.

In 2020, there were 1 300 hubs, while in November 202 the network includes more than 6,000 Hubs nationwide, and the number continues to grow.[32] An interactive map of the Hub network is available on the Diia.Digital Education.[33] For better navigation, users can personalize the search criteria on the map and find the nearest Digital Skills Hub, its address, contact information, opening and closing hours, and driving directions.

Map 1: The Interactive Map of the Education Hubs on the Platform Diia.Digital Education



Offline Hubs can be used for individual, group, or peer-to-peer learning, for ambassadorial (see Chapter 5.3) and professional online courses, depending on user interests, digital literacy level, or needs.

[32] https://ula.org.ua/255-programi-proekti/4488-diia-tsyfrova-osvita

[33] https://osvita.diia.gov.ua/hubs

Moreover, they are equipped with relevant training resources, information, promo and marketing materials, and PR support for better visibility. Besides, citizens can get counselling and other types of support.[34]

The development of the hub network resulted from fruitful cooperation between the Ministry of Digital Transformation and the Ukrainian Library Association. Other partners also include the Office of the President of Ukraine, the Tourism Development Association, the Favbet Foundation, local, regional, and state authorities. To implement this initiative, more than 3,700 computers were donated to the regions for the computerization of remote areas.

5.2. Train the Trainer Program

The Diia. Digital Education Platform provides training for eSkills trainers of the offline Hub.[35] Trainers can take an interactive course with practical assignments for free and receive a certificate after successful completion.[36] The training is led by a blogger, author of telegram channel "Technologies, Media & Society", and the head of Liga.tech.[37] It consist of 25 short series (see Annex VII) and focuses on Dig Comp, its sub-competencies and various training practices, including, for example, preparation of required materials according to the customer's needs:

- How to register in social media
- How to create strong password
- How to send messages
- How to find the contact on the phone
- How to check whether the information is trustworthy

The trainers learn how to train adults and adjust the methods to the users' age, life experience and needs. The course covers such topics as creating the training plan and guiding users through Diia. Digital Education series, the concept of blended learning, and how to adapt courses to individual learning paths and needs. It also includes good practices and recommendations on the efficient use of digital technologies for teaching and learning, etc. Finally, the trainers learn how to improve their skills and where to find other courses on digital literacy.

As of November 2021, more than 2209 trainers completed the course and were certified. Yet, the dropout rate is still high, at nearly 43,6% of participants. It means that the reasons need to be analyzed and the curriculum improved in the coming years. Nevertheless, the number of DigComp trainers is steadily increasing to ensure that DigComp training is supported in the regions and local communities.

5.3. Ambassadors Initiative

[34] https://ula.org.ua/255-programi-proekti/4488-diia-tsyfrova-osvita
[35] https://osvita.diia.gov.ua/en/courses/training-for-trainers
[36] https://osvita.diia.gov.ua/en/courses/training-for-trainers/seria-1---intro-v-kurs
[37] https://tech.liga.net /

In March 2020, the Ministry of Digital Transformation of Ukraine launched a Chapter for digital ambassadors on the national platform Diia:Digital Education. The initiative emphasizes the opportunities tha digital literacy offers for everyone: to feel more at ease in the digital world, to have a better job, to develop professionally and personally, to qualitatively communicate, to solve personal and professional issues, etc.

The Digital Ambassadors project engages active and innovative Ukrainians of all ages to participate in achieving the ambitious goal of educating 6 million Ukrainians in digital literacy over 3 years. NGOs, private companies, libraries, CNAPs, schools, universities, and independent activists may become digital education ambassadors. Anyone who is willing to promote digital literacy through social networks, among friends or colleagues, those who teach or help others learn and develop digital skills are encouraged to participate.

There are different initiatives within the network of digital ambassadors focused on various target groups, for example, the *IT-Grandma Community*, which teaches digital skills to seniors, or a partnership of youth communities. Besides, the Digital Ambassadors cooperate and interact with each other to exchange good practices.

To become a digital education ambassador, a candidate must register on the platform and follow instructions. People who have already joined the initiative can share their success stories and upload photos or videos. The first ambassadors were employees of computerized libraries and activists of the Open University of Reforms.

6. Key Findings

The experience of Ukraine shows that the development of digital skills at the national level should be synergetic, persistent, and consistent, based on a holistic approach.

The following fundamental principles should be considered as the main finding in Ukraine:

- **Accessibility.** Accessibility is a basic requirement for a functioning digital education ecosystem. Online educational tools and resources for developing digital skills must be available to every citizen, regardless of age, social and financial status, to acquire the necessary competencies to achieve the goal of the digital transformation set by the Ministry of Digital Transformation, which is "any Ukrainian who wants to have digital skills can freely obtain them".
- **Strategic and conceptual envisioning.** It helps to ensure the effective functioning of the Dig.Comp training system, to predict and avoid possible issues, to form a loyal perception of digital transformation and implementation of smart solutions, to attract key stakeholders, partners, socially responsible businesses, and thus to achieve better results.
- **Holistics approach.** It includes making connections, creating a system, providing assessment tools and curricula, training trainers, supporting new methods and practices, and engaging students. Digital skills development means not only training but also building a digital culture in society.
- **Adaptation.** Depending on the country specifics, the EU Digital Competency frameworks (DigComp 2.0, 2.1. or others) should be adapted to local needs. In the case of Ukraine, some competence areas or specific competencies have been added

because they are critical for a particular target group, e.g., teachers, public officers, or entrepreneurs. Some specific competence areas were added or renamed, and some were partially changed. Some competencies were cross-cutting and may have been linked to other domains. In any case, the DigComp frameworks are mandatory, and adapting them to the country's needs is highly preferable. So, the usage models have to be adapted and localized.

- **Methodology.** Methods and forms of training should be simple, understandable, and informative for each target audience and meet the requirements of the conceptual framework of digital competencies for Ukrainian citizens. Evaluators should be involved in the creation and validation of tests and eSkills digigrams.
- **Engagement.** This principle defines the need for a system that actively engages trainees and is supported by communities of digital mentors and ambassadors, digital students, and volunteers. In addition, the involvement of partners and all stakeholders is essential to create synergy.
- **Innovation.** It serves as guidelines for dynamic changes and educational activities based on developing various forms of thinking, creative skills, and high social and adaptive capabilities of the individual. This principle indicates openness, ability to forecast based on a constant reassessment of values, readiness for active and constructive actions in rapidly changing situations
- **Monitoring**. Allows receiving timely feedback for further improvement and sustainability of the programme.

The development of digital competencies should focus on the effective use of digital technologies and e-services, upskilling and reskilling the labor force, and providing every citizen with self-development opportunities, and creating new digital technology solutions and new digital services.

Revisiting the main objectives set by the Concept Paper in March 2021, it appears that much has been achieved in just six months. The following is a strong indication of this:

- ➔ Increased public awareness of the role of digital skills for personal and national growth;
- ➔ Raised public awareness of the risks associated with the Internet as well as human rights in a digital society;
- ➔ Legal regulation of digital competencies;
- ➔ Created and adapted DigComp frameworks;
- ➔ Defined the terminology, descriptors and requirements of eSkills for citizens, public servants, teachers, and entrepreneurs;
- ➔ Ensured coordination between ministries and regional state executive authorities.

The initial goal of the Ministry of Digital transformation was to educate 6 million people in digital literacy. The results show that there has been a steady improvement in basic digital competencies:

- The number of those with no skills decreased by 4%, and those with basic skills increased by 4% (that translates to nearly 2 million citizens).

- The share of citizens without access to the Internet at home due to a lack of skills fell by 17%
- 26.9% reported that their digital skills had improved since the start of the Covid-19 pandemic.
- During the 2021 pandemic confinement, 51.9% of the population tried new digital opportunities (e.g., online shopping, distant education, remote work, etc.).

Map 2: The Status of Digital Skills Development in different regions of Ukraine

6.1. Key steps to be made

Summarizing the entire process of development of digital skills in Ukraine, the following algorithm can be identified:

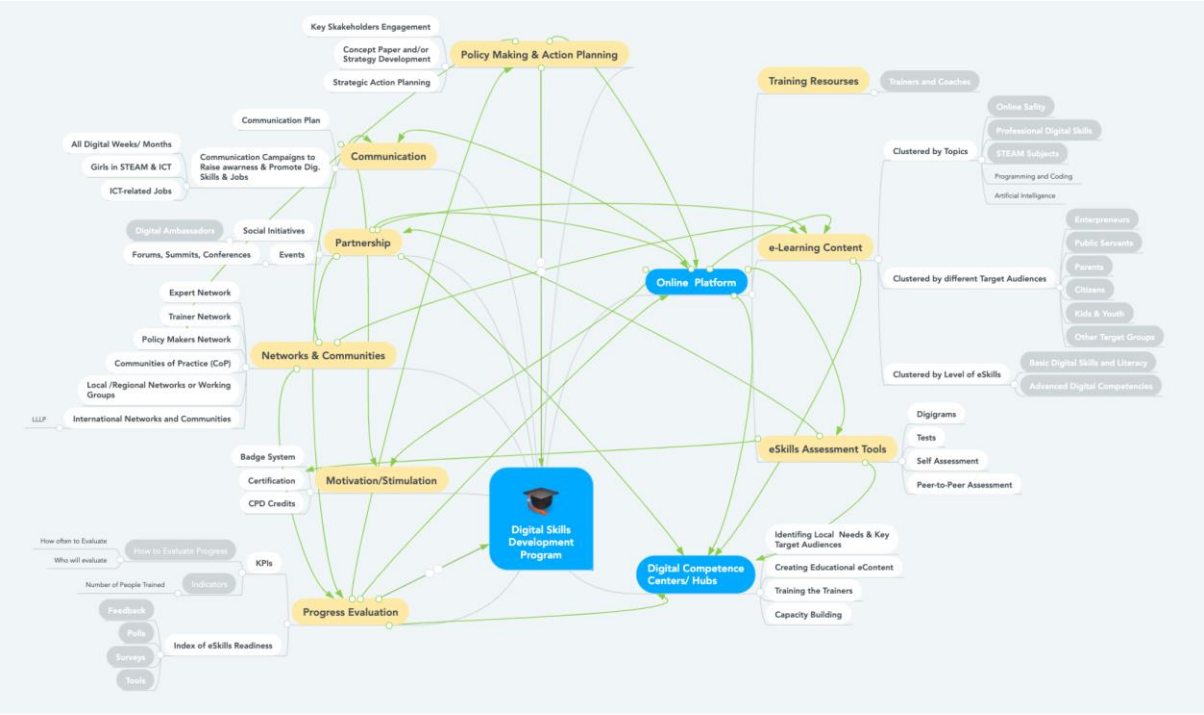
Table 10

The Algorithm of DigComp Development on the National Level
• Setting goals, aligning systems, unlocking talents, building trust. • Introducing legislation (concept paper (strategy) for developing digital competence, action plan, definition of terminology) • Creating or adapting DigComp frameworks • Raising awareness with a communication strategy or communication plan to meet the needs of key target audiences.

- Providing tools for digital skills assessment or self-assessment.
- Supporting each target audience with relevant educational resources (Diia.Digital Education platform).
- Developing a concept paper or strategy and action plan at the regional level, providing tools for local authorities to develop regional and local concept papers.
- Taking actions, implementing tangible activities and initiatives.
- Integrating digital skills development into the education system through professional standards, educational programmes, curricula, and national qualifications.
- Monitoring and evaluation at the country level to further shape policy and make timely changes.

However, it should be noted that all these steps are interrelated and interdependent. See a diagram that can demonstrate the interdependence of the entire digital skills programme process.

Map 3: The Mindmap of Digital Skills Development Program



6.2. Key Stakeholders

The Ministry of Digital transformation works across government and with partners in the private and philanthropic sectors to improve digital skills so that everyone who can participate in the digital economy can do so. Digital inclusion and digital skills enable citizens to achieve a wide range of positive outcomes: find a job, save money, expand career opportunities, reduce isolation, ensure online safety, improve health and wellbeing, and more.

Among other ministries and governmental agencies, key strategic partners of the Ministry of Digital Transformation are:

- Ministry of Education and Science (MoES)
- National Agency of Qualifications (NAQ)
- National Agency of Ukraine on Civil Service (NAUCS)

Digital skills expertise for the development of concept papers, frameworks, and recommendations is also provided by Ukrainian experts from different institutions and organizations united in the EU4Digital eSkills network, who also conduct workshops and seminars to help create the National Coalition, define a common competency framework for SMEs and micro-businesses and run promotion campaigns.

6.3. Partnership and Collaboration

The unique role of the Ministry of Digital Transformation in developing digital skills is to create synergy among the key stakeholders to achieve better results. Thus, the Diia.Digital Education project is actively supported by many partners.

The Swiss government supports the project as part of the Swiss-Ukrainian programme "E-Governance for Accountability and Participation (EGAP).[38] The EGAP programme is being implemented during 2015-2023 by East Europe Foundation[39] and Innovabridge Foundation[40] in partnership with the Ministry of Digital Transformation. In addition, Swiss Agency for Development and Cooperation (SDC) provides the funding.

Overall, over 90 partners are actively engaged in the Diia.Digital Education project. For example, the online platform Diia.Digital Education was developed by Vintage Web Production. The educational series "Digital Literacy" was first developed by EdEra online education studio with the support of Google Ukraine, Microsoft Ukraine, DTEK Academy, UNDP Innovative Development Laboratory in Ukraine, CISCO, SFC Consulting, Osvitoria, Global Teacher Prize initiative. Huawei Ukraine and MOYO provided technical support for the filming process. And the assistance in organizing communications was provided by Quadrate 28.

During the Project's development, more than 17 other important partners were involved in the development of various online series.

Furthermore, the offline development of the Diia. Digital Education platform is also actively supported by the following partners:

- Ukrainian Library Association;
- All-Ukrainian Union of Active Longevity "IT-grandmothers";
- U-LEAD with Europe (Ukraine - Local Empowerment, Accountability and Development Programme);
- Regional and local authorities, business partners, universities and NGOs.

[38] http://egap.in.ua/en/

[39] https://eef.org.ua/

[40] http://innovabridge.org/

In 2019, the MLS Group conducted the first digital skills survey in Ukraine.

The first in the history of Ukraine sociological surveys in citizens' digital skills were conducted by MLS Group in 2019 and in 2021.

In general, the project partners represent the following partner groups:

- International governmental organizations and programs (USAID, SDC, U-LEAD)
- International Development Agencies (UNDP, UNICEF, OSCE)
- International and Ukrainian IT Companies (Google, Microsoft, CISCO, MLS Group, Huawey, Ukrainian IT Clusters and Associations)
- National Governmental Agencies and Institutions (NAUCS, NAQ)
- Educational Establishments (Universities, DTEK Academy)
- Other Ukrainian Associations (Ukrainian Library Association, All-Ukrainian Union of Active Longevity "IT-grandmothers")
- NGOs (e.g. EdTech Solutions)
- Individual experts, volunteers, and contributors.

The Ministry of Digital Transformation recognizes the importance of partnerships for successful implementation of the e-skills development projects on the national, regional and local levels. As an example of Diia.Digital Education showcases, cooperation brings fruitful results. After 1.5 year since the project has started, over 1 000 000 people have been trained and many more engaged in e-skills development in Ukraine.

6.4. Key Challenges and Lessons Learnt

6.4.1. Mindset. Skillset. Toolset.

Digital Transformation consists of many components, one of which is to reshape the mindset of the end-users, especially the elderly, to change traditions, lifestyles and prove the vital need to develop digital skills. Therefore, the Ministry has used various technologies, such as edutainment and microlearning, to overcome this challenge. Besides, preparing a communication plan with the right messages for each specific age group and target audience is equally important.

6.4.2. What Could Have Been Done Better

Monitoring

Every two years, the Ministry of Digital Transformation conducts a survey to monitor progress. Nevertheless, to increase the effectiveness of the monitoring, it is essential to run it regularly and, in addition, to identify the following:

- Measurement to assess and evaluate the level of digital competencies at the individual, organizational and systemic levels;
- Indicators to evaluate the effectiveness of the activities, programmes, and initiatives;
- Measurements to monitor the state of development of the digital skills at the organizational, regional, or national levels.
- Indicators for comparative analysis, benchmarking, and action plans updates.

Developing professional digital skills

In 2020 - 2021, the Ministry of Digital Transformation focused on older adults with no or very basic digital skills. In the future, there should be a greater focus on developing professional

digital skills in collaboration with the Ministry of Economic Development, Trade and agriculture, Industry 4.0., trade unions, associations, and business partners. A roadmap should be created for the development of digital skills related to various areas of the economy.

Cybersecurity and Cyber Hygiene

The Government has done much in this area. However, the study shows that 37.3% of Ukrainians have encountered fraudulent messages ("phishing") in the past year, increasing by 16% over 2019. In addition, 18.0% of Ukrainians experienced redirects to fake sites requesting personal information ("pharming"), an 8% increase over 2019. Thus, the number of cybersecurity issues increased by 12% compared to 2019.

6.4.3. Progress Monitoring Indicators

The Resolution of the Cabinet of Ministers of Ukraine #1134 of November 2012 "On the introduction of the National System of Indicators of Information Society Development" defines several indicators that can be attributed to those that to some extent (but not enough) allow to measure the level of digital skills and competencies in Ukraine:

- the number of Internet users per 100 people;
- the number of Internet users of broadband access per 100 people;
- the share of mobile Internet users, the percentage of the total number of Internet users;
- the level of use of information technology by enterprises and organizations;
- the level of use of information technology by scientists;
- the level of use of the Internet by scientists and researchers;
- the level of use of the Internet and telecommunications by the population;
- the level of application of information technologies by executive authorities for public consultations on the formation and implementation of public policy;
- the level of application of information technology in educational institutions;
- the level of application of information technology in health care facilities.

The Order of the Ministry of Education and Science of Ukraine № 1271, 2013, "On approval of the Methodology for the formation of indicators of information society development," clarified the ways of calculating these indicators. However, not all of the above indicators are used in the national statistics system. For example, the number of Internet users and the level of information technology use are included in the statistical bulletins "Use of information and communication technologies in enterprises," "State and development of communication in Ukraine," statistical yearbook of Ukraine, statistical collection "Ukraine in numbers" and section "Information Society" on the website of the State Statistics Service of Ukraine.

The above shows that the approaches to the collection of statistics and measurement in eSkills need to be updated. New indicators need to be introduced. It is necessary to use new technologies to collect, process and analyze statistical data.

The European Union’s EU4 Digital Initiative supports the digital reform agenda in Ukraine with a range of actions to promote key areas of the digital economy and society in line with EU norms and practices to bring economic growth, generate more jobs, improve people’s lives and help businesses.

The Methodology for measuring and forecasting digital skills gaps[41] was developed within the EU4Digital eSkills network in eastern partnership (EaP) countries.[42] This methodology provides a brief description of the current measurement of digital skills gaps in the Eastern Partner countries, including Ukraine, and forecasting approaches and recommendations for the implementation of a common measurement and forecasting methodology aligned with EU practices. Ukraine plans to consider this methodology to improve eSkills measurement system in the country.

7. Plans for the Future

7.1. Next Steps

In Ukraine, much has been achieved with regard to the development of eSkills nationwide, but monitoring and analysis of surveys show that there is still much to be done. The priority areas in this regard are the following steps to be taken:

1) **Legislation. Improvement of terminology in legislation.**

   As mentioned earlier, it is necessary to harmonize terminology, synchronize the approaches of ministries and industries to be on the same page and use the common language related to digital transformation, digital skills and competencies at the national level.

2) **Measurement. Improvement of the eSkills measurement system.**

   Ukraine plans to consider improving the eSkills measurement methodology to introduce new indicators and improve the country's data processing system.

3) **Engagement. Engaging more stakeholders and professionals in the development of professional DigComp Frameworks.**

   Given the rapid adoption of digital technologies in all areas of the economy and agriculture, there is a need to raise awareness and upskill the workforce in agriculture, Industry 4.0. to better integrate eSkills development into VET and higher education.

4) **Motivation. Motivate the creation of learning skill sets.**

   Motivate experts to create new open educational resources for digital skills that are already running on the Diia.Digital Education Platform. This approach will be used more widely in the future.

5) **Communication. The communication plan and media campaigns for digital skills development need to be updated and revised.**

   Use more success stories, case studies, polls and survey results, digital inclusion dashboards, blogs and vlogs about digital skills and inclusion to engage more stakeholders and users in the development of digital competencies. Post more features, news, reports and posts on how to get the necessary access, skills, motivation and trust to go online with confidence. No target audience should be left out.

[41] https://eufordigital.eu/library/methodology-for-measuring-and-forecasting-digital-skills-gaps/
[42] https://eufordigital.eu/countries/ukraine/

New approaches to "All Digital Week" in 2021 should be considered and expanded to the whole country, as well as involving regional authorities, IT businesses and NGOs. All-Ukrainian Digital Skills Months will become regular and will be held on an annual basis.

6) **Inclusion. Revise online educational resources to make them more adaptable to people with special needs for better inclusion in digital social life and to ensure online safety, and wellbeing.**

The survey shows that people with disabilities are more vulnerable in the digital world. Ukraine needs to overcome this challenge and provide more accessible resources aimed at developing eSkills for personal and professional growth and for safe social inclusion.

7) **Expansion. The Ministry of Digital Transformation of Ukraine plans to continue supporting digital skills development at the regional level.**

Just recently, a new initiative called Lift was launched, aimed at finding and employing young professionals at the regional level to foster digital transformation.[43] The dashboard provides detailed information about employment opportunities in each specific city or territorial community. It will be updated in real time and engage experts and professionals to implement digital skills initiatives across the country.

8) **Networking. Provide networking opportunities and engage youth.**

Consideration should be given to creating a network similar to ITU Youth Generation Network.[44]

9) **Personalization.** Artificial intelligence algorithms will be used to improve the quality of online digital skills training, and there will be a greater emphasis on personalization and development of specific content for different target audiences.

10) **Innovations and new technological solutions.**

Diia.Business Platform. Diia Business will provide recommendations on digital competencies for entrepreneurs and doctors, adapted to the needs and specifics in UKraine.

Four Digital Job Profiles for small and medium enterprises will be available online.

Focus not only on digital use models, but also on digital technologies creation, creativity, wellbeing protection and cybersecurity.

Diia.Digital Education Platform. The Diia.Digital Education platform, although already proven to be highly efficient and achieving the expected goals, will also be upgraded. New technologies such as artificial intelligence (AI), augmented reality (AR), virtual reality (VR) may be considered to provide individualization and personalization for the end-users. AI algorithms will be used to enhance online training on digital skills.

More specific content needs to be developed for different target audiences.

[43] https://lift.net.ua/

[44] https://www.itu.int/generationconnect/generation-connect-europe-youth-group-gc-eur/?fbclid=IwAR1qr_1l7tUU6pHSW8GwIkbFAEEDNIUHss-i5U1Os5BMiXaf5c8JD8cdkWc

Activities will focus on DigComp for citizens and upskilling and retraining the workforce.

Intelligent government services will leverage data analytics capabilities, learn and adapt to the user, and will be available on mobile devices.

From 2022, the Platform will also be available in English in order to be open to the world and share good practices with those who are just starting to develop digital skills regionally or nationally, or with those who are looking for new approaches and experience exchange.

7.2. Calls for Action

What can be useful to consider:

Finally, Ukrainian digital skills experts draw attention to some ideas *about what can be done internationally to accelerate and support digital skills development programmes at the national level:*

1. Create an international online glossary of digital skills-related terminology.
2. Initiate and conduct research on the correlation between workforce digital skills development and workplace efficiencies that improve productivity and economic growth.
3. Create and maintain an international network of eSkills experts to share experience, provide peer-to-peer support and mentoring
    - to help identify metrics to measure the effectiveness of digital skills activities, programmes and initiatives;
    - to create a roadmap for professional Digital Skills development, including different fields of economy;
    - to create new partnerships between countries and organizations to increase international cooperation and exchange between Ministries, expert groups, and networks that are taking different paths toward the common global goal of digital skills development.
4. To make EaP partner countries part of the EU/ International Indexes and research in digital skills for better benchmarking and fostering the progress of the neighboring countries.

Annexes

Annex I. Abbreviations and acronyms

ITU -The International Telecommunication Union (ITU), the United Nations specialized agency for information and communication technologies – ICTs.

EU4Digital -EU for Digital Program

EaP - Eastern Partnership Countries within EU Digital Program

KPIs - key performance indicators

MoDT - Ministry of Digital Transformation in Ukraine

MoES - Ministry of Education & Science in UKraine

MCIP - Ministry of Culture and Information Policy

NAQ - National Agency of Qualifications

NAUCS - National Agency of Ukraine on Civil Service

OSCE - Organization for Security and Co-operation in Europe

SME - Small and medium enterprises

UNDP - United Nations Development Program

UNESCO - United Nations

UNICEF - United Nations Children's Fund (formerly, United Nations International Children's Emergency Fund

USAID

Annex II. References

Ministry of Digital Transformation Official Website https://thedigital.gov.ua
Ministry of Digital Transformation Social Networks
FB: https://www.facebook.com/mintsyfra
Telegram: https://t.me/mintsyfra
Instagram: https://www.instagram.com/mintsyfra.o
Twitter: https://twitter.com/mintsyfra
Diia. Digital Education official web-site https://osvita.diia.gov.ua/en
Research Results on Digital Skills in Ukraine (2019) https://osvita.diia.gov.ua/research
Research Results on Digital Skills in Ukraine (2021)
Partner sites:
EGAP: https://egap.in.ua/en/projects/diia-digital-education/
https://egap.in.ua/en/projects/diia-digital-education/
UNDP:
Favbet Foundation http://favorit.foundation/
International and EU web-sites relevant to DigComp
JRC https://ec.europa.eu/jrc/en/research-topic/learning-and-skills
JRC https://publications.jrc.ec.europa.eu/repository/handle/JRC122830
DigCompEdu: https://ec.europa.eu/jrc/en/digcompedu
DigCompOrg: https://ec.europa.eu/jrc/en/digcomporg
DigCompConsumers: https://ec.europa.eu/jrc/en/digcompconsumers
OpenEdu: https://ec.europa.eu/jrc/en/open-education
EntreComp: https://ec.europa.eu/jrc/en/entrecomp
CompuThink: https://ec.europa.eu/jrc/en/computational-thinking
Learning Analytics: http://europa.eu/!cB93Gb
MOOCKnowledge: http://moocknowledge.eu
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Emerging Digital Technologies. Citizens Participation https://www.citizentech.org/
EU4Digital https://eufordigital.eu/library/digital-skills-forum-materials/

Annex III. Key Digital Transformation Projects in Ukraine

Project Titles	***Project Description***	***Sub-Projects***
Justice		
e-Notary	***Digital transformation of the notary*** *Simplification and automation of notarial acts (dedication of signature, transaction, document, etc.)*	*Design, creation and implementation of three main components of eNotary: Electronic Workplace of Notary, Electronic Archive of Notaries and Electronic Register of Notarial Actions*
e-Condemnation	*Digital Transformation of Execution of Criminal Punishments and Probation* *Automation of cases of convicts and detainees, automation of risk assessment of re-offending (CASANDRA subsystem), modernization of the Unified Register of Convicts and Detainees*	
e-Bankruptcy	*Digital Transformation of Bankruptcy* *Automation of arbitration trustees, providing them with access to relevant registers, introduction of electronic document management, introduction of digital tools for other participants in bankruptcy proceedings (insolvency)*	
e-Proceedings	*Digital transformation of the organization of enforcement of decisions* *Modernization of the Automated system of enforcement proceedings in order to implement the possibility of adopting enforcement documents in electronic form, automation of individual stages of enforcement proceedings, automation of seizure of debtors' bank accounts, implementation of online debt payment, public access to statistical reporting on state executive bodies services and private performers, implementation of electronic interactions with information systems of public authorities*	*e-Collaboration with Police, Tax-services, Banks, etc.*

e-Legal Aid	***Digital Transformation of Free Legal Aid*** *Introduction of electronic services for obtaining consultations / clarifications on legal issues, submitting an application for free secondary legal aid and submitting documents to prove belonging to one of the categories*	Client's office of the free legal aid system "Your Right" mobile application
REINTEGRATION		
e-TOT	***Digital Transformation of Access to Public Services for Internally Displaced Persons and Persons Living in Temporarily Occupied Territories*** *(TOTs)* *Simplification and electronic transfer of priority administrative and other public services for internally displaced persons and persons living in the temporarily occupied territories: obtaining certificates, targeted assistance, remote identification, registration of civil status*	
e-MinRegions	***Digital transformation in the field of protection of human rights and freedoms.*** *Applying for the payment to persons deprived of their liberty and members of their families, creating e-learning tools for studying and promoting the languages of indigenous peoples, simplifying and electronically applying for temporary residence of foreign journalists, approving the entry of foreigners into the temporarily occupied territories*	
e-Property	***Digital transformation of state registration of real rights to immovable property and their encumbrances.*** *Introduction of a modernized State Register of Real Property Rights, introduction of electronic services for registration of real property rights and the ability to pay administrative fees online, providing electronic interaction with the Bureau of Technical Inventory, introduction of digital tools to combat raiding*	
e-Healthcare		
eHealth Information	***Digital Transformation of Health Services and Health Information Management (EHP)*** *The electronic health care system (EHS) automates the accounting of medical services and*	*Automation of hospitalization processes: reception, examination and discharge of patients, prescription of*

Management System	*the management of medical information, in particular simplifies the work of health care facilities, promotes the quality and accessibility of medical services for patients*	*drugs, injections, etc. Introduction of the target model of electronic medical records of the hospital according to the HL7 FHIR standard, etc.*
e-Medicines	***Digital transformation of quality and safety assurance of medicines, medical devices*** *Introduction of a stock management system for medicines and medical devices, creation / modernization of the State Register of Medicines and the State Register of Medical Devices, development of the use of electronic prescriptions.*	
(e-Public health)	***Digital transformation of promotions of a healthy way of life,*** *protection of the population against infectious diseases and counteraction to socially dangerous diseases. Development of communicable disease surveillance, standardization and public health data disclosure*	
Education & Science		
e-School	***Digital transformation of Preschool, General secondary and Extracurricular education.*** *Introduction of e-textbooks in the framework of "New Ukrainian School" reform , distance learning courses for students of 5-11 (12) grades, promoting automation of educational and managerial processes, including the introduction of e-record books and e-diaries, e-reporting, and sub of advanced training on the basis of state information systems, involvement of third-party educational information systems, creation within the unified state e-database on education, the registers of students of all educational levels, all school teachers, university professors and other employees in the education system.*	
e-Science	***Digital transformation of funding and services in the field of science.*** *Creation of an electronic system of competitive financing of scientific research, creation of an electronic access system to existing digital services for scientific purposes, electronic scientific information system, creation of a register of Ukrainian research infrastructures, development of a Ukrainian index of scientific citations, creation of an electronic system for awarding scientific degrees. submission of documents and conducting state certification of scientific institutions and institutions of higher education in terms of their scientific activities, development of a repository of academic papers and interconnection*	

	of local repositories to it	
Digital Literacy	*Digitization of Education.* *Introduction and development of the National Digital Literacy Online Platform. Increasing the level of digital literacy of Ukrainians in order to increase/accesselerate the competitiveness of Ukraine's economy.*	
Energy		
e-Electricity	***Digital transformation of the electric power complex*** *Automation of data collection and forecasting of electricity consumption, digitalization of power supply networks and accounting of energy consumption*	*Smart Grid* *Smart Metering*
e-Atom	***Digital transformation of the nuclear-industrial complex*** *Creating conditions for the development of data centers for the use of electronic energy of nuclear generation*	
e-Mine	***Digital transformation of the coal-industrial complex*** *Automation of reporting by coal enterprises, introduction of analytical tools for monitoring and ensuring transparency of coal mine structuring*	
e-Energy saving	***Digital transformation of energy saving, efficient use of fuel and energy resources, renewable energy sources and alternative types of fuels*** *Creation of an electronic system for monitoring the use of decarbonization funds, automation of reporting and accounting of data from mining entities, the electricity market, monitoring the use of "warm loans", introduction of an electronic service for the qualification of cogeneration units*	
Development of communities and territories		

e-Urban construction	***Digital transformation of urban planning, rationing and technical regulation in construction .*** *Introduction of electronic and automatic services in the field of construction and a single state electronic system in the field of construction, national address register, national register of buildings and structures, urban cadastre, automation of construction control and public discussions of construction projects, opening data on urban planning*	
e-Community	***Digital transformation of local self-government, territorial ~~organization of~~ power and administrative-territorial organization*** *Introduction of a register of administrative-territorial units and settlements, an information system for maintaining / publishing acts and powers of local self-government bodies.*	
(e-Housing)	***Digital Transformation of Housi****ng and Communal Services, Housing Policy and Improvement (Благоустрою)* *Introduction of a national online portal for building management, ordering, payment and monitoring of online utilities and information system for an effective policy of control over the state of improvement, including the possibility of involving citizens in control and notification of violations*	Digital transformation of the housing and communal government, housing policy and (e-ZhKG)
Economy & Trade		
e-Entrepreneur	***Digital Transformation of Entrepreneurship Development*** *Introduction of comprehensive electronic business registration services for the most popular types of economic activity on a single application, automation of trade investigations.*	***Subprojects*** *Comprehensive business start-up service in electronic form through the Action portal* *Reorganization of the system of providing services of the Ministry of Economy* *Creation of an IT platform for conducting trade investigations to protect the national producer (TRADE DEFENCE)*

e-Permit	***Digital Transformation of Licensing and Permitting System*** *Introduction of the information system of licensing cases and permits and the possibility of obtaining all licenses and permits in electronic form*	
e-Products	***Digital transformation of food quality and safety*** *Introduction of electronic services for registration of market capacity operators and examination, issuance of electronic certificates and permits, creation / modernization of information systems for automation of phyto and veterinary laboratories, infection control, introduction of an interactive public system with access to information on food safety requirements and access to foreign markets*	
e-Consumer	***Digital transformation of consumer protection*** *Implement the possibility of consumer complaints online submitting and creating an appropriate support service*	
e-Window for citizens complains	***The only information and analytical system for reviewing citizens' complaints*** *Creating a system for submitting complaints of citizens in a convenient format, tracking the path of the complaint, monitoring the timing of its processing, obtaining the result of the complaint and assessment by the complainant upon completion of such processing, integrated into the document management system of the State Food and Consumer Service and its territorial bodies*	*Consumer appeal platform* *Consumer mobile application*
e-Employment	***Digital transformation of labor and employment*** *Introduction of electronic services on compliance of material and technical base and performance of high-risk work, assistance and job search, as well as other employment services for job seekers and employers*	
Infrastructure		

e-Carrier	***Digital transformation of passenger and freight /cargo transportation*** *Providing multimodal freight transportation, integration with other systems and digitization of processes in different modes of transport (sea and river ports, railways, etc.), implementation of a system for simultaneous registration of travel documents by different modes of transport with the possibility of issuing a single electronic ticket on the "e-Transport" portal.*	
e-Roads	***Digital transformation of the road sector*** *Introduction of a comprehensive system based on a data processing center, which deals with the collection, monitoring of congestion, analysis and formation of fines for congestion on the roads of Ukraine, creation of an electronic database on technical characteristics of national and local roads of Ukraine, automation of infrastructure construction projects. funds are carried out by structures and enterprises subordinated to the Ministry of Infrastructure, as well as public control over the implementation of works on planning, design, construction and operation of infrastructure facilities, the use of budget and public funds in real time.*	
e-Port	***Digital transformation of sea and river transportation*** *system development* *Improving the system of collection, analysis and use of statistical data, creating conditions for the introduction of innovative technologies, automation of seafarers' interaction with public authorities in order to submit documents and timely obtain relevant documents of seafarers*	***Subprojects*** - *Sailor's electronic office - Introduction of a sea transport registration system, including vessel registration in electronic format* - *Web portal "The Only Sea Window"*
e-Pilot	***Digital transformation of aviation transportation development*** *Creating a system of zoned interactive digital map with the ability to apply for approval to build facilities on the near-to-aerodrome zone in Ukraine, simplify the approval procedure, notification of incidents and their processing, etc., automation of applications and documents to obtain or revoke a license to transport passengers, dangerous cargo and hazardous waste by air, providing online administrative services for issuing and exchange of crew member ID*	Subprojects Aeromap System for automation of submission and processing of applications for unmanned flights (e-Drones) Licensing in the field of air transportation Crew member ID
e-Democracy	***E-Democracy***	*Subprojects*

	Introduction of e-democracy tools: e-petitions, e-polls, online discussion of legal regulations draft , public budget, citizens' e-appeals	*Interaction platform*
(eID)	***Electronic trust services*** *Introduction of a mobile qualified electronic signature (DiyaID) on the basis of a single state web portal of electronic services, further harmonization and approximation of Ukrainian legislation and standards in the field of trust services to the requirements of the European Union, development of trust services infrastructure*	***Subprojects*** *Remote Qualified Electronic Signature (ActionID)* *Joint work plan for cooperation between the European Union and Ukraine in the field of electronic trust services* *Amendments to the Law of Ukraine "On Electronic Trust Services" regarding the improvement of access of individuals and legal entities to electronic services* *Development of electronic identification system*

Annex IV. eSkills Communication Plan Template

The structure of the Communication Plan may be used as follows:

Table 12.

Events	**Target Audiences**	**Purpose and Objectives Expected Results**	**Timing, Frequency and Location* Due dates**	**Channel: Means of communication**	**Responsibilities: senders and creators Delivered by**	**Feedback Mechanisms**
Data Governance Council Meetings	Key Stakeholders	Update on the status	Monthly	Distribution list	PR Team	
Executive Toolkits	TV, Radios, Social Media	Provide toolkits to enable better information distribution	Weekly			
Press Conference	Regional Authorities	Inform on	As needed	Official and Social Media	External stakeholders	
Information Campaigns	Elderly People, Kids, School Children, Parents, Young People, Public Servants, Doctors, Teachers, Entrepreneurs , etc.	Provide information on	Acc. to the Action Plan	Press- Releases TV, Radio, Social networks, regional mass media		
Monthly/ Weekly updates on the online dashboards		To keep updated and track progress	Monthly	Newsletter		

Annex V. Digital Skills Media campaigns

Table 13: **Digital Skills Media Campaigns initiated by the Ministry of Digital Transformation and Regional Authorities in Ukraine**

Social Advertising on Digital Skills	
Various communication messages e.g., articles, social media posts. https://thedigital.gov.ua/news/osvoiti-tekhnologii-legshe-shvidshe-prostishe-mintsifra-zapuskae-novu-sotsreklamu-diyatsifrova-osvita	
All Digital Week	
All Digital Week - or European Digital Literacy Week - is an annual information campaign dedicated to the development of citizens' digital skills. https://osvita.diia.gov.ua/all-digital-week	
In 2021, All Digital Week was held for the first time in Ukraine at the governmental level, run by the Ministry of Digital Transformation together with partners and the organizing committee. Beyond national events the Program included regional and local social initiatives:	
Dnipro Region	"Digital Non-Stop"
Pavlograd	"Open University of the Third Age" for elderly people
Zhytomyr	"Distant Learning Marathon"
Kostyantynivka	"With a Computer on You"

Kharkiv Region	”Digital SKills for the Jobs of the Future”
Chernivtsi Region	“Media Security for everyone”, etc.
https://docs.google.com/document/d/1CMZnblDQR2jWMCOrBI60ssTgu-38aB91enEhIDiisZ4/edit	
Digital Skills Month	
The Ministry of Digital Transformation of Ukraine has announced the launch of Digital Literacy Month,a large-scale information campaign to inspire Ukrainians to upskill their digital competencies. Every day of November, the Ministry and its partners: · give talks about digital competencies and conduct interactive quests; · organize online educational events; · hold contests in social media on digital literacy with presents; · provide step-by-step instructions on how to use online services. A national digital literacy test is also planned for citizens, teachers, doctors, and civil servants. Information about the activities of Digital Literacy Month can be tracked on social media under the hashtag #DigitalMonth. There are interactive activities on social media that also develop users' digital skills. Every day there is a new hands-on activity that improves DigComp Framework skills. https://www.facebook.com/diia.education	
Cybersecurity Awareness Month	

Cybersecurity Month is a series of cyber hygiene awareness events aimed at raising cybersecurity awareness among the general public to better protect against cyberattacks, as well as learning basic cyber hygiene rules and raising awareness of cybersecurity risks in the workplace.
Cyber Hygiene Memo Leaflets
The OSCE Project Coordinator, the Ministry of Digital Transformation of Ukraine, IFES Ukraine, and Vodafone Ukraine developed a Leaflet to circulate among government officials and public service institutions as part of an ongoing campaign on the safe use of modern information technologies. It provides valuable data and statistics on cyber incidents and cyber-attacks occurring worldwide, including Ukraine, focusing on the effect brought about to countries' public and private sector infrastructure. In addition, public officials will benefit from links to educational resources and a set of useful rules they should follow at their workplace to minimize the risks of such incidents. The cyber hygiene awareness-raising campaign is organized as part of the project "Strengthening Ukrainian State Authorities' Cyber Hygiene and Cybersecurity Capacity," implemented by the Coordinator in co-operation with the National Agency of Ukraine for Civil Service and Ukrainian School of Governance with financial support by the Foreign, Commonwealth & Development Office and German Federal Foreign Office. Digital copy of the leaflet is available online in Ukrainian at Diia.Digital education: https://osvita.diia.gov.ua/tips-for-cybersecurity
Child Online Protection
The MInistry of Digital Transformation translated and published ITU Guidelines on Child Online protections https://www.itu-cop-guidelines.com/

Table 14: **Digital skills media campaigns initiated by other ministries**

The Ministry of Culture and Information Policy	https://filter.mkip.gov.ua/ = МКІП - ФІЛЬТР
The Cabinet of Ministers in Ukraine	https://www.kmu.gov.ua/news/za-iniciativi-mincifri-pidgotuvali-rekomendaciyi-shchodo-zahistu-ditej-u-cifrovomu-seredovishchi
The National Bank of Ukraine launched the social initiative	Goodbye Fraudster related to financial cybersecurity. https://bank.gov.ua/promo/stopfraud/
The Ministry of Education and Science	Published online recommendations to parents and school children " Kids' Security in Digital Environment" https://mon.gov.ua/ua/news/bezpeka-ditej-u-cifrovomu-prostori-mon-nadaye-rekomendaciyi-dlya-pedagogichnih-pracivnikiv-ta-batkiv Provides online consultations for kids and parents, access to chatbots in Viber and Telegram, etc. https://mon.gov.ua/ua/npa/shodo-neobhidnosti-provedennya-dodatkovih-profilaktichnih-zahodiv-v-seredovishi-ditej-ta-pidvishennya-obiznanosti-batkiv

Table 15: **Diia.Digital Education social networks**

Facebook	https://www.facebook.com/diia.education
Instagram	https://www.instagram.com/diia.education
Telegram	https://t.me/diia_education
Viber	https://bit.ly/2QRzQnA
TikTok	https://vm.tiktok.com/ZMe1kvMVQ

Annex VI. Diia. Digital Education course for trainers

Train the Trainer course consists of 25 short episodes that are divided in five categories.

Table 16.

Diia.Digital Education Train the Trainer Course Structure
I. Introduction Series 1 - Intro to the course Series 2. What are digital skills Series 3. How to teach digital skills with the help of a basic series II. Topics related to specific Digital Skills Series 4. Competence: information literacy Series 5. Competence: communication and cooperation Series 6. Competence: content creation Series 7. Competence: security Series 8. Competence: problem solving III. Topics related to Pedagogy. Some tips on methods and specifics of teaching adults Series 9. Some Features of teaching adults - Andragogy Series 10. Nine steps of teaching Series 11. Classroom work: integration of online course materials Series 12 - 13. Classroom activities: peer-to-peer, group work, project work, classroom discussions Series 14. Feedback Series 15. How to start and end the classes Series 16. Preparation for classes Series 17. The first lesson: registration and testing Series 18 - 21. Typical problems and questions IV. Topics related to remote learning due to the pandemic of COVID-19 Series 22 - 23. Fundamentals of blended learning. Models of blended learning: flipped classroom and rotation V. References and support materials: Series 24-25. Other courses on the platform and professional development