dComFra

Digital competence framework for Ukrainian teachers and other citizens

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WP 1.3: Report on analysis of EU Digital competence framework for citizens and for educators; UNDC report

Research Report

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Results Overview

The report provides an analysis of the European Union's basic documents on digital competences - the Digital Competence Framework for Citizens (DigComp) and the European Framework for Digital Competence of Educators (DigCompEdu). These documents set out the basic principles for mastering and using digital competencies for citizens and for employees of educational institutions.

Analysis of Ukrainian citizens and teachers DC needs and realities is made, possibilities for adaptation of DigComp and DigCompEdu are learnt and analyzed. Based on the results of the analysis and EU frameworks, DigComp and DigCompEdu, Ukrainian Digital competence framework for citizens and Ukrainian Digital competence framework for teachers are developed.

Analysis of existent European national digital coalitions including more detailed review and analysis for project participants countries is implemented. Description of developing Ukrainian National Digital Coalition (UNDC), its goals and objectives, UNDC main documents are represented.

Introduction

Aims and goals

The main goals of WP1 are to develop major requirements for building the dComFra program by using the WP1 results for target groups' DC needs on a base of UA and EU labour market, EU DigComp[1] frameworks analysis, existing experience of UA partners, and Program Countries best practices; and to launch Ukrainian National Digital Coalition (UNDC). The aim of deliverable 1.2 is to provide an overview of EU Digital competence framework for citizens and for educators, and view on their adaptation to Ukrainian realities.

The output of this research will serve as a starting point for:

- development of the Ukrainian digital competencies framework for citizens DigCompUA;.
- development of the Ukrainian digital competence framework for educators DigCompEduUA;
- new public structure – UNDC and signed memorandum by UA stakeholders. UNDC action plan for coming year.

Target groups

Target groups within the research were:

- Partners themselves.
- Ukrainian citizens.
- Ukrainian teachers.

European regulations on digital competencies in the daily lives of citizens and in education

EC activities in the field of digital skills development are based on the Digital Competence Framework for Citizens (DigComp) and the European Digital Competence Framework for Educators (DigCompEdu)[2]. Within the framework of the European Union's Digital Education Action Plan (DEAP)[3], efforts are being made to formulate a new vision of digital competencies, which are concentrated in three key areas: 1) making better use of digital technology for teaching and learning; 2) developing digital competences and skills; 3) improving education through better data analysis and foresight.

[1] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-21-digital-competence-framework-citizens-eight-proficiency-levels-and-examples-use
[2] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu
[3] https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

The Action Plan outlines European initiatives that the Commission, in partnership with Member States, stakeholders and society, will implement by the end of 2020. It forms part of the Commission's broader ambition towards a European Education Area, complementing the Recommendations on Common Values and Key Competences. The Action Plan will be implemented as part of the European cooperation in education and training (ET2020) process. It will also support the European Semester, which is a key driver for reform through the education- and training related country-specific recommendations[4].

[4] https://ec.europa.eu/education/education-in-the-eu/digital-education-action-plan_en

1 Analysis of EU Digital competence framework for citizens

In 2013, The European Commission launched a projectto develop a Digital Competence Framework to producedigital competence descriptors for all levels of learners.This framework consists of five digital competencedomains(Competence Areas) and 21 competences namely: Information andData Literacy, Communication and Collaboration, DigitalContent Creation, Safety and Problem Solving asillustrated in Fig. 1.1[5].

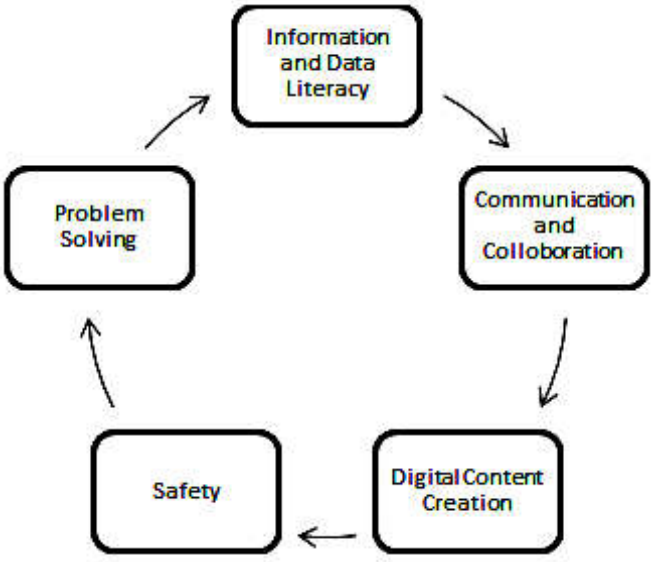


Fig. 1.1–Digital Competence Domains

In 2016, the European Commission introduced the Digital Competence Framework for Citizens (DigComp), DigComp 2.0: Digital Competence Framework for Citizens, which is today one of the latest European modern strategic documents developed by the European community of countries that create educational standards. The document was updated in 2017 as DigComp 2.1[6].

The project was carried out on behalf of the European Commission's Directorate-General Education and Culture (DG EAC). It included a review of existing relevant frameworks and structures, the development of a conceptual map, online consultation with stakeholders, and workshops.

DG Education and Culture commissioned the project with the following aims[7]:

[5]EsinHazar ."A Comparison between European Digital Competence Framework and the Turkish ICT Curriculum."Universal Journal of Educational Research 7.4 (2019) 954 - 962. doi: 10.13189/ujer.2019.070406.
[6]https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-21-digital-competence-framework-citizens-eight-proficiency-levels-and-examples-use
[7]Pg 2: "DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe".

- To identify the key components of Digital Competence in terms of the knowledge, skills and attitudes needed to be digitally competent;
- To develop Digital Competence descriptors that will feed a conceptual framework and/or guidelines that can be validated at European level, taking into account relevant frameworks currently available;
- To propose a roadmap for the possible use and revision of a Digital Competence framework and descriptors of Digital Competences for all levels of learners.

In the context of the DigComp framework, the term'digital competence' refers to the use of ICT to achievegoals related to citizens' work, employability, learning,leisure time, citizenship participation, skills and attitudes. From 2013 to now, DigComphas been usedextensively in the context of employment, education andtraining and lifelong learning. One of DigComp's keyobjectives is to plan educational and training initiatives toincrease the digital competence of specific target groups.

The EC names two key target groups of the DIGCOMP framework: citizens and institutions.

The following citizen groups are indicated as users of DIGCOMP[8]:

- Citizens with low abilities to use ICT in daily life – to better identify the skills that they need to improve in order to live and work as active citizens;
- Unemployed people and those looking for a job – to identify digital skills that they already have and their level, and include them in their CVs. To identify which skills are missing and, based on that, find relevant learning opportunities;
- Employers looking for new employees – to define, exactly, the set of competences that a specific vacancy requires when developing a job description;
- Employment services – to use relevant labour market information in a meaningful way to offer career guidance for job seekers;
- Teachers – to develop courses linked to relevant curriculum and assessment.

Institutions are advised to use DIGCOMP in the following ways[9]:

- To develop digital competence strategies for education and training;
- To update/reform curricula and content;
- For professional development and guidance for teachers;
- For the individual assessment of job seekers;
- For the provision of training courses and validation of informal and non-formal training.

DigComp also offers a common language for identifyingkey areas of digital competence and a common reference at European level[10]. It is a framework that is expected toserve as a guide for

[8] Lieve Van den Brande, European Commission, DG EMPL "EU Common digital competence framework", December 2015, http://www.eucis-lll.eu/eucis-lll/wp-content/uploads/2015/12/eu-commission_digital-competences.ppt

[9] Lieve Van den Brande, European Commission, DG EMPL "EU Common digital competence framework", December 2015, http://www.eucis-lll.eu/eucis-lll/wp-content/uploads/2015/12/eu-commission_digital-competences.ppt

[10] http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32006H0962

accessing, evaluating and usinginformation, communicating through various channels,producing and sharing digital content, and using digitaltechnology in a reliable and critical way in every aspect of life. The Framework provides detailed descriptions ofall the qualifications required to be sufficient in the digitalenvironment and explains these competences in terms ofknowledge, skills and attitude.

Although the frameworkwas developed for rather different purposes, it aims todescribe what and how, students acquire, use, adapt to, andlearn with technology. The framework underlinesstudents' ability to retrieve and understand information; toproduce information; to communicate digital information;and to search, produce, and communicate in a safe andresponsible way.

The competence area Information anddata literacy includes identifying, retrieving, and analysing digital information. The competence areaCommunication involves students' awareness, knowledge,and understanding of communication with others. TheContent Creation competence area refers to students' use ofdigital tools for production, publishing. The fourth areaSafety captures personal protection, data protection, digitalidentity, and security issues. Problem Solving is related tothe ability to identify and solve various problems.

DigComp 2.1 continues the update initiated by DigComp 2.0 adding new proficiency levels and examples of use. The three proficiency levels of DigComp 1.0 are now eight. The first six levels are linked to the ones identified in the first version (foundation, intermediate and advanced) and the seventh and eighth are new highly-specialised levels.

Each new level represents a step up in citizens' acquisition of the competence according to its cognitive challenge, the complexity of the tasks they can handle and their autonomy in completing the task. This more detailed range of levels supports the development of learning and training materials. It also facilitates the creation of assessment tools.

The examples of use have been updated and contextualised in two different scenarios: employment and learning. The first competence (Browsing, searching and filtering data, information and digital content) has examples for every level. The rest of competences have examples for only one level. The levels illustrated vary along the report, so at the end, all competence levels have some examples. These examples help readers understand the progression in the acquisition of skills and support the implementation of the framework.

The DigComp Framework has 5 dimensions:

- Dimension 1: Competence areas identified to be part of digital competence;
- Dimension 2: Competence descriptors and titles that are pertinent to each area;
- Dimension 3: Proficiency levels for each competence;
- Dimension 4: Knowledge, skills and attitudes applicable to each competence;
- Dimension 5: Examples of use, on the applicability of the competence to different purposes.

Competence Areas

1. Competence area 1: Information and data literacy.
1.1 Browsing, searching, filtering data, information and digital content.
1.2 Evaluating data, information and digital content.
1.3 Managing data, information and digital content.

2. Competence area 2: Communication and collaboration.
2.1 Interacting through digital technologies.
2.2 Sharing through digital technologies.
2.2 Engaging in citizenship through digital technologies.
2.4 Collaborating through digital technologies.
2.5 Netiquette.
2.6 Managing digital identity.

3. Competence area 3: Digital content creation.
3.1 Developing digital content.
3.2 Integrating and re-elaborating digital content.
3.3 Copyright and licenses.
3.4 Programming.

4. Competence area 4: Safety.
4.1 Protecting devices.
4.2 Protecting personal data and privacy.
4.3 Protecting health and well-being.
4.4 Protecting the environment.

5. Competence area 5: Problem solving.
5.1 Solving technical problems.
5.2 Identifying needs and technological responses.
5.3 Creatively using digital technologies.
5.4 Identifying digital competence gaps.

Proficiency levels.

Foundation
1. Simple tasks with guidance.
2. Simple tasks, autonomous and with guidance when needed.

Intermediate
3. Well-defined and routine tasks, and straightforward problems on my own.
4. Tasks, and well-defined and non-routine problems; independent and according to my needs.

Advanced
5. Different tasks and problems; guiding others.
6. Most appropriate tasks; able to adapt to others in a complex context.

Highly specialized

7. Resolve complex problems with limited solutions; integrate to contribute to the professional practice and to guide others.
8. Resolve complex problems with many interacting factors; propose new ideas and processes to the field.

Table 1.1– Proficiency level descriptors[11]

Proficiency level descriptors				
Proficiency levels		**Complexity of Task**	**Autonomy**	**Cognitive Domain**
1.0 (earlier version off framework)	**2.1** (current version)			
Foundation	**1**	Simple tasks	With guidance	**Remember**
	2		Autonomy, guidance as needed	
Intermediate	**3**	Well-defined, routine tasks & straightforward problems	On my own	**Understand**
	4	Well-defined tasks & non-routine problems	Independent	
Advanced	**5**	Different tasks & problems	Guiding others	**Apply**
	6	Most appropriate tasks	Able to adapt in complex context	**Evaluate**
Highlyspecialized	**7**	Resolve complex problems with limited solutions	Integrate to contribute to professional practice	**Create**
	8	Resolve complex problems with many interacting factors	Propose new ideas to the field	

Conclusion

DigComp 2.1 is a digital competency framework. It was designed by the EU's knowledge and competency centres, which include EU Science Hub and JRC25. Each of the framework's competency area is divided into proficiency levels and sub divided into task complexity, autonomy, and cognitive domain. These capture the "knowledge, skills and attitudes applicable to each competence"26 and support the provided examples.

[11] Wedlake, Stacey and Keyes, David and Lothian, Karah, Digital Skill Sets for Diverse Users: A Comparison Framework for Curriculum and Competencies (March 31, 2019). Available at SSRN: https://ssrn.com/abstract=3427252 or http://dx.doi.org/10.2139/ssrn.3427252

It is supporting framework for the European Commission & Member States to guide digital literacy and inclusion initiatives through implementation and policy design. It is meant for use at all levels: EU, national, and local.

DigComp 2.1's digital competency framework is most evenly distributed across digital skill areas in comparison to other frameworks. It demonstrates strengths in the areas of communication and information literacy skills. As proficiency grows in these two domains, DigComp 2.1 relies on workplace specific skills to demonstrate increased proficiency in these areas. Despite its more holistic approach to digital skills, DigComp 2.1 weakly addresses mobile-specific skills, gateway/foundational skills, and lifelong learning.

2 Analysis of EU Digital competence framework for teachers

The European Framework for the Digital Competence of Educators (DigCompEdu)[12] published in 2017 describes the digital competences specific to the teaching profession. This framework is based on extensive expert consultations and aims to structure existing insights and evidence into one comprehensive model, applicable to all educational contexts.

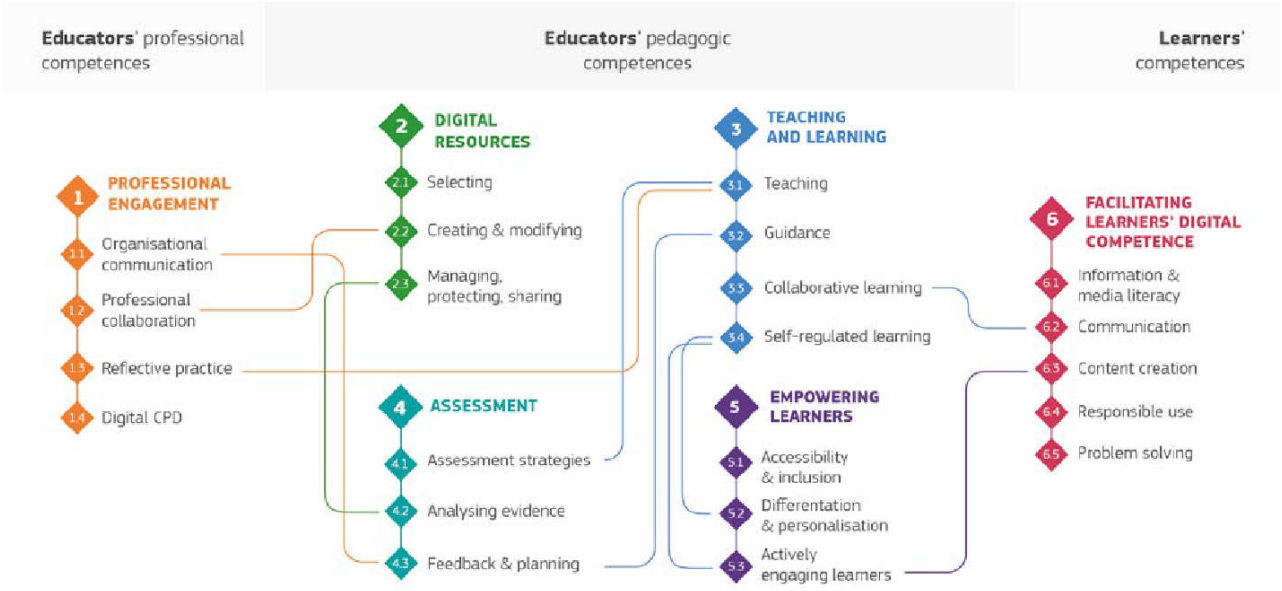


Fig. 2.1– The DigCompEdu framework

European Framework for the Digital Competence of Educators (DigCompEdu) details 22 educator-specific digital competences organised in six areas.

Applied to the context of school education Area 1 Professional Engagement describes teachers' efficient and appropriate use of technologies for communication and collaboration with colleagues, students, parents and external persons. An educator should not only be able to use digital technologies for teaching, but also for their professional engagement, such interactions with colleagues and continuous professional development.

The core of the DigCompEdu framework is represented by the areas 2 to 5, in which technologies are integrated into teaching in a pedagogically meaningful way.

Area 2 Digital Resources. There are so many great resources available online that can be used for teaching. Area 2 focuses on the selection, creation, modification and management of digital educational resources. This also includes the protection of personal data in accordance with data

[12] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/european-framework-digital-competence-educators-digcompedu

protection regulations and compliance with copyright laws when modifying and publishing digital resources.

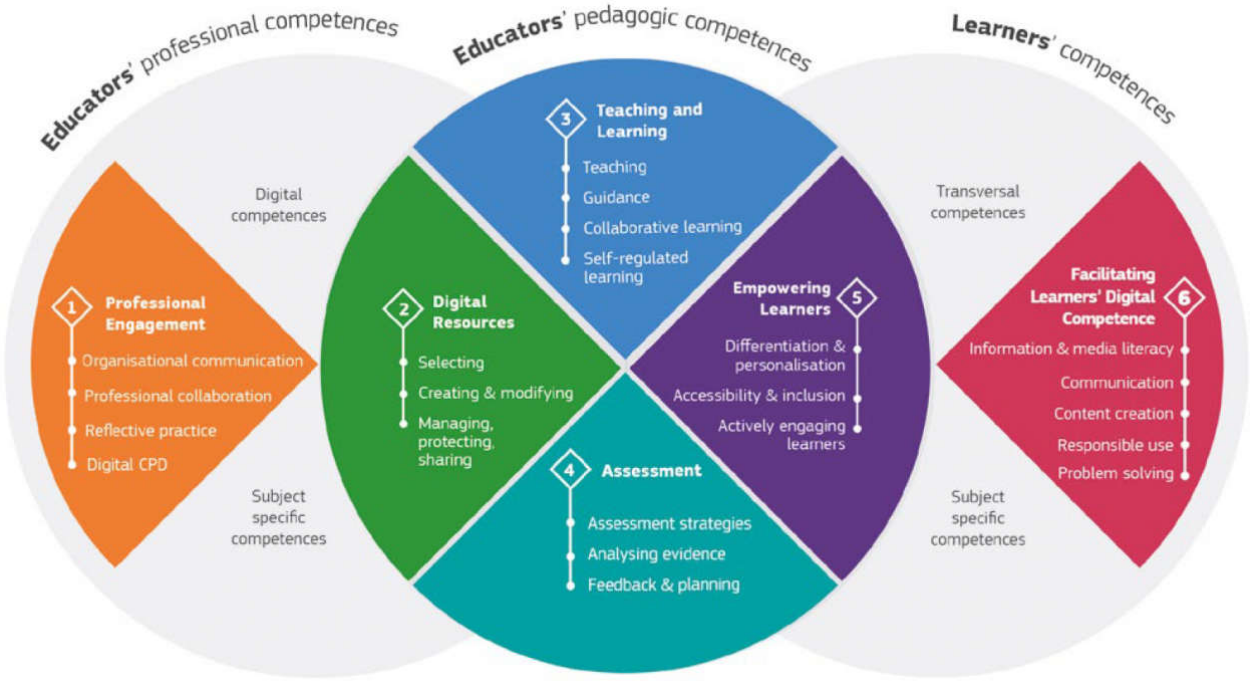


Fig.2.2–DigCompEdu areas and scope

Area 3 Teaching and Learning. This is the core area of competencies of the framework. Digital technologies can enhance and improve teaching and learners, but is currently often under used because of the digital competency of an educator. The third area deals with planning, designing and orchestrating the use of digital technologies in teaching practice. It focuses on the integration of digital resources and methods to promote collaborative and self-regulated learning processes and to guide these activities by transforming teaching from teacher-led to learner-centred processes and activities.

Area 4 Assessment.Digital technologies offer great opportunities to facilitate innovative assessment approaches. We really can move away from the 3 hour written exams. The area addresses the concrete use of digital technologies for assessing student performance and learning needs, to comprehensively analyse existing performance data and to provide targeted and timely feedback to learners.

Area 5 Empowering Learners.Digital technologies can contribute to supporting classroom differentiation and personalised education by offering learning activities adapted to each individual learner's level of competence, interests and learning needs to ensure accessibility for all learners.With Area 5being centred on Empowering Learners the framework emphasises the

importance of creating learning activities and experiences that address students' needs and allow them to actively develop their learning journey.

Area 6 Facilitating Learners' Digital Competence.An educator should be able to facilitate the development of learners' digital competences. Area 6 completes the framework by highlighting that a digitally competent teacher should be able to promote information and media literacy and integrate specific activities to enable digital problem solving, digital content creation and digital technology use for communication and cooperation.

A progression model is proposed to help educators understand their personal strengths and weaknesses, by means of describing different stages or levels of development of their digital competences.

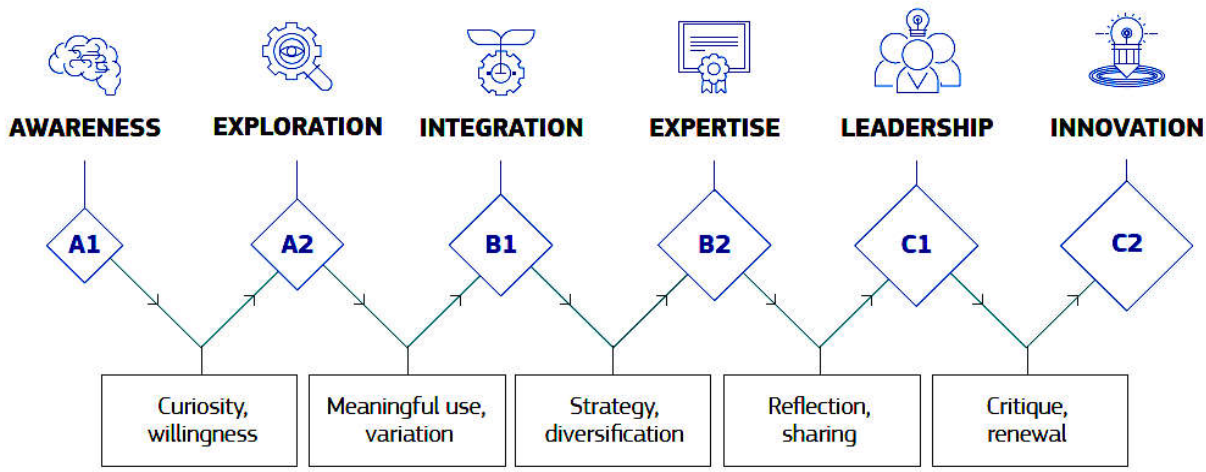


Fig.2.3–DigCompEdu progression model

Each individual competence of the DigCompEdu framework is described along six proficiency levels (A1, A2, B1, B2, C1, C2) with a cumulative progression, linked to the Common European Framework of Reference for Languages (CEFR)[13].

According to DigCompEdu, the following characterisations are used for the different competence stages:Newcomer (A1), Explorer (A2), Integrator (B1), Expert (B2), Leader (C1) and Pioneer (C2).

Teachers at the first two levels, A1 and A2, havestarted to use technology in some areas and are awareof the potential of digital technologies for enhancingpedagogical and professional practice. Teachers at level B1 or B2 already integrate digital technologies into practice in a variety of ways and contexts. At thehighest levels C1 and C2, teachers share their expertise with peers, experiment with innovative technologies and develop new pedagogical approaches.

[13] https://www.coe.int/en/web/common-european-framework-reference-languages/level-descriptions

For all competencies defined in DigCompEdu, the progression of skill levels is cumulative. This means that each higher level descriptor contains all lower level descriptors, with the exception of the first level, Newcomer (A1). For example, Expert level (B2) means mastering all skills at levels A2 through B2, but not skills at levels C1 and C2. The Newcomer level (A1) is largely described by the lack of certain competencies, that is, knowledge, skills or relationships present at higher levels.

According to this approach, a teacher's general digital competences (as described in DigComp) is a prerequisite for developing the teacher-specific digital competences as described in DigCompEdu. Further prerequisites are the teacher's subjectspecific, pedagogical and transversal competences[14].

Therefore, DigCompEdu agrees with the TPACK framework[1516], which postulates that three knowledge areas - technological, pedagogical and content knowledge - need to be effectively integrated for teachers to use digital technologies with benefit in their teaching. However, where TPACK falls short of explaining how this connection is established, DigCompEdu aims to identify pedagogical and professional focus areas for the integration of technology into teaching and professional practice.

To be able to supply such detail and still be applicable across all subjects and in a continuously changing technological landscape, the focus of DigCompEdu is clearly on the pedagogical element. DigCompEdu describes how technological competence (as described in DigComp) and subject-specific teaching competence (as described by curricula) can be pedagogically integrated by teachers to provide more effective, inclusive, personalised and innovative learning experiences to students. DigCompEdu furthermore acknowledges that to transform education in such a way a wider approach, including the professional environment and the integration of learning into the overall social and societal context is needed. Areas 1 and 6 cover these aspects.

Conclusion

DigCompEdu is a must read for educators and educators of educators. The framework describes in details what it means for educators to be digitally competent. It also has a useful list of typical activities per competence.

[14] Ghomi, M. andRedecker, C. (2019). DigitalCompetenceofEducators (DigCompEdu): DevelopmentandEvaluationof a Self-assessmentInstrumentforTeachers'DigitalCompetence.In Proceedings ofthe 11th International Conference on Computer Supported Education - Volume 1: CSEDU, ISBN 978-989-758-367-4, pages 541-548. DOI: 10.5220/0007679005410548

[15] Mishra, P., Koehler, M. J., 2006. Technologicalpedagogicalcontentknowledge: A frameworkforteacherknowledge. TeachersCollegeRecord, 108(6),1017-1054.

[16] http://www.tpack.org/

3 Developing an Adapted Digital Competence Framework for Ukrainian Citizens (DigCompUA - The Digital Competence Framework for UA Citizens)

The development of digital technologies opens for Ukraine a new "window of opportunity" for the growth of the national economy, improving the quality of life of citizens. To take advantage of these opportunities is a serious challenge and an important task for Ukrainian society.

The main goals of Ukraine's digital development are recognized by the state and society, as evidenced by the emergence of such documents as the Cabinet of Ministers of Ukraine Order # 67-r of January 17, 2018 “On Approval of the Concept of Development of the Digital Economy and Society of Ukraine for 2018-2020 and Approval of the Action Plan on its implementation»[17], Digital agenda Ukraine - 2020[18], Draft Law of Ukraine "On the Digital Agenda of Ukraine"[19].

Digital development involves performing a set of tasks that will positively impact the economy, business, society and life of the country as a whole. The main goals of digital development are:

- accelerating economic growth and attracting investment;
- transformation of economic sectors into competitive and efficient ones;
- technological and digital modernization of industry and creation of high-tech industries;
- accessibility to citizens of the benefits and opportunities of the digital world;
- human resources implementation, development of digital industries and digital entrepreneurship.

Today, in Ukraine, the development of digital and information and communication technologies covers almost all spheres of social and economic life, but unfortunately, access to them by citizens is largely limited by the relatively low level of development of broadband digital networks, the considerable cost of modern communication devices and services, weak digital skills of considerable the number of citizens.

According to the Global Information Technology Report (2016), published by the World Economic Forum[20], Ukraine is ranked 64th position among 139 countries in the world by the level of development of information and communication technologies.

In particular, the reasons for such positions of Ukraine in the ranking are lagging behind such components:

- low level of ICT use by the government (114th position);
- low efficiency of Ukrainian law-making bodies (120th position);

[17] https://zakon.rada.gov.ua/laws/show/67-2018-p
[18] https://ucci.org.ua/uploads/files/58e78ee3c3922.pdf
[19] https://www.rada.gov.ua/uploads/documents/40009.pdf
[20] http://www3.weforum.org/docs/GITR2016/WEF_GITR_Full_Report.pdf

- judicial system (131st position in assessing the independence of courts and 123rd - on the ease of challenging government actions by private business);
- problems with protection of intellectual property (120th position).

In addition, factors hampering the development of digitalization in Ukraine are:

- the low level of development of new technologies by business (100th position);
- the significant level of use of pirated software (92nd position);
- the availability of the latest technologies (96th position);
- 80th ranked by number of Internet users;
- ranked 72 by the number of households equipped with Internet access;
- and only ranked 121st by the number of subscribed broadband Internet users.

Results of a survey conducted in preparation of the analytical report “Industry 4.0 in Mechanical Engineering. Situation in Ukraine and Prospects for Development"[21]prove that "insufficient knowledge and skills in new technologies" are placed on the 2nd place among the main barriers to the digitization of production in our country. The main objective of digital infrastructure development is to ensure that all citizens of Ukraine, without restrictions and difficulties of technical, organizational and financial nature (in particular, socially vulnerable groups) can take advantage of digital opportunities regardless of their location or residence and not be in the "digital divide" segment. This is characterized by inequalities in access to opportunities in the economic, social, cultural, educational sectors that exist or deepen as a result of incomplete, uneven or inadequate access to computer, telecommunications and digital technologies.

However, the reality is that, according to experts, “in Ukraine there is no vision and no state initiative, program, strategic document aimed at creating a comprehensive national digital literacy development system. There are also no tools at the state level to monitor and evaluate digital competences.”[22] The lack of a comprehensive methodology for conducting the necessary studies of the digital skills and competences situation makes it impossible to develop a methodology for measuring and implementing independent certification of the digital skills level according to the needs of the labor market. The methodology for collecting statistics by the state statistical authorities is not very perfect for conducting a proper analysis of the situation in the field of development of digital skills and competences. Thus, the designated industry is one of the most unsettled in the sphere of harmonization of the digital market of Ukraine with the EU markets.[23]

Therefore, due to the rapid introduction of digital technologies, the development of digital skills of citizens is of particular importance, and the tasproblem of developing a digital competency framework for Ukrainian citizens (DigCompUA) is of high relevance.

[21] https://industry4-0-ukraine.com.ua/report/

[22] https://www.civic-synergy.org.ua/wp-content/uploads/2018/04/Problemy-ta-perspektyvygarmonizatsiyi-tsyfrovogo-rynku-Ukrayinyz-rynkamy-YES-ta-krayin-ShP.pdf

[23] Цифрові компетенції як умова формування якості людського капіталу : аналіт. зап. / [В. С. Куйбіда, О. М. Петроє, Л. І. Федулова, Г. О. Андрощук]. – Київ : НАДУ, 2019. – 28 с. – Режим доступу :http://academy.gov.ua/pages/dop/198/files/90a7d5c8-d10a-4f8f-8987-4d1077fdc8f6.pdf

The achievement of the stated goals of Ukraine's digital development is based on the development and deepening of citizens' digital competences to ensure their readiness to use digital opportunities in their personal and public life. Therefore, as stated in the Human Development Report[24], mastering the skills required for the 21st century should become an integral part of a lifelong learning process aimed at critical thinking, creativity and communication.

The key problem is how to prepare for big changes in the conditions of global competition in the formation of new types of competences and new forms of training, new educational practices:

- development of the online education market;
- continuous modernization of traditional education systems;
- the introduction of competency approach to learning;
- the transition to quantitative assessment of the educational process based on data analysis.

In developing the Ukrainian Digital Competence Framework for Citizens, an approach has been taken to adapt the best European digital competencies frameworks, as well as the relevant regulatory and scientific frameworks developed in Ukraine. Some provisions that are fundamental to most relevant research by other institutions, organizations and professionals working in this field are also considered[25]:

- competence formation is the result of the interaction of many different factors;
- modern life at the same time requires a person to acquire a set, a set of competencies that are called key;
- the selection of the most important competences (including digital ones) should be made taking into account relevant ideological ideas, cultural, economic, technological, educational and other contexts of Ukrainian society and the individual, their interaction;
- selection and identification of core competencies are influenced by subjective factors related to the individual: age, gender, social status, etc.;
- the definition and selection of competences requires broad discussion among different professionals and representatives of different social groups.

In the deliverable of WP1.3, an analysis of the European and world experience of forming digital competences of citizens was conducted, as well as the valid documents adopted in the European Union and UNESCO:

- DigComp 2.0: The Digital Competence Framework for Citizens26;
- DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use[27];

[24] Звіт про людськийрозвиток 2016 [Електронний ресурс]. – Режим доступу :http://www.ua.undp.org/content/ukraine/uk/home/library/annual-reports/human-development-report-2016.html

[25] Основистандартизаціїінформаційно-комунікаційних компетентностей в системіосвітиУкраїни : метод.рекомендації /[В. Ю. Биков, О. В. Білоус, Ю. М. Богачков та ін.]. – К.: Атіка, 2010. – 88 с.

[26] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-20-digital-competence-framework-citizens-update-phase-1-conceptual-reference-model

- Digital agenda for Europe[28];
- DigitaleKompetenzmodellfürÖsterreich - DigComp 2.2 AT[29];
- UNESCO's ICT Competency Framework for Teachers[30];
- Guidelines on adaptation of the UNESCO ICT competency framework for teachers: methodological approach on localization of the UNESCO ICT-CFT[31].

Based on the analysis, as well as taking into account the results of other projects on the state of development of digital competencies in the EU and in Ukraine, in particular MoPed[32], the project of Digital Competence Framework for Citizens of Ukraine (DigCompUA) was proposed. DigCompUA is based on the conceptual reference model DigComp 2.0 and the updated European framework DigComp 2.1, which are adapted to national, cultural, educational and economic features of Ukraine.

It is suggested to leave 4 dimensions (Dimension) DigCompUA (Fig. 3.1).

Dimension 4 of the Ukrainian DigCompUA framework (Knowledge, skills and attitudes applicable to each competence) is determined for each competency at the final stage, after the agreed list of competencies has been adopted by all stakeholders.The dimension 5 of the European DigComp2.1 framework (Examples of use, on the applicability of competence to different purposes) with examples of the use of competencies at the stage of developing the conceptual Ukrainian model is not applicable. This dimension should be determined after approval of DigCompUA and its practical experimental verification.

The developed adapted model of the Ukrainian DigCompUA framework is presented in Table 3.1. The changes made are explained and discussed below. All changes are highlighted in the table in green. The basic terminology is the same as that described in the DigComp 2.0 reference model.

[27] https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/digcomp-21-digital-competence-framework-citizens-eight-proficiency-levels-and-examples-use

[28] https://publications.europa.eu/en/publication-detail/-/publication/0f8a8894-2c86-4359-b578-b2cd2ea91c28/language-en/format-PDF/source-103678768

[29] https://www.bmdw.gv.at/DigitalisierungundEGovernment/DigitalisierungGesellschaft/Documents/DigComp_2.2_AT_barrierefrei_V14.pdf

[30] https://unesdoc.unesco.org/ark:/48223/pf0000213475?posInSet=2&queryId=ca72b47b-157f-4255-9d36-fb6023905587

[31] https://unesdoc.unesco.org/ark:/48223/pf0000224188?posInSet=4&queryId=ca72b47b-157f-4255-9d36-fb6023905587

[32] http://erasmusplus.org.ua/projects/ka2/2244-modernizatsiia-pedahohichnoi-vyshchoi-osvity-z-vykorystannia-innovatsiinykh-instrumentiv-vykladannia.html

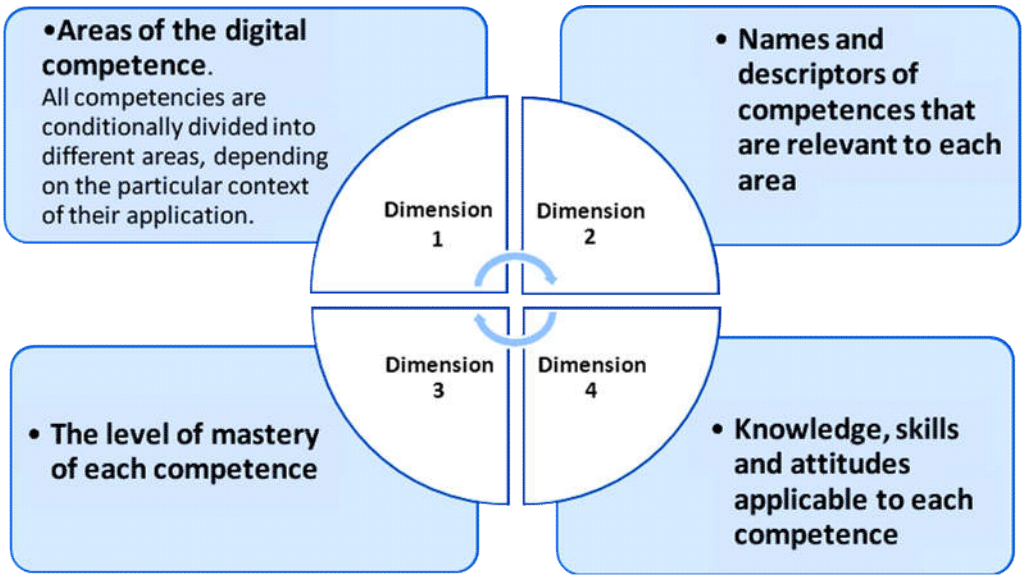


Fig. 3.1 – Measurements of DigCompUA Digital Competence Framework

Table 3.1 - DigCompUA model adapted.

Competence areas (CA) Dimension 1	Competences (C) Dimension 2
CA0 Basic digital skills	**C0.1 Using digital devices.** Functional literacy in the use of digital devices, mobile tools for communication. Ability to configure and deploy digital devices for your own use. **C0.2 Using basic software for digital device.** Application of basic software for digital device; ability to install and work with operating systems, online services, applications, files, the Internet.
CA1 Information literacy and ability to handle data	**C1.1 Browsing, searching and filtering data, information and digital content** To articulate information needs, to search for data, information and content in digital environments, to access them and to navigate between them. To create and update personal search strategies. **C1.2 Evaluating data, information and digital content** To analyse, compare and critically evaluate the credibility and reliability of sources of data, information and digital content. To analyse, interpret, verify authenticity and critically evaluate the data, information and digital content. **C1.3 Managing data, information and digital content** To organise, store and retrieve data, information and content in digital environments. To organise and process them in a structured environment.

Competence areas (CA) Dimension 1	Competences (C) Dimension 2
CA2 Communication and collaboration	**C2.1 Interacting through digital technologies** To interact through a variety of digital technologies and to understand appropriate digital communication means for a given context (In terms of cultural, social, gender- differences, etc.). **C2.2 Sharing and collaboration through digital technology** Use digital tools and technologies for data, information and digital content sharing processes. Apply digital technologies and tools for collaboration, co-creation and development of digital resources and knowledge. To act as an intermediary, to know about referencing and attribution practices. **C2.3 Engaging in citizenship through digital technologies** To participate in society through the use of public and private digital services. To seek opportunities for self-empowerment and for participatory citizenship through appropriate digital technologies. **C2.4 Satisfaction of personal needs through digital technologies** Use digital tools and technologies for the sale and consumption of goods and services, recreation, healthy lifestyles etc. **C2.5 Netiquette** To be aware of behavioural norms and know-how while using digital technologies and interacting in digital environments. To adapt communication strategies to the specific audience and to be aware of cultural and generational diversity in digital environments. **C2.6 Managing digital identity** To create and manage one or multiple digital identities, to be able to protect one's own reputation, to deal with the data that one produces through several digital tools, environments and services.
CA3 Digital content creation	**C3.1 Developing digital content** To create and edit digital content in different formats, to express oneself through digital means. **C3.2 Integrating and re-elaborating digital content** To modify, refine, improve and integrate information and content into an existing body of knowledge to create new, original and relevant content and knowledge. **C3.3 Copyright and licences** To understand how copyright and licences apply to data, information and digital content. Attitude to pirated software and content. **C3.4 Programming and process automation** To plan and develop a sequence of understandable instructions in order to solve a given problem or perform specific task using digital tools.

Competence areas (CA) Dimension 1	Competences (C) Dimension 2
CA4 Safety	**C4.1 Protecting devices** To protect devices and digital content, and to understand risks and threats in digital environments. To know about safety and security measures and to have due regard to reliability and privacy. **C4.2 Protecting personal data and privacy** To protect personal data and privacy in digital environments. To understand how to use and share personally identifiable information while being able to protect oneself and others from damages. To understand that digital services use a "Privacy policy" to inform how personal data is used. **C4.3 Protecting health and well-being** To be able to avoid health-risks and threats to physical and psychological well-being while using digital technologies. To be able to protect oneself and others from possible dangers in digital environments (e.g. cyber bullying). To be aware of digital technologies for social well-being and social inclusion. **C4.4 Protection against fraud and abuse of consumer rights.** Knowledge of the most important legal provisions in term of consumer protection, ability to identify questionable online stores, compare prices, apply customer protection measures.. **C4.5 Protecting the environment** To be aware of the environmental impact of digital technologies and their use.
CA5 Problem solving and further learning	**C5.1 Solving technical problems** To identify technical problems when operating devices and using digital environments, and to solve them (from trouble-shooting to solving more complex problems). **C5.2 Identifying needs and technological responses** To assess needs and to identify, evaluate, select and use digital tools and possible technological responses to solve them. To adjust and customise digital environments to personal needs (e.g. accessibility). **C5.3 Creatively using digital technologies** To use digital tools and technologies to create knowledge and to innovate processes and products. To engage individually and collectively in cognitive processing to understand and resolve conceptual problems and problem situations in digital environments. **C5.4 Identifying digital competence gaps** To understand where one's own digital competence needs to be improved or updated. To be able to support others with their digital competence development. To seek opportunities for self-development and further learning; and to keep up-to-date with the digital evolution.

Using the experience of Austrian partners and taking into account the development of citizens' digital competences, an additional area of DC competence CA0 - Basic digital skills has been introduced. In order to ensure consistency with the numbering of the European model, the prefix to the Ukrainian model of the competence "Basic digital skills" was given a number 0 (zero). The introduction of such a field will draw the attention of the users of the framework to the study and assessment of knowledge and skills in using the most popular digital devices (computer, netbook, tablet, smartphone, etc.) and their basic software. Functional literacy is used in the sense of an individual's ability to understand and use different types of information in order to function successfully in today's society in everyday, professional and public life[33], as well as an educational level characterized by the ability to unleash a vital different spheres of life based mainly on applied knowledge[34].

The CA1 domain name – «Information literacy and ability to handle data» has been modified to make it clear to the Ukrainian user. In the European model, the word «literacy» is used, which translation to Ukrainian does not quite fit with the word "data". In the explanation of C1.2 competence, the word "validation" (in relation to data) has been added. We consider that critical evaluation and interpretation of the data is possible only after verifying their accuracy, especially - in a situation where assessing the reliability of their source is not possible.

The name of the sphere of CA2 is proposed to be left as "Communication and interaction". In our view, the term "interaction" is wider than "cooperation." Competencies C2.1 and C2.5 received little refinement for the Ukrainian user, taking into account the peculiarities of Ukrainian society.

Competency C2.2 “Sharing and collaboration through digital technology” has been changed. From the perspective of ICT users, collaboration in this area is impossible without data and digital content sharing. It is therefore advisable to combine exchange and cooperation in one area of competence.

C2.4 Competency “Meeting personal needs through digital technologies”, reflecting the significant level of use of e-commerce services by Ukrainian citizens, as well as other consumer Internet services is added.

In CA3, the phrase "Attitude to pirated software and content" has been added to C3.3 competence. Attitudes are considered as components of competence, as well as - motivators of productivity, the basis of constant competent performance. These include values, aspirations and priorities. The state of use of pirated digital content in Ukraine is presented above, so inclusion of such a requirement is considered appropriate.

C3.4 competence is clarified for unambiguous interpretation by Ukrainian users.

[33] Сбруєва А.А. Функціональнаграмотність // Енциклопедіяосвіти / Акад. пед. наук України; головний ред. В.Г. Кремень. – К.: ЮрінкомІнтер, 2008. – С. 970 – 971.

[34] Розвитокпрофесійноїкомпетентності в галузі ІКТ. Рекомендації для співробітниківАпаратуВерховної Ради України. Режим доступу: https://iportal.rada.gov.ua/uploads/documents/38361.pdf

Based on the experience of Austrian partners (DigComp 2.2 AT), the competence C4.4 has been added. The level of digital fraud in Ukraine is quite high.

CA5 area name is changed. Problem solving and further learning, and C5.4 competence refined, which is logical because it reflects the real potential of information technology to seek new knowledge and lifelong learning for all citizens.

Therefore, the adapted DigCompUA model contains 24 competencies (Dimension 2) in 6 areas (Dimension 1). A brief description of competencies (descriptors) can be used to develop Dimension 3 - Knowledge, Skills and attitudes applicable to each competency.

Table 3.2 - Key keywords characterizing skill level

Levels in DigCompUA		Complexity of Task	Autonomy	Cognitive Domain
Foundation	A1	Simple tasks	With guidance	Remember
	A2	Simple tasks	Autonomy, guidance as needed	Remember
Intermediate	B1	Well-defined, routine tasks & straightforward problems	Independently	Understand
	B2	Well-defined tasks &non-routine problems	Independently and according to own needs	Understand
Advanced	C1	Different tasks & problems	Guiding others	Apply and Evaluate
	C2	Resolve complex problems with limited solutions	Integrate to contribute to professional practice	Evaluate and Create

According to the etalon European model, the Ukrainian digital framework should describe the levels of measurement of professional skills. At this stage of the project to set for DigCompUAfor each competencysix (6) levels of acquisitionis proposed (Table 3.2). We consider that until the

DigCompUA framework is adopted and tested in use in Ukrainian realities, it is very difficult to distinguish between Advanced and Highly specialized levels in practice. The need for a "Highly specialized" level can be identified in further studies. The structure and terminology for determining the levels of ownership for each competence are based on the European Qualifications Framework (EQF) and DigComp 2.1. In addition, each level description contains the knowledge, skills, and skills described in a single descriptor for each level of each competency (144 descriptors - 6 x 24 learning outcomes).

Conclusion

According to the results of the researches, the Digital Competence Framework for Citizens of Ukraine or DigCompUA was developed and adapted to Ukrainian realities. It is based on the European digital competency model for DigComp2.1 citizens and other European digital competency documents. DigCompUA's custom framework includes 4 dimensions, 24 competencies and 6 levels of mastery of each competency.

4 Digital competence framework for educators (Ukraine) DigComEduUA

Accumulated till the XXI century, the potential for the development of information and communication technologies is the cause of significant changes in the functioning of systems of various levels - from the world economy to individual economic entities, and digitalization - the most important factor not only for economic growth of the national and global economy, but also for raising the educational, cultural level of the population. Because of ICT's influence, there is a shift from the introduction of digital technologies to the integrated construction of the digital ecosystem. The most important part of digitalization process is its transition to the fourth industrial revolution and to the sixth technological way. In this regard, digitalization is an important component of economic, educational, cultural development of most countries, and at the same time becomes the basis for the sustainable development of various spheres of society, improving competitiveness and living standards of citizens. It is digitization that drives people to prosper, improve their knowledge, skills, competences, and master new activities.

Digital technology in the modern world is not only a tool, but also an environment of existence that opens up new opportunities: learning at any convenient time, continuous education, the ability to design individual educational routes, becoming creators from consumers of electronic resources. However, the digital environment requires teachers of a different mentality, perception of the world picture, completely different approaches and forms of work with students. The educator becomes the bearer of knowledge that he shares with students, a leader in the digital world. He must possess digital competencies, the ability to create and apply content through digital technologies, including computer programming skills, searching, sharing information, and communication.

Substantial work has been done in Ukraine to determine the requirements for the teacher, taking into the consideration the trends of digitalization, in particular, the concept of the implementation of state policy in the field of reforming general secondary education ("New Ukrainian School" project, for the period up to 2029[35], approved by the CMU decree # 988 of 14.12.2016). Among the core competencies that a primary school teacher must possess for successful fulfillment of the strategic goal and tasks of reforming primary education, information and digital competence are the ability to navigate informational space, get information, and use it according to their own needs and requirements of modern high-tech information society. Public discussion on the content of basic competences that a secondary school teacher[36] must possess in order to successfully fulfill the strategic goal and objectives of secondary education reform is currently underway. In general, due to the need for digitalization in the field of Ukrainian education, it is planed to modernize the system of education and training, to bring educational programs in line

[35] https://mon.gov.ua/ua/news/ministerstvo-osviti-i-nauki-ukrayini-proponuye-dlya-gromadskogo-obgovorennya-proyekt-derzhavnogo-standartu-bazovoyi-serednoyi-osviti

[36] https://mon.gov.ua/ua/news/ministerstvo-osviti-i-nauki-ukrayini-proponuye-dlya-gromadskogo-obgovorennya-proyekt-derzhavnogo-standartu-bazovoyi-serednoyi-osviti

with the needs of the digital economy, to widely introduce digital tools of educational activity and to integrate theminto the information environment, to provide the opportunity to educate citizens individual learning plan throughout their life - anytime, anywhere.

Today, information and knowledge are the basis of economic progress. Everyone in this situation, regardless of age and type of activity, must possess digital technologies, apply them in professional activity, daily life, self-education, etc.

Formation of specific competences occurs at different levels of education, but digital competences are formed throughout life. Therefore, digitization of education depends directly on the teacher's level of knowledge of the digital technologies. This actualizes the need to develop the ability to navigate, work with, process, and integrate digital technology within educators.

In order to develop the framework, European approaches to the digital competency of citizens, were analyzed:

1. DigComp 2.1: The Digital Competence Framework for Citizens (2017)

The European Digital Competence System, also known as DigComp, is a tool for enhancing citizens' digital competence. DigComp was first launched in 2013 and has become a benchmark for many digital competence initiatives both at the pan-European and EU Member States.

2. Digital Competence Framework for Educators DigCompEdu (Redecker, 2017)

The Teacher's Digital Competence Framework DigCompEdu (Redecker, 2017) is targeted at teachers and educators of all levels of education from kindergarten to higher and postgraduate education, general and vocational, special needs education and non-formal learning contexts. This framework identifies 6 major areas in 22 components that express teacher competence.

3. The ICT Competency Framework for Teachers (ICT CFT) Version 3

In 2005, UNESCO prepared a project to develop the UNESCO's ICT Competency Framework for Teachers. As a result of this work, Teacher Information and Communication Competency Standards were issued in 2008, updated in 2011 and 2018. Contains a complete set of competencies that teachers need to integrate into their professional ICTs to facilitate student achievement of learning goals. Identifies 6 areas of competence across 3 skill levels.

Table 4.1 - Comparison of digital competency frameworks

Frameworks:	DigComp 2.1 (European Union)	DigCompEdu (European Union)	ICT Competency Framework for Teachers (UNESCO)
Year	2017	2017	2018
Areas	5	6	6
Descriptors	21	22	31
Levels	8	6	3
Target audience	citizens	Educators at all education levels	Primary and secondary school teachers

The New Ukrainian School declares that the cross-cutting use of information and communication technologies in the educational process and management of educational institutions and the educational system should become an instrument for ensuring the success of the new Ukrainian school. The introduction of ICT in the education sector must move from one-off projects to a systematic process that covers all activities. ICT will greatly enhance the teacher's capabilities, streamline management processes, building the technological competencies that are important to students of this century.

For the successful application of this tool teachers need to have basic digital skills. Today, there is a digital divide between a teacher and a student. Many educators do not yet know how to research problems using modern tools, work with large amounts of data, draw and present conclusions, collaborate online in educational, social and scientific projects, and more.

This is due to the general low level of digital competence of Ukrainian citizens. Unfortunately, in Ukraine there are not many statistics on the level of digital competences of citizens, but if we look at the statistics of EU countries, the age category 45+, which includes a significant number of Ukrainian teachers and tutors (according to [37, 38, 39]), traditionally has lower rates of digital competence. The insufficient level of digital competence of teachers is manifested both at the level of preparation for educational activities (for example, the development of teaching materials) and in the process of self-education, as well as in the willingness to use ICT directly in the educational process.

The research materials of the Erasmus+ MOPED[40] project concerning the subject were analyzed, specifically the tendencies of understanding of the basic modern educational trends, the use of innovative pedagogical technologies and digital tools by teachers and students of higher education institutions and teachers of secondary education institutions.

The results indicate that teachers and students need to develop competencies related to professional development and lifelong learning, the use of digital resources and tools in their professional activities, the role of the teacher in the information society, and the formation of students' digital competencies.

The Online4Edu[41] project is focused on teachers of schools of various degrees (primary, secondary and vocational education) and focuses on competencies related to the use of online collaboration tools in schools. The study was conducted among teachers in Latvia, Lithuania, Estonia and Germany and found significant gaps in the use of online tools,

[37] https://cedos.org.ua/edustat/graph
[38] http://iea.gov.ua/wp-content/uploads/2017/12/8.pdf
[39] https://osvita.ua/doc/files/news/617/61743/1serpkonf-informatsiyniy-byuleten.pdf
[40] http://moped.kubg.edu.ua/wp-content/uploads/2014/03/MoPED_D1.2-3DMapping.pdf
[41] https://www.online4edu.eu/

Taking into account the transformation processes in Ukrainian education and the leading role of the teacher in implementing innovation in learning, the dComFra project working group at KNUC&A proposes to introduce a single framework for all levels of education.

Regardless of the type and level of education, the activities of the teacher can be structured in the following areas:

- Pedagogical activities aimed at the education, upbringing and development of a person, his or her cultural, civic and / or professional competences.
- Educational activities related to the organization of the educational process.
- Professional development, lifelong learning and engagement.

We consider these competences necessary when developing a digital competence framework for educators. Talking about DigComp digital competency framework for citizens, which has a separate component "Creating digital content", it should be noted that the competencies for working with digital resources intended for teaching activities have significant differences, so in the digital competence of teachers they should be stated a separate component, because the digital competencies for using, creating and disseminating digital learning resources are a cross-cutting line that combines the above activities.

In view of the above, the following areas (components) are proposed for the Digital Competence Framework for teachers:

Table 4.1 – Areas for competences

1. Digital resources
Searching, creating and sharing digital resources
2. Professional development and collaboration
Using digital technologies for communication, collaboration and professional development
3. Educational activities
Using digital technologies in teaching, learning, to enhance assessment, inclusion, personalization and learners' active engagingment
4. Facilitating learner's digital competence
Enabling learners to creatively and responsibly use digital technologies for information, communication, content creation, wellbeing and problem-solving.

Table 4.2 - Competence descriptors

Digital resource's	Professional development and collaboration	Educational activities	Facilitating learner's digital competence
• Searching and Selecting digital resources • Creating and modifying digital resources • Managing, protecting and sharing digital resources	• Continuous Professional Development • Research activities • Reflection and pedagogical practice improvement • Professional Collaboration • Organizational communication	• Teaching • Guidance • Self-regulated Learning • Collaborative learning • Assessment and results analysis • Feedback and Planning • Differentiation and personalization • Accessibility and inclusion • Actively engaging learners	• Information and media literacy • Digital communication and interaction • Digital content creation • Safety • Digital problem solving and further learning

Table 4.3 - Areas and competence descriptors

Competence areas (CA) **Dimension** 1	Competences (C) Dimension 2
Area 1. **Digital resources**	**1.1 Searching and Selecting digital resources** To identify, assesse and select digital resources for teaching and learning. Consideration of the specific learning objective, context, pedagogical approach and group of learners when selecting and planning to use digital resources **1.2 Creating and modifying digital resources** To modify and build on existing openly-licensed resources and other resources where this is permitted. To create or co-create new digital educational resources. **1.3 Managing, protecting and sharing digital resources** To organise digital content and make it available to learners, parents

Competence areas (CA) **Dimension** 1	Competences (C) Dimension 2
	and other educators. To effectively protect sensitive digital content. To respect and correctly apply privacy and copyright rules. To understand the use and creation of open licenses and open educational resources, including their proper attribution.
Area 2. **Professional development and collaboration**	**2.1 Continuous Professional Development** To use digital resources and resources for ongoing professional development, professional trainings and lifelong learning. **2.2 Research activities** The use of digital technology at various stages of research, including searching and collection of data, qualitative and quantitative data analysis, publication and dissemination of research results **2.3 Reflection and pedagogical practice improvement** To individually and collectively reflect on, critically assess and actively develop one's own digital pedagogical practice and that of one's educational community. **2.4 Professional Collaboration** To use digital technologies to engage in collaboration with other educators, sharing and exchanging knowledge and experience, and collaboratively innovating pedagogic practices **2.5. Organizational communication** To use digital technologies to enhance organizational communication with learners, parents and third parties. To contribute to collaboratively developing and improving organisational communication strategies.
Area3. **Educational activities**	**3.1 Teaching** To plan for and implement digital devices and resources in the teaching process, so as to enhance the effectiveness of teaching interventions. To appropriately manage and orchestrate digital teaching strategies. To experiment with and develop new formats and pedagogical methods for instruction. **3.2 Guidance** To use digital technologies and services to enhance the interaction with learners, individually and collectively, within and outside the learning session. To use digital technologies to offer timely and targeted guidance and assistance. To experiment with and develop new forms and formats for offering guidance and support. **3.3 Self-regulated Learning** To use digital technologies to support learners' selfregulated learning, i.e. to enable learners to plan, monitor and reflect on their own learning, provide evidence of progress, share insights and come up with creative solutions **3.4 Collaborative learning** To use digital technologies to foster and enhance learner

Competence areas (CA) **Dimension** 1	Competences (C) Dimension 2
	collaboration. To enable learners to use digital technologies as part of collaborative assignments, as a means of enhancing communication, collaboration and collaborative knowledge creation. **3.5 Assessment and results analyse** To use of digital technologies to form current and final assessment. Increasing the diversity and suitability of evaluation formats and approaches. Selection, critical analysis, and interpretation of digital metrics on student performance, effectiveness, and progress/ **3.6 Feedback and Planning** To use digital technologies to provide targeted and timely feedback to learners. To adapt teaching strategies and to provide targeted support, based on the evidence generated by the digital technologies used. To enable learners and parents to understand the evidence provided by digital technologies and use it for decision-making. **3.7 Differentiation and personalization** To use digital technologies to address learners' diverse learning needs, by allowing learners to advance at different levels and speeds, and to follow individual learning pathways and objectives. **3.8. Accessibility and inclusion** To ensure accessibility to learning resources and activities, for all learners, including those with special needs. To consider and respond to learners' (digital) expectations, abilities, uses and misconceptions, as well as contextual, physical or cognitive constraints to their use of digital technologies. **3.9 Actively engaging learners** To use digital technologies to foster learners' active and creative engagement with a subject matter. To use digital technologies within pedagogic strategies that foster learners' transversal skills, deep thinking and creative expression. To open up learning to new, real-world contexts, which involve learners themselves in hands-on activities, scientific investigation or complex problem solving, or in other ways increase learners' active involvement in complex subject matters.
Area4. **Facilitating learner's digital competence**	**4.1 Information literacy and ability to handle data** To incorporate learning activities, assignments and assessments which require learners to articulate information needs; to find information and resources in digital environments; to organise, process, analyse and interpret information; and to compare and critically evaluate the credibility and reliability of information and its sources. **4.2 Digital communication and interaction**

Competence areas (CA) **Dimension** 1	Competences (C) Dimension 2
	To incorporate learning activities, assignments and assessments which require learners to effectively and responsibly use digital technologies for communication, collaboration and civic participation. **4.3 Digital content creation** To incorporate learning activities, assignments and assessments which require learners to express themselves through digital means, and to modify and create digital content in different formats. To teach learners how copyright and licenses apply to digital content, how to reference sources and attribute licenses. **4.4. Safety** To take measures to ensure learners' physical, psychological and social wellbeing while using digital technologies. To empower learners to manage risks and use digital technologies safely and responsibly **4.5 Digital problem solving and further learning** To incorporate learning activities, assignments and assessments which require learners to identify and solve technical problems, or to transfer technological knowledge creatively to new situations

For all competences, the progression of proficiency levels is cumulative in the sense that each higher level descriptor comprises all lower level descriptors, with the exception of the first level.

Level A.1. Newcomer (Basic User)

Newcomers are aware of the potential of digital technologies for enhancing pedagogical and professional practice. However, they have had very little contact with digital technologies and use them mainly for lesson preparation, administration or organisational communication. Newcomers need guidance and encouragement to expand their repertoire and to apply their existing digital competence in the pedagogical realm/

Level A.2. Explorers (Pre-intermediate User)

Explorers are aware of the potential of digital technologies and are interested in exploring them to enhance pedagogical and professional practice. They have started using digital technologies in some areas of digital competence, without, however, following a comprehensive or consistent approach.

Level B. Integrator (Intermediate user) .

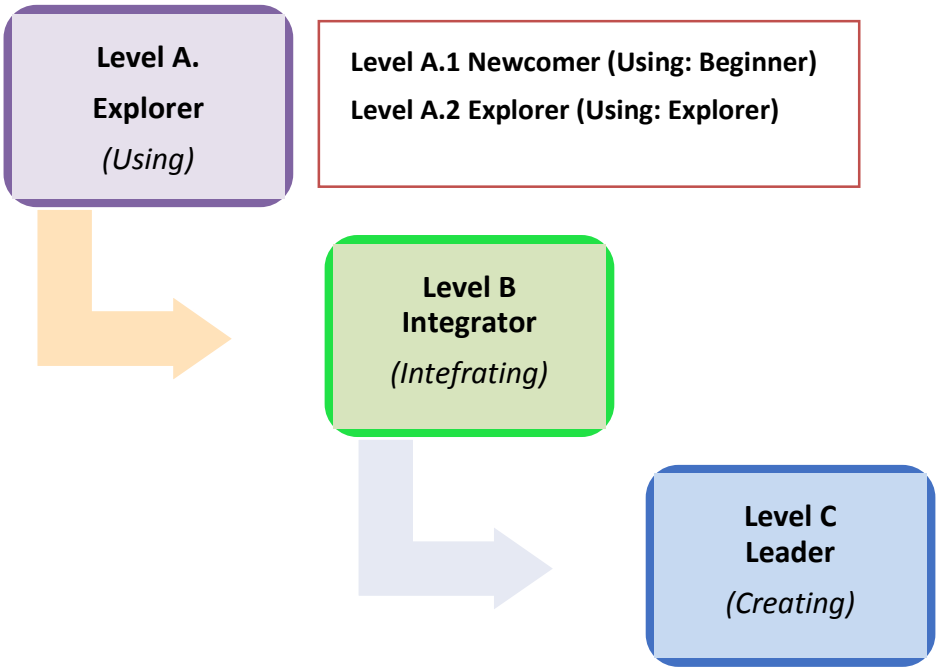
Integrators experiment with digital technologies in a variety of contexts and for a range of purposes, integrating them into many of their practices. They creatively use them to enhance diverse aspects of their professional engagement. They are eager to expand their repertoire of

practices. They are, however, still working on understanding which tools work best in which situations and on fitting digital technologies to pedagogic strategies and methods.

Level C. Leader (Advanced User)

Leaders have a consistent and comprehensive approach to using digital technologies to enhance pedagogic and professional practices. They rely on a broad repertoire of digital strategies from which they know how to choose the most appropriate for any given situation. They continuously reflect on and further develop their practices. Exchanging with peers, they keep updated on new developments and ideas.

Table 4.2 - Proficiency levels



A definitive solution to the need and content of Level B and Level C is possible only after conducting a WP.4 teacher trainings and evaluation of the received results.

Conclusion

According to the results of the researches, the Digital Competence Framework for Educators of Ukraine or DigCompEduUA was developed and adapted to Ukrainian realities. It is based on the European digital competency model for DigComp2.1 citizens, European Framework for the Digital Competence of Educators (DigCompEdu) and other European digital competency documents. DigCompEduUA's custom framework includes 2 dimensions, 4 areas with 22 competencies and 3 Proficiency levels.

5 National coalitions experience analysis (countries taking part in consortium)

The Digital Skills and Jobs Coalition (#DSJCoalition) was launched in Brussels on December 1st.

It brings together Member States, companies, social partners, non-profit organisations and education providers, who take action to tackle the lack of digital skills in Europe[42].

Currently, there are National Coalitions in Belgium, the Netherlands, Bulgaria, Latvia, Lithuania, Italy, Portugal, Cyprus, Malta, Greece, Romania and Poland. Coalitions have been recently launched in Estonia, Slovakia, The Czech Republic, Ireland, Spain, and Slovenia. The #DSJCoalition hopes to form coalitions in UK, Luxembourg, Sweden, Denmark, Finland, Austria and Germany and thus have a coalition in every country[43].

There are two ways to join the initiative. First way is join by making a pledge[44]. Pledges are 'promises' organisations make to bridge the digital skill gap: this can range from promising to train a certain number of people in digital skills, upskilling a certain number of people in digital skills, getting digital skills workshops to reach a certain number of schools. The second one is take part in the National Coalition.

Transforming teaching and learning of digital skills in a lifelong perspective is one of the target areas of the Digital Skills and Jobs Coalition. Having digital skills is a basic requirement to fully participate in society, but many people of all ages lack them and are at risk of being digitally excluded.

The main goal of the initiative to improve digital skills at national, regional or local level as well as mobilise all actors that have the capacity to train and re-skill people with the digital skills they need to take part in society and the labour force to remain productive and employable.

Members of the Digital Skills and Jobs Coalition agreed to build strong partnerships and work together to reduce digital skills gaps in Europe by contributing to one or more of the following actions to be achieved by 2020:

- Train (1 million) more young (unemployed) people for vacant digital jobs by training (each year an extra 250,000) unemployed and disconnected young people for digital professions, including through good quality internships/traineeships, apprenticeships and short term training programmes linked to local skills needs as well as to concrete opportunities for employment.
- Support the up-skilling and retraining of the workforce for new digital technologies by offering all workers the opportunity to assess and upgrade their digital skills, improving the

[42] https://ec.europa.eu/digital-single-market/en/digital-skills-jobs-coalition
[43] https://all-digital.org/digital-skills-and-jobs-coalition-launch-event/
[44] https://ec.europa.eu/digital-single-market/en/pledge-for-digital-skills-jobs-coalition

understanding of skills demand. And in particular take concrete measures to support SME swho face specific challenges in attracting and retaining digital talent as well as retraining their workforce.

- Modernise education and training –including through dialogue and cooperation between industry and education stakeholders -to make the most of digitisation for learning, for work and for life and to provide all students and teachers with the opportunity to develop and upgrade their digital skills.
- Reorient and make use of available funding to support digital skills and carry out awareness-raising to inform and convince 1) young people about the benefits of studying and pursuing careers in ICT, 2) entrepreneurs and managers of SMEs in all sectors of the potential and relevance of digital technologies for their businesses and 3) citizens at large of the benefits of using digital technologies and learning digital skills for their lives. Members are encouraged to come forward with concrete pledges (see below) for action in the areas identified above.

Digital Skills and Jobs Coalition combines a variety of projects related to initiatives that aimed to improve the digital skills of Europeans at school, at work, for ICT specialists, for girls and women as well as in society. In accordance with its police Digital Skills and Jobs Coalition initiatives embrace such categories as:

- All citizens (developing digital skills to enable all citizens to be active in our digital society).
- Labour force (developing digital skills for the digital economy, e.g. upskilling and reskilling workers, jobseekers; actions on career advice and guidance).
- ICT professionals (developing high level digital skills for ICT professionals in all industry sectors).
- Education (transforming teaching and learning of digital skills in a lifelong learning perspective, including the training of teachers).

National Coalitions bring together ICT and ICT-intensive companies, education and training providers, education and employment ministries, public and private employment services, associations, non-profit organisations and social partners, who develop concrete measures to bring digital skills to all levels of society.

They collaborate in areas such as increasing industry-led training, certifying skills, improving school and university curricula, and raising awareness about ICT careers, especially among young people and women[45].

By 2020, the Coalition hopes to achieve the following higher level goals:

Train 1 million young unemployed people for vacant digital jobs through internships/traineeships, apprenticeships and short-term training programmes.

[45] https://ec.europa.eu/digital-single-market/en/national-local-coalitions

Support the upskilling and retraining of the workforce and in particular take concrete measures to support small and medium enterprises (SMEs) who face specific challenges in attracting and retaining digital talent as well as retraining their workforce.

Modernise education and training to provide all students and teachers with the opportunity to use digital tools and materials in their teaching and learning activities and to develop and upgrade their digital skills.

Reorient and make use of available funding to support digital skills and carry out awareness-raising about the importance of digital skills for employability, competitiveness and participation in society.

Lithuania

Bearing in mind that the significant shortage of professionals in information and communications technology (ICT) in the European Union (EU) creates a bottleneck for economic growth, while educational institutions fail to provide a sufficient number of professionals with adequate ICT knowledge and skills demanded on the labor market, in December 2012, the European Commission (EC) announced the Grand Coalition Initiative for the Promotion of Digital Skills and Jobs, the aim of which is to implement the Digital Agenda for Europe and to solve this problem through concrete and coordinated actions of the public and private sectors, by increasing the number of ICT apprenticeships as well as to establish more direct links between education and business, to standardize qualification requirements and to achieve other goals that are pursued.

In order to achieve striking and positive changes at the national level as soon as possible, the EC invited National governments, education and training sectors, ICT companies and non-governmental organizations to join the coalition.

In Lithuania it was identified quite a big youth unemployment rate – over 20%, it was foreseen a huge lack of ICT professionals as well as a lack of ICT skills awareness raising among society. At the same time formal education was not able to fill the lack of ICT professionals as soon as possible.

The activities of the National Coalition are coordinated and the relationship with other organizations are coordinated by the association “Langas į ateitį“. The mission of NDC in short is to increase youth employment by promoting ICT knowledge and achieve more effective use of the digital potential by cooperation in implementing information society development programme Digital Agenda for Lithuania 2014-2020.

Relaunching National Digital Coalition in Lithuania

On 14th February of 2017 in the ministry of Transportation and Communication a relaunch event was organized by NDC Stakeholders and Members, and it was agreed to continue its activities with

the newly elected Lithuanian Parliament and government support[46].

NDC fully meets the goals of the newly launched Digital Skills and Jobs Coalition by EC, together with Member States, companies, social partners, NGOs and education providers so that to add to the recent challenges - the high demand for digital skills in Europe which are essential in today's job market and society.

National Digital Coalition founders signed the Memorandum with the following goals:

1. To substantially reduce the shortage of IT professionals, to improve the conditions for the private and public sector employees as well as all inhabitants to learn and continuously improve the necessary ICT skills for job, the establishment of IT business and development of the digital market:

- To (re)skill the ICT professionals according to market requirements and to encourage professionals from other fields to specialize in ICT.
- To promote e-leadership, ICT start-ups and the use of new digital opportunities in multifarious Lithuanian economy fields.
- To promote a more efficient use of available ICT infrastructure and existing services.
- To promote the development and use of open educational resources, to encourage institutions, companies and organizations to develop and provide Internet courses.

2. To attract more young people to choose ICT and other science studies and professions, to ensure the acquisition of digital skills also when learning other professions:

- To continuously improve general education, higher education and vocational training programmes according to the labor market requirements.
- To seek that the professionals that are being trained had necessary ICT skills required by the labormarket.
- To reinforce the framework of digital skills training by cooperation between the representatives of business, education and other organizations.
- To include ICT training to the system of non-formal youth education.

3. To raise public awareness of the importance of digital skills and competences:

- To involve the society in the dissemination activities of digital skills and competences.
- To constantly keep the Lithuanian society informed about the importance of digital skills and competences.
- Reaching every resident of Lithuania, jointly organize public informational campaigns and regional activities.

For the fluent execution of the Coalition and execution of Coalition’s goals the following working methods are used:

[46] http://sumin.lrv.lt/lt/naujienos/susisiekimo-ministras-butina-ugdyti-vyresniu-zmoniu-skaitmeninius-gebejimus

- Communication between Stakeholders (participation in work groups organized by Ministries and Government).
- Dissemination during national events (conferences; meetings with young people, business and education; contests).
- Implementation of partners' projects using different funding sources.
- Implementation of national projects using EU structural funds (in progress).

Digital Champion actively participates in NDC activities beginning the very launch of NDC

Every NDC partner has been introduced and encouraged to use NDC logo, EK Digital Skills and Jobs Coalition logo and is informed to use them for all dissemination events and publications related with NDC activities.

The greatest recent achievement is the agreement of the government to submit NDC partners' project application CONNECTED LITHUANIA which will be funded by ERDF. Duration – 36 months, project start 2018. Scope – national.

The project seeks to stress the importance of digital skills as well as motivate and encourage the Lithuanian society to acquire the necessary digital skills, to use the Internet and e-services efficiently, comprehensively, safely and responsibly. The target group is reached through the active involvement of 500 local communities and 1200 Public Internet Access Points in public libraries starting with local community members needs. In order to encourage the target group to discover the benefits of the Internet, ICT products and services, it is necessary to inform the target group in the digital divide, about the benefits and possibilities offered by ICT, support and encourage them to acquire the needed skills for their better life quality and become smart ICT users.

The project is planned to achieve 2 main goals, which will include:

- Promoting the benefits of digital skills to Lithuanian residents - non users of the Internet as well as support to them to acquire digital skills for life. The activities planned will start with local communities, recognition of 2000 "digital leaders", their train-of trainer sessions which will empower the "digital leaders" to influence the local community members to have an interest in ICT, develop and improve their digital competences discovering the potential of digital skills. The project will create a sustainable networks of 2000 local "digital leaders" as well as young e- scouts'(volunteers) to help the members of the local community provide mutual assistance and learn how to use the Internet, electronic services and share this community with relevant knowledge and experience using ICT;100 K citizens will directly participate in digital skills training sessions;
- Encourage Lithuanian citizens to improve their digital skills - by effectively, comprehensively, safely and responsibly exploiting the opportunities offered by ICTs for quality of life and professional activity.

Continue NDC activities gathering information and promoting best digital skills projects which add to the development of the digital skills of Lithuanian society as well as reaching goals foreseen in

the Lithuania's Digital Agenda as well as actively participate in the Lithuania's Digital Agenda Council activities - to assess how the goals are met, how the tasks are implemented, analyze the changes related to digital competences, to make proposals for the solutions necessary for the development of the information society. During the 'ICT 2013: Create, Connect, Grow' conference in Vilnius, which was organised by the European Commission, the Ministry of Transport and Communications, and the Ministry of Foreign Affairs, a memorandum of cooperation regarding the creation of the National Digital Coalition in Lithuania was signed[47].

Czech Republic

DigiKoalice (Czech National Coalition for Digital Jobs) is an open grouping of representatives of state institutions, IT companies, ICT sector, educational institutions, academia, non-profit organizations, founders of schools and school facilities and other entities that want to contribute to increasing digital literacy of Czech citizens , to increase their chances of succeeding with their digital skills in the labor market and to achieve this as a result of greater competitiveness of the Czech economy[48].

The Czech National Coalition for Digital Jobs (DigiKoalice) was established in the Czech Republic on 28 November 2016. It represents one of the ten key initiatives proposed under the new Skills agenda for Europe and aims to support digital skills that are quickly becoming a basic requirement for the performance of most occupations in line with the requirements of Industry 4.0.

Its 67 members include representatives of state institutions, entrepreneurs and the non-profit sector. Coalition members have made several commitments, including providing one obligatory semester of practical training at a faculty of informatics and setting up a digital education centre focused on elderly citizens. In municipalities, local employers and representatives of schools aim to encourage foreign language acquisition and digital education through purchases of IT equipment for schools and provision of internships in companies.

The Czech National Digital Skills and Jobs Coalition has its own Memorandum[49], which was signed by Minister of Education, Youth and Sports, Minister of Labour and Social Affairs, Minister of Industry and Trade, Deputy Prime Minister for the Science, Research and Innovation and representative of the Czech ICT Alliance.

Digital technologies are fast-developed and rapidly changing domain. They affect directly the lives of all people in different fields, and digital competences are increasingly becoming a prerequisite for most professions. The prerequisite of DC creating is to provide an effective digital education for every citizen of the Czech Republic with the opportunity to develop their own digital competences throughout their lives. In this case they will be able to succeed in the labor market and use digital technologies to meet their life needs.

[47] http://www.skaitmeninekoalicija.lt/wp-content/uploads/2017/03/MEMORANDUM-Summary_eng.pdf
[48] https://digikoalice.cz/
[49] https://drive.google.com/file/d/0B5oT44tVYmopV1pLeXRrOFhfTk0/view

The DigiKoalice helps with specific activities development of digital literacy of Czech citizens and for this purpose synergistically links cooperating organizations and their activities. It aims also to popularize of activities and good practice in the field of digital education.

The coalition organises panel discussions, roundtables, workshops and other joint meetings to create space to debate and discuss selected topics. It provides support for conferences, seminars and campaigns promoting IT fields and digital skills.

The coalition[50] faces multiple challenges that require agreement of various parties: preparing learners in formal and non-formal education for a digital world; teacher training; the impact of digitalisation on interpersonal relationships; how to address digital literacy and computational thinking in primary and secondary schools curricula; big data in education; and the need for pedagogical research on use of digital technologies in teaching or the position of network administrators in schools.

Description of groups

- A group of representatives of the state sector and ICT sector, which are reported every 3 months in shifts in the activities of DigiKoalice and against which it is possible to raise the initiative of the Czech National Coalition for Digital Jobs.
- CODEWEEK 2019 - A group of event organizers supporting the teaching of information thinking and programming. The group was established to support the promotion of the CODEWEEK campaign in the Czech Republic. It is coordinated with EUN Schoolnet, DZS MŠMT activity, member of DigiKoalice.
- Digital infrastructure and connectivity for Czech schools
- The working group aims to support solutions in the selection and acquisition of new (teaching) technologies and the school's digital infrastructure and to ensure their sustainable management. The group also deals with the topic of accessing high-speed internet to schools.
- Digital educational resources, quality of educational content

The starting point for the work of the working group will be a reflection of the quality of the content that is presented to pupils and teachers in digital form, and which supports the various forms of education.

Variety of projects and activities were launched under DNC umbrella. For instance “Unusual summer suburban camps for children from 6 to 19 years”, “Conceptual maps in pedagogical practice - DVPP course”, “Czech nationwide cyber security competition for secondary school students”, Programming with Czechitas Scratch 1, 2[51].

[50] https://digikoalice.cz/

[51] Programming with Czechitas - Scratch 1, https: //digikoalice.cz/kalendar-akci/

Some of them operate as a regularly organized professional trainings, for example I4wifi Specialized Training[52], Programming with Czechitas C#[53]. All of them focused on educational activities as well as development of digital skills by population of Czech Republic.

Moreover, methodological portal RVP.CZ[54] has been developed in order to facilitate communication and knowledge exchange between teachers on different educational levels.

Methodological portal is intended for preschool, elementary, grammar, special, vocational, language, art education and general educational teachers. It brings practical ideas to the classroom, provides a forum for discussing current topics in education and is an innovative and comprehensive environment for sharing teachers' experiences. It contains over 20 000 methodological, didactic and informative contributions. Daily offers new guaranteed materials and texts for teaching. All submissions are free under the Creative Commons license. Communicate with friends and colleagues at the social networking level, present your own portfolio and share ideas on the web in Digifolio. Discuss your views on the situation in the school environment, seek and offer advice and help, consult your experiences in the discussion module . Create pedagogical documents together, inspire with shared thematic plans, and take advantage of Wiki-enabled Creative Commons resources. The methodological portal offers materials that undergo reviews and proofreading in the so-called guaranteed modules. It also provides teachers with open environments for professional development and pedagogical use through non-guaranteed modules. Guarantees include Articles, DUM, Links, Audio Video, E-learning. Non-guaranteed are modules Discussion, Digifolio, Wiki, Blogs, Gallery.

DigiKoalice contributes to raising the digital literacy of all Czech citizens through the promotion of digital skills in education, and digital skills in the labour market. This in turn helps the Czech economy increase its competitiveness. DigiKoalice reaches this multipurpose goal by symbiotically connecting cooperating organizations, stakeholders and their activities

While the current way of teaching in general education focuses primarily on the user's approach to technology, future emphasis should be given to the development of computational thinking. Digital literacy should become an integrative part of all other disciplines. MŠMT has announced projects, under the ESF, with the participation of pedagogical faculties in developing teaching materials for the new approaches and topics to be incorporated into current updating of 10 year-old curricula. In 2017, the ministry also provided support to tertiary professional schools that will be engaged in the development of digital teaching material of foreign languages and vocational subjects and creation of massive open online courses (MOOC). A key priority of Czech digital education is to promote greater applicability of creative commons' licences in education, particularly for resources and teaching materials paid from public sources. At regional level, the

[52] I4wifi Specialized Training https://digikoalice.cz/akce/specializovana-skoleni-i4wifi-zari/
[53] Programming with Czechitas - C#: https://digikoalice.cz/akce/programovani-s-czechitas-c/
[54] Methodological portal RVP.CZ: https://rvp.cz/

goal is to create and build human resources – lecturers, network administrators and ICT professionals – to avoid the need buy in digital support[55].

Poland

As a Member State Poland was the first country that set up a Broad Agreement for Digital Skills under umbrella of European Commission's Grand Coalition for Digital Job in July 2013. In accordance with an agreement the Broad Alliance of Digital Skills was created. The purpose of this initiative is to inspire and support efforts to acquire e-skills according to the needs of the labour market and for digital participation in public life. Among the main strategic partners are the Polish Information Processing Society (PIPS), polish universities, associations and major ICT companies including UPC Poland, Microsoft and Cisco Systems[56]. The Broad Agreement for the Development of Digital Skills aims to support activities leading to universal digital education, the effective use of digital technology and acceptance of changes caused by its constant development. This will translate into specific actions taken by both public institutions and the private sector, by educational institutions and by employers. Common understanding and acceptance will be created to intensify efforts leading to the high level of use of digital technologies. The agreement will look for synergies between implemented initiatives, inspire new ventures, focus information on good practices, promote them in various environments even distant from the issues of digitization. By increasing awareness of the benefits, but also threats, it will act for the access to knowledge and information, dissemination of digital participation and acquiring skills necessary in all periods of life and areas of social and professional activity. The coalition pursues this by disseminating digital education and sustainable development of digital skills adapted to the dynamically changing labour market. It could be achieved through promoting and supporting activities leading to developing skills for effective use of modern information technologies as well as creating activities in the field of universal digital education.

Rapid development of digital techniques affects both economy model and social life. Universal digital skills are in a high demand for the dynamics of development and Poland's position among the European Union and World countries. According to scientists, over 60% of children starting education today will be working in jobs that do not yet exist . Over the past 10 years, the number of emails sent per day has increased from 12 billion to 247 billion. The TMT sector (Technology, Media, Telecommunications) in some European countries generates about 4.7% of GDP[57].

Filling the gap in order to comply the need for specialists with digital skills on the one hand, and high unemployment, on the other, the Grand Coalition for digital jobs was set up by European Commission. Thus, the establishment of the Broad Agreement on Digital Skills in Poland is a response to the European initiative and expression of a sense of responsibility for the future of Poland.

[55] https://www.cedefop.europa.eu/en/news-and-press/news/czech-republic-digital-education-challenges-and-actions
[56] http://eskills-monitor2013.eu/fileadmin/monitor2013/documents/country_reports/country_report_poland_ib.pdf
[57] http://umiejetnoscicyfrowe.pl/porozumienie/o-koalicji/

Principles of operation of the Broad Agreement for Digital Skills in Poland.

The Broad Agreement for Digital Skills, established on July 3, 2013, is an informal, voluntary association of institutions, organizations and companies that identify with its goals and work towards their achievement.

The purpose of the Agreement is to promote the full use of the potential of modern information technologies for the development of Poland, which significantly transforms virtually all aspects of the functioning of societies and economies, and to a large extent also of individual persons.

The agreement seeks synergies between implemented initiatives, gathers information on good practices and also disseminates them in environments that seem to be far from the issues of digitization. By increasing awareness of the benefits, but also threats, it helps to improve access to knowledge and information, acquire the skills necessary for a dynamically changing labor market, popularize digital participation in public life, and actively participate in culture.

The agreement refers directly to the idea of the Grand Coalition for Digital Workplaces and the Manifesto on Digital Skills as instruments of support for the Digital Agenda for Europe and the Digital Single Market Strategy. The establishment of the National Leader of Digitization and the Minister competent for Digitization took the initiative to establish him, obtaining support from a group consisting of companies and non-governmental organizations participating, among others, in the "Coalition of Mature @ 50 in the 50+ network".

The National Leader of Digitization operates in a network of national leaders of digitization, appointed by the governments of European Union member countries in response to the initiative of the European Commission. Their role is to transfer knowledge and experience related to the implementation of the tasks of the Digital Agenda for Europe and the Digital Single Market Strategy.

It makes sense to describe briefly the main activities of the coalition.

The Digital Skills Conference 2017 was organized under the patronage of the Ministry of Digital affairs and the Ministry of National Education. 16 regions in Poland decided to join the Broad Alliance of Digital Skills in Poland. Heads of the regional authorities formally signed the declaration during the Convention of Polish Marshals that was organized on 30th of October 2016[58]. This activity is done on an annual basis.

The activity LIST 100 was launched[59]. LIST 100 '2018 includes people reported by the Wide Alliance for Digital Skills who have significantly contributed to improving citizens' digital skills over the past year. It was the second edition of LIST 100.

“Develop creativity and analytical thinking, using programming to deal with practical and interesting tasks” is the slogan of “The League of Extraordinary Minds”[60]. It combines IT experts

[58] http://umiejetnoscicyfrowe.pl/porozumienie/
[59] http://umiejetnoscicyfrowe.pl/lista-100/lista-100-2018/
[60] http://lnu.org.pl/dla-kogo/uczniowie/

from different levels including IT companies, academic and non-academic structures as well as governments partners (associations, foundations, local governments, media, universities). The main goal is a cooperation in the field of promotion, marketing, organization of events, and teaching activities.

Digital Economy Forum a unique event combining a technological and expert perspective in the field of finance, banking, insurance and e-commerce.

The Digital Economy Forum[61] is a space where the digital world meets the world of modern economics, banking, finance, insurance and commerce. It is a meeting place for experts from global finance and accounting corporations, local banks, local government officials, politicians and representatives of the start-up environment, which is responsible for innovation in the sector.

II edition of the project "Digitized" focused on the problem of digital exclusion 45+ street residing. In 2018 it was a short-term computer workshops for the inhabitants of the region at the Marshal's Office. Workshop participants learned who can receive the card, how to properly complete the application and what benefits it brings[62].

"Information Society in Lodz" - a conference for participants of the Ucyfrowieni project[63]. The conference was addressed to the inhabitants of the region, including participants of the " Digitized " project , as well as people interested in raising digital competence from the 45+ generation.

“THE PRESchoolER CAN - JUNIOR CODING MASTERS” initiative[64]. Digital education, preparing for the conscious use of the opportunities offered by new media, is one of the areas of our activity. The purpose is support initiatives that prepare children and young people, but also adults, for the conscious and creative use of digital technologies. One of the programs supported by initiative is the Coding Masters activity.

Romania

The Romanian National Coalition (Skills4IT) is an open platform that includes a variety of stakeholders: policy makers, ICT companies, associations, training providers and NGO’s involved in the digital transformation. Activities are focusing on rolling out coding and IT classes in schools, organising cybersecurity courses and educational events. The coalition also provides training to upgrade digital skills of the labour force[65].

The Romanian National Coalition (Skills4IT) is one of the two main national initiatives, the second one is “Start Industry 4.0”. The main objective of Skills4IT initiative is to increase the digital skills among citizens. Whereas “Start Industry 4.0” is focused on increasing awareness among

[61] https://business.krakow.pl/informacje_na_temat_dzialan_i_projektow_umk/218489,1643,komunikat,digital_economy_forum_w_centrum_kongresowym_.html
[62] https://si.lodzkie.pl/polski/
[63] https://si.lodzkie.pl/
[64] https://centrumcyfrowe.pl/czytelnia/mistrzowie-kodowania-junior/
[65] http://coalitiait.ro/

employers on the need to train employees as well as competences of entrepreneurs. Skills4IT is an open platform it gathers different types of stakeholders, including policy makers, ICT companies, associations, training providers and NGOs. This initiative operates within the Grand Coalition for Digital Jobs, initiated by the European Commission in 2013. The platform organises activities which focus on coding and IT classes in schools, cybersecurity courses and other educational events. The activities are aimed at different groups: education (40%), ICT professionals (30%), general population (15%) and labour force (15%).

Project coordinator is APDETIC - Association of Producers and Dealers of ICT equipment. Main partners is Ministry of Communications and Information Society Ministry of National Education Union of IT Teachers of Romania Informal School for IT Association of Librarians and Public Libraries (ANBPR) HP Inc. Romania, IBM[66].

The initiative is still ongoing, with a number of activities completed (e.g. Hour of Code in high schools, IT Open Days in several ICT companies, computers donations for schools in rural areas and a foster home, etc.)

As was mentioned above Coalitia Skills4IT carries out activities that target the general population with the aim of increasing the digital skills. At the same time it is are perceived as highly useful by the industry associations. The main strength of Coalitia Skills4IT is that it focuses on the need to develop digital skills for both career and everyday life.

Memorandum with the Ministry of Communications and Information Society signed in March 2016. Many educational events such as: Hour of Code in high schools, InfoEducatia Summer camp, Cybersecurity sessions, Online Quiz and IT Open Days in several ICT companies. Computers donation for schools in rural areas and a foster home, campaign in partnership with ECOTIC and Rotary Club. Involvement in several awareness raising campaigns including: Safer Internet Day, All Digital Week.

One of the activities of Skills4IT coalition is Seminar General Data Protection Regulation. It is devoted to general concepts included in the new regulation (personal data, operator processing, processor, data subject), the material and territorial scope of application of the Regulation, the principles applicable to the processing of personal data and what is the practical impact. of these principles, their obligations, including from the perspective of new rights introduced for data subjects, as well as aspects related to risks and sanctions[67].

Another initiative is National Library of Romania seminar "THE ROLE OF LIBRARIES IN DIGITALTRANSFORMATION"[68].

This activity is focused on the issue of how Romania adapts to the demands of the digital economy from the perspective of the formation and development of digital human resources. The event is

[66] https://ec.europa.eu/information_society/newsroom/image/document/2019-32/country_report_-_romania_-_final_2019_0D3138B1-C7F4-5048-6DBAF910309CA4D9_61216.pdf
[67] http://coalitiait.ro/seminar-general-data-protection-regulation/
[68] http://coalitiait.ro/seminar-apdetic-anbpr-rolul-bibliotecilor-in-transformarea-digitala/

supported by the Association of Manufacturers and Distributors of Information and Communication Technology Equipment (APDETIC) in collaboration with the National Association of Librarians and Public Libraries of Romania (ANBPR) and the Skills4IT Romania Coalition.

Smart Transformation Forum 2017[69].

The initiative focused on two major topics:

- Smart Cities: Urban challenges. Strategies and recommendations.
- IoT: A Sustainable Development of a Smart Infrastructure.

In the debates, APDETIC highlighted the need for developing and upskilling of digital human resources in Romania.

In order to support the business environment and IT specialists, the Internet & Mobile World conference introduced the VI edition of the Cyber Security scene, called Security Stage,Prepare for the Digital Invasion #IMWorld[70]

IMWorld generates concrete value and contributes actively to the development of the economy, putting in direct relation the specialists with the need for digitization. One of the main objectives of the activity is to facilitate their access to IT technologies.

Safer Internet Day Event at the National College of Informatics "Tudor Vianu"[71]. Within the Skills4IT Coalition, the representatives of APDETIC, IBM and Junior Achievement Romania highlighted, presented to the students of the National College of Informatics Tudor important aspects regarding the risks and opportunities of the daily activity on the Internet and also the importance of knowing the procedures and measures for the protection of personal identity that anyone Internet user must know them.

[69] http://coalitiait.ro/smart-transformation-forum-2017/
[70] http://coalitiait.ro/prepare-for-the-digital-invasion-imworld/
[71] http://coalitiait.ro/eveniment-safer-internet-day-la-colegiul-national-de-informatica-tudor-vianu-bucuresti-15-martie-2017/

Conclusion. Implications of Results for Programme

This concluding section draws together the results from the desktop research, survey, and analysis to make recommendations for the programme that will form the core of the dComFra project.

Based on:

- an analysis of the European and world experience in shaping citizens' digital competences;
- applicable documents adopted in the European Union, in particular DigComp, DigCompEdu, and in international organizations, in particular, UNESCO (UNESCO's ICT Competency Framework for Teachers);
- a thorough analysis carried out in the framework of the dComFra project (WP 1.1, WP 1.2) and other projects, in particular MoPed, on the state of development of digital competences in the EU and in Ukraine;
- the Digital Agenda of Ukraine 2020 project;
- Concepts for the Development of the Digital Economy and Society of Ukraine for 2018-2020, adopted by the Decree of the Cabinet of Ministers of Ukraine of January 17, 2018 No. 67-p;
- other sources, discussions, experiences, conceptual provisions for the development of the Ukrainian Digital Competence Framework for DigCompUA citizens and the Ukrainian Digital competence framework for teachers DigCompEduUA are proposed.

DigCompUA is based on DigComp 2.1 as the most up-to-date version of the Digital Competence Framework for citizens, adopted in the EU and adapted in many EU countries, taking into account their national characteristics (egDigComp 2.2 AT, Austria).

To develop the DigCompEduUA framework, European approaches to the digital competency of citizens, including teachers and teachers, have been analyzed: DigComp 2.1, DigCompEdu, UNESCO ICT Competency Framework for Teachers; Erasmus + projects MOPED, Online4Edu, related to the topic being researched.

To adapt DigComp 2.1 and DigCompEdu to Ukrainian realities, the national, cultural, educational and economic features of Ukraine have been taken into account.

Ukrainian National Digital Coalition (UNDC) was created. UNDC goals and objectives as well as main documents are represented.

Appendixes

Appendix 1: Memorandum UNDC signed

МЕМОРАНДУМ ПРО ВЗАЄМОРОЗУМІННЯ

ЩОДО СТВОРЕННЯ УКРАЇНСЬКОЇ НАЦІОНАЛЬНОЇ ЦИФРОВОЇ КОАЛІЦІЇ

«Коаліція Цифрової Трансформації»

м. Київ 05.09.2019

Цифрова трансформація економіки та суспільства є одним з істотних факторів розвитку України, підвищення продуктивності та економічного зростання, створення робочих місць, підвищення якості життя громадян та розвиток демократії. Однією з вихідних рамкових умов гармонізації з цифровими ринками країн ЄС та Східного партнерства є наявність цифрових навичок, а цифровий розвиток відіграє ключову роль у прискоренні економічного і соціального зростання країни загалом.

Високо оцінюючи важливість співпраці та усвідомлюючи необхідність розвитку цифрової економіки та суспільства України, державні та приватні установи, організації, асоціації, громадські організації (надалі Партнери) уклали цей Меморандум про наступне:

Стаття 1. Мета

Сформувати Українську національну цифрову коаліцію «Коаліція цифрової трансформації» (надалі — Національна коаліція), діяльність якої буде спрямована на консолідацію та координацію ініціатив і зусиль Партнерів у галузі цифрового розвитку та інтеграції України до Європейського цифрового простору (Єдиного цифрового ринку ЄС).

У рамках цього Меморандуму Партнери погоджуються співпрацювати для розвитку цифрового простору та підтримки набуття цифрових навичок усіма верствами населення в Україні, а також щодо посилення ролі цифрових технологій для економічного зростання країни.

Стаття 2. Напрями співпраці

Партнери домовились взаємодіяти у таких напрямах співпраці:

2.1. Поширення інформації про сучасні цифрові технології та практики їх використання.

2.2. Створення та розвиток відповідної інфраструктури для набуття та покращення цифрових навичок молоді та суспільства загалом задля підвищення рівня зайнятості населення та ефективного використання цифрових можливостей:

- упровадження цифрових навичок та технологій до системи освіти для підготовки конкурентоспроможного молодого покоління на внутрішньому та міжнародному ринках праці;

- розвиток цифрових навичок для підтримки ефективного управління в державному та приватному секторах економіки;
- промоція цифрових технологій та підвищення обізнаності про важливість цифрових навичок та компетентностей;
- подолання цифрового розриву, забезпечення рівного доступу громадян до цифрових сервісів завдяки необхідному рівню цифрових компетентностей.

2.3. Гармонізація із Цифровим порядком денним (Digital Agenda) та Єдиним цифровим ринком (Digital Single Market) Європейського Союзу:

- розробка пропозицій до покращення законодавства з питань цифрового розвитку та оновлення суміжних законів відповідно до стандартів та ключових директив Європейського Союзу;
- сприяння впровадженню комплексної національної цифрової стратегії в Україні – «Цифрова програма/Digital Agenda України» та створенню «Стратегії цифрової трансформації України».

2.4 Покращення доступу до цифрової інфраструктури та мережі Інтернет:

- сприяння подоланню цифрового розриву, сприяння забезпеченню рівного доступу громадян до Інтернету та цифрових сервісів;
- сприяння розвитку широкосмугового доступу до Інтернет.

2.5. Сприяння інтеграція цифрових технологій у процеси виробництва, або цифровізація промисловості:

- сприяння інтеграції цифрових технологій у практику діяльності українського бізнесу та створення необхідних умов для переходу до втілення на практиці концепції «Індустрія 4.0».

2.6. Сприяння розвитку населених пунктів та регіонів:

- розвиток міст на основі концепції «смарт-сіті», покращення системи міського управління на основі інтеграції інформаційних систем та даних;
- визначення економічних моделей розвитку міст з урахуванням не тільки природного, промислового, а й людського потенціалу;
- підтримка розвитку цифрової інфраструктури у сільській місцевості та розробки цифрових сервісів для жителів сіл і агросектору та формування концепції «розумне село»;

2.7. Цифровізація науки, розвиток українських е-інфраструктур;

2.8. Сприяння розвитку креативних індустрій, систем кібербезпеки та інших напрямків цифрової трансформації України;

2.9. Розвиток міжнародної співпраці у сфері розвитку цифрових технологій та цифрових навичок.

Стаття 3. Цілі та завдання Національної коаліції

Усі цілі та завдання Національної коаліції, відповідно до напрямів співпраці, визначаються в Планах дій на окремі періоди, які погоджуються

простою більшістю партнерів і реалізуються ними у межах повноважень кожного з них на підставі та у спосіб, що визначені чинним законодавством України.

Стаття 4. Інші положення

4.1. Національна коаліція ґрунтується на принципах рівноправності, добросовісності та добровільності.

4.2. Започаткування Національної коаліції не передбачає за собою створення жодної юридичної особи, а також взаємних майнових та фінансових зобов'язань між Партнерами.

4.3. Кожен Партнер Національної коаліції зобов'язується співпрацювати, брати участь у розробці документів, ініціатив та проектів розвитку сучасного цифрового інформаційного суспільства, пропагуючи переваги ІКТ та заохочення до їх використання.

4.4. Завдання та діяльність Національної коаліції визначаються та коригуються на зустрічах Партнерів, що відбуватимуться не рідше, ніж один раз на півроку.

4.5. Конкретні цілі та завдання можуть бути розширені та описані у Плані дій Національної коаліції охоплюючи не лише вищезазначене, а й поширюватись на цифровізацію інших галузей економіки та суспільства.

4.6. Національна коаліція відкрита до співпраці з державними, освітніми, науковими установами, бізнес компаніями, асоціаціями, а також громадськими об'єднаннями, які прагнуть приєднатись до досягнення цілей Національної коаліції. Порядок розширення Національної коаліції, шляхом прийняття нових членів, буде визначений Партнерами в окремій письмовій угоді.

4.7. Припинення партнерства з Національною коаліцією відбувається шляхом письмового повідомлення інших Партнерів за 3 місяці

4.8. Даний Меморандум діє протягом 5 років з моменту його підписання та може бути продовжений за письмової згоди всіх Партнерів.

Від імені Партнерів Національної коаліції в Україні:

Партнери-Координатори:
Громадська спілка «ХАЙ-ТЕК ОФІС УКРАЇНА»
Всеукраїнська громадська організація «Українська асоціація фахівців інформаційних технологій»

Партнери:

Міністерства та державні установи:
Державна інноваційна фінансово-кредитна установа
Сумська обласна державна адміністрація
Виконавчий комітет Херсонської міської ради

Університети:
Київський національний університет імені Тараса Шевченка
Київський національний університет культури і мистецтв
Донецький національний технічний університет
Кременчуцький національний університет імені Михайла Остроградського
Національний політехнічний університет «Харківський політехнічний інститут»
Прикарпатський національний університет імені Василя Стефаника
Харківський національний університет радіоелектроніки
Чернівецький національний університет імені Юрія Федьковича
Сумський національний аграрний університет
Медичний інститут Сумського державного університету
ДННУ «Академія фінансового управління»
Кафедра романської філології та порівняльно-типологічного мовознавства, Київський університет ім. Бориса Грінченка

Асоціації та громадські організації:
Асоціація підприємств інформаційних технологій України
Асоціація «Телекомунікаційна палата України»
Асоціації підприємств промислової автоматизації України
Громадська спілка «Kharkiv IT Cluster»
Громадське об'єднання «Український союз промисловців і підприємців»
Громадська організація «Агенція Європейських Інновацій»
Громадська організація «Поліський фонд міжнародних та регіональних досліджень»
Громадська організація «Українська Федерація Інформатики»
Інтернет асоціація України
Асоціація «ІТ України»
Асоціація українських банків
STEP IT Academy
«Експертно-консультативний комітет з цифрових технологій в освіті при МОН України»
«Соціальна ініціатива «ІТ-Школяр»
Громадська спілка «STEM-коаліція України»
Український національний комітет міжнародної торгової палати ICC Ukraine
Громадська організація «Платформа здоров`я»
Інтраком Телеком Україна
Jet Technolodgies
Eccentex Coporation
ТОВ «лайфселл»
Hi Tech Cluster NGO
Softcube
Фундація «Національного розвитку та інновацій»
ТОВ «АКСІОНТ»

ГС МСБ «Система самопорятунку»
ПНЗ «Міжнародна Кібер Академія»
Громадська організація «Науково-дослідний центр правової інформатики»
Платформа відкритих інновацій REACTOR
Агенція регіонального розвитку Івано-Франківської області
ТОВ «ЄВРОМД Україна»