THE NATIONAL DIGITAL SKILLS STRATEGY OF THE SLOVAK REPUBLIC AND THE ACTION PLAN FOR THE YEARS 2023 - 2026

Executive Summary

The National Digital Skills Strategy of the Slovak Republic and the Action Plan for the years 2023 – 2026 (hereinafter referred to as the 'NSDZaAP') are based on, directly follow and at the same time take into account the outputs contained in the national documents such as:

- The Strategy and Action Plan for Improving Slovakia's Position in the DESI Index by Year 2025 (hereinafter referred to as the 'DESI strategy')
- The 2030 Strategy for Digital Transformation of Slovakia (hereinafter referred to as the 'Strategy')
- The Action Plan for the Digital Transformation of Slovakia for the Years 2019 – 2022
- The Action Plan Draft for the Digital Transformation of Slovakia for the Years 2023 – 2026
- The Strategy for the Lifelong Learning and Guidance for the Years 2021 – 2030
- The Action Plan for the Strategy of the Lifelong Learning and Guidance for the Years 2022 – 2024
- The Programme of Informatisation of Education Until the Year 2023 and the Corresponding Action Plan.

The NSDZaAP also reflects the priorities established in the Recovery and Resilience Plan of the Slovak Republic, in the Research and Innovation Strategy for Smart Specialisation of the Slovak Republic 2021 – 2027 (hereinafter referred to as 'RIS3'). It also reflects the objectives of the Digital Europe Programme, the objectives set in the Digital Compass of the European Union (hereinafter referred to as 'EU'), the recommendations of the Organisation for Economic Cooperation and Development cooperation and development (hereinafter referred to as 'OECD') and other key strategic documents in the field of digitalisation regarding the development of human capital from the point of view of digital competencies and skills.

The need for this document is also proven by the intensive deployment of digital elements and systems in almost all areas of the economy, industry, and society. This creates pressure for expansion basic labour literacy of the workforce with new digital skills and competencies. However, it is not only about current, but also the future workforce. Digitalisation affects the lives of all citizens without distinction of age, gender, or geographic location.

Knowledge of digital skills at the adequate level is a necessary prerequisite for applicability of the individual in the constantly changing labour market. Without appropriate knowledge of the digital skills in the near future the possibilities of the individual mainly to find a job and communicate electronically will be significantly limited.

Therefore, in the acquisition of the knowledge and skills, active support is necessary not only from the state, but also other representatives of companies and organisations with the aim of building digital literacy and competencies not only for the professional but also for the lay public.

The material was created through the cooperation of several institutions and experts from the practical field by collecting stimuli and comments from experts from the academic and private sectors, municipalities, individuals, ministries and civic or interest associations. It is also necessary, that while using the implementation of the needed measures the principle of transparency, openness, and participation towards the general as well as professional public was also applied to facilitate the effective fulfilment of the set goals and achieving expected expectations. During the creation, existing analyses made by partners,

state and international institutions over the years, were also used. Within the creation of the document the OECD was consulted and provided the document with a set of substantive comments. As well as interim findings from the European Commission Initiative regarding National coordinators for education and skills development was used. The document was also based on the findings of the OECD, that dealt with the skills in Slovakia during the year 2019. When in cooperation with Slovak institutions, it prepared the National project skills strategy in the Slovak Republic[1], which identified three priority areas:

- Equipping younger and older generations with the right skills needed in the future
- Ensuring inclusion in developing skills
- Strengthening the management of the skills strategy

At the time, the OECD, in cooperation with the government of the Slovak Republic (hereinafter referred to as 'SR'), identified four priority areas for improving the level of skills utilisation in Slovakia, which are also addressed by the NSDZaAP:

- Priority 1: Strengthening youth skills
- Priority 2: Reducing skills imbalances
- Priority 3: Promoting higher participation rates in adult education
- Priority 4: Strengthening the use of the skills in the workplace

The role of the EU in terms of supporting the digital transformation is mainly being strengthened by its strategic direction of the member countries. The long-term vision of the SR is therefore updated in case of significant changes, which is also reflected on the NSDZaAP.

In September 2020, the European Commission (hereinafter referred to as 'Commission') proposed a new Digital Action Plan of education for the years 2021 – 2027. This action plan states as its main guiding principles of digital literacy for life and the need to include basic digital skills in the core of transferable skills that each of us should have. In accordance with these principles, the Commission proposes a range of activities to support digital education and the development of digital competencies and skills.

After taking into account the analysis of the facts and the available information, six key priorities were identified within the NSDZaAP in the area of digital skills that needed to be improved and further developed in the context of SR. The output of the working group's activities is a draft of the analytical part and measures for the NSDZaAP, which should be used as a basis for the creation of a legislative environment and proposals for the preparation of project challenges.

The NSDZaAP is divided into six areas of priority that cover individual chapters dealing with key areas. The main chapters consist of:

- Institutional background ('Governance model')
- ICT specialists
- Digital skills of young people and educators in the educational process
- Digital skills of active labour market participants
- Share of girls and women in ICT

---

[1] https://www.oecd.org/skills/centre-for-skills/OECDSkillsStrategySlovakRepublicReport%20SummarySlovak.pdf

- Digital divide and digital exclusion

The NSDZaAP reaffirms the intention to implement digital transformation as the highest priority. The recent COVID-19 pandemic has further highlighted the need to rapidly achieve digital ambitions, which the SR has within the EU member states. Digital technologies represent an immense potential for the growth for the country and at the same time an opportunity to become one of the most powerful economies in Europe.

The NSDZaAP contains measures that can be implemented in the medium term, already from the beginning of 2023 to the end of 2026. However, the successful fulfilment of the measures in the action plan requires cooperation not only of public administration bodies, civil society and socio-economic partners, but also of EU member states.

The NSDZaAP implementation deduction will be submitted to the Slovak government for the first time on September 30, 2023. From 2024 to 2027 the Government of the Slovak Republic will be presented with a deduction for the implementation of the NSDZaAP for the relevant previous calendar year, always on September 30.

The Ministry of Investment, regional development and informatisation of SR (hereinafter referred to as the 'MIRRI SR') is responsible for monitoring the fulfilment of individual measures and setting of other measures for the following period.

Within the framework of the DESI Strategy, the following vision was presented for the human capital dimension. The NSDZaAP fully identified with this vision and represents a strong support tool through a wide range of measures for its fulfilment.

> *In the context of the Digital Economy and Society Index (hereinafter referred to as 'DESI'), it continues to be a strategic target in terms of human capital to achieve at least the EU average in all indicators of this dimension for Slovakia. However, given the nature of the economy and the significant need for an increase competitiveness of Slovakia, the main goal in the horizon of the next 3 to 5 years will be to improve the DESI ranking position abo the EU average.*

Achieving this vision will require maximum political support and early initiation of reforms, which SR has been putting off for years.

Through the MIRRI SR, the achievement of measurable goals of individual measures will be monitored in the digital agenda, which will be based on NSDZaAP, national legislation and relevant standards, as well as leading European indexes. The MIRRI SR will set up a cooperation with the relevant departments and possibly by the professional public, measurable indicators for the set goals and the method of data collection for their evaluation at regular intervals. This will thus systematically monitor the implementation of the NSDZaAP measures and update its implementation plan.

To carry out effective measures in the mentioned priority areas is from the short term necessary a strengthened institutional background, which represents the basis of the innovation ecosystem. The proposal is based on priority recommendations and commitments of European policies or directly from EU member states agreements. The success of the NSDZaAP will depend mainly on more effective international cooperation and sharing examples from good practice. At the same time, it is necessary that

the affected parties identify with the goal. In order to achieve the goal, it is important that the relevant parties have the opportunity to adapt their own structures and institutional scope.

The goals of the NSDZaAP are based on the visions of the SR defined in the national strategic documents, as well as strategic documents at the EU level, DESI, or current conversations with representatives of the Commission in within the recently established institution of National Coordinators for digital learning and skills. The goal of the NSDZaAP is:

- strengthening institutional background and creating an effective coordination mechanism for the area of digital skills within public administration, as well as in connection with the professional public and the academic community or the business sector
- creation of conditions and support of activities to increase the number of specialists in information and communication technologies (hereinafter referred to as 'CT')
- development of digital skills of young people and educators, at all levels of the educational process
- development of digital skills of active participants in the labour market, support for raising the qualification ('upskilling'), or retraining ('reskilling')
- creating conditions and supporting activities to increase the share of girls and women in the IT sector
- reduction of the so-called digital divide and minimizing the negative impacts of digital exclusion.

These goals are elaborated within individual thematic areas and defined at the level of individual subchapters. Concerning the fulfilment of these strategic goals, they are subsequently identified measures, the success of which will be monitored through the process of the SR within the measurable indicators.

The measures, which are based on these goals, are proposed in the individual chapters, that can be reviewed and located at the beginning of the related chapter as well as in the summary table at the end of the document.

The National Cybersecurity Strategy for the years 2021 to 2025[2] is dedicated to the education of digital skills in the field of cyber security and cyber strategy. The initial as well as target state of professional education in the field of cyber security, building security awareness and basic security education in the area of safe behaviour on the Internet, including the determination of steps leading to the achievements of the established goal is described in the section well-educated professionals and well-educated public. The action plan of the National Cybersecurity Strategy for the years 2021 to 2025[3] specifies the specific tasks and activities necessary to achieve a targeted strategy.

---

[2] https://www.nbu.gov.sk/wp-content/uploads/kyberneticka-bezpecnost/Strategia_kybernetickej_bezpecnosti_2021.pdf
[3] https://www.nbu.gov.sk/wp-content/uploads/kyberneticka-bezpecnost/Akcny-plan-kybernetickej-bezpecnosti.pdf

Terminology

Key terminology used in the following text:

Knowledge is a set of facts, figures, concepts, ideas, and theories that are already established, and contribute to the understanding of a certain area of topic.

Ability is a psychological characteristic of the personality, which is a condition (prerequisite) of being successful in performing a certain complex activity, e.g., the ability to think abstractly or the ability to learn. The measurement of abilities depends on innate assumptions (aptitudes) and acquired assumptions (e.g., acquired via learning) for the performance of a certain activity.

Skill is the ability and competence to perform processes and use existing knowledge to achieve results. It is a specialised ability to perform a certain specific activity, to solve a certain specific problem, e.g., read, or take notes. It follows that the ability to learn consists of a multiskilled system. A skill of intellectual nature is usually also called capability.

Basic skills such as the ability to read write and speak in the Slovak language or languages of the national minorities, the use of mathematics, and those cognitive activities, which are search, research, exploring, and discovering, and information and communication technologies within the digital competencies necessary for proper function at work and in society.

Attitude is an individual's character and opinion, on which his action or reaction to thoughts, people, or situations are based on.

Competence is a combination of knowledge, skills, and attitudes. It is an ability (behaviour activity or a set of activities) characterized by excellent performance in some areas of activity. Competencies are characteristic elements of activity that occur much more frequently and consistently in achieving outstanding performances than in achieving average and poor performances in a certain area. A competent person in a certain field is usually considered to be someone, who has the abilities, motivation, knowledge, skills, etc. to qualitatively do what is required to be done in the respective field.

Key competencies are the most important competencies from a set of competencies. They are suitable for solving a whole series of mostly unpredictable problems that will enable the individual to successfully cope with rapid changes in work, personal and social life.

Lifelong learning represents activities through which knowledge, skills, and competencies are acquired for employment on the labour market, personal fulfilment and health, active and responsible citizenship, and social inclusion of an individual into the society. Lifelong learning is the basic principle of upbringing and education applied in the educational system of the SR constitutes formal education, non-formal education, and informal learning. It allows everyone to supplement, expand and deepen acquired education or to requalify or satisfy their interests.

Digital literacy is a selected set of demonstrated abilities of an individual confidently, critically and to use digital technologies responsible for living, learning, and working in the digital society.

Adult education includes all general and specialised activities carried out within the framework of formal education, non-formal education, and informal learning.

Formal education is the education, which is carried out within the framework of the system of schools according to their special regulations and accredited study programs at universities by education and training. Education is structured as a curriculum, while it is covered by a certain institution (The Ministry of Education, Science, Research and Sports of the SR (hereinafter referred to as 'MŠVVaŠ SR')) After completing the formal education, the graduate receives a document such as a certificate, academic degree, etc.

Non-formal education is the education that takes place in educational institutions outside of the formal system (hereinafter referred to as 'educational institution'). Non-formal education allows you to get a qualification that corresponds to the relevant level of the Slovak qualification framework, supplement it, to extend or deepen qualifications gained through formal education or to satisfy interests and gain the ability to participate in the life of civil society. It is about voluntary and conscious learning beyond the framework of formal education. It is intended for different target groups, without age restrictions. In non-formal education, the key goal, as well as sub-goals of the education programme, are individually connected activities with which we can work toward the goal.

Informal learning is the result of everyday activities and self-learning that is not planned structured, or deliberate.

The digital divide ('digital divide') is the gap between people who have access to information technologies and can use them effectively and those who do not have access to them or have this access restricted. In addition to physical access to technology and resources, this concept includes the necessary skills for the effective use of information and communication technologies.

1. Introduction

The human capital is extremely important and has an impact not only on other DESI dimensions but above all on the future of the country itself.

The drain of brains abroad for better educational opportunities or living conditions is one of the most urgent problems of the Slovak education system, which is necessary to address within the improvement of the position of Slovakia in DESI. Also, according to the Institute's latest survey of the educational policy of the MŠVVaŠ SR, mainly the most successful graduates go abroad. The consequences are evident and negative also for the Slovak economy. Thus, Slovakia loses the best students, the labour market loses those most qualified for labour, and science loses potential doctoral students and scientists. In the event that this negative trend in Slovakia will not be reversed, the consequences for the whole society will be unbearable.

Slovakia urgently needs to take measures that will not only support the study of information and communication technology, science, engineering and mathematics (hereinafter referred to as 'STEM') fields, but especially measures that will motivate students to pursue such studies in their home country.

A critical element of the successful implementation of the NSDZaAP is the regular updating of the content and scope of curricula in areas of digital skills and IT at all levels of education. This is the only way we can do it to ensure that the education corresponds to the current requirements of the labour market, the state of the currently available and used technologies, and creates the potential for the use of human capital from Slovakia in development, deployment, and management of digital technologies.

The first step is the proposed curriculum reform for primary schools, which is part of the already approved one of the Recovery and Resilience Plan of the SR, specifically component 7: EDUCATION FOR THE 21st CENTURY. That's why it is important that the national strategy is following the Recovery and Resilience Plan of the SR and provides substantive, structural, and formal support in its implementation.

We consider it of the utmost importance to consider the importance of digital skills and incorporate them building into the education of both children from an early age, as well as adults within the framework of quality lifelong learning and increasing their opportunities in the labour market, or keeping a job or transition to another job (the impact of digitalisation on the labour market is dealt with in a research report "The impact of robotization, automation and digitalisation on the labour market in the SR. Results of an empirical survey" prepared by the Institute for Work and Family Research on the basis of a contract with the Ministry of Labour, Social Affairs and Family of the SR[4] (hereinafter referred to as 'MPSVR SR')). Acquiring digital skills must be at the same time available to all residents of Slovakia, regardless of age, education, or the fact that they belong to disadvantaged groups of the population. In addition to the effective use of digital technologies it is also necessary to focus on the area of building awareness about basic literacy in the areas of cyber security, media literacy, and increasingly necessary digital hygiene skills.

Another area is women and their share among ICT specialists. In Slovakia, they represent only 13.3% of ICT specialists compared to the EU average of 17.7%. Despite the fact that in recent years Slovakia has succeeded in increasing the proportion of women studying ICT fields, it is still insufficiently promoting to women the attractiveness and potential of their study and professional application in IT and the digital

---

[4] https://ivpr.gov.sk/vplyv-robotizacie-automatizacie-a-digitalizacie-na-trh-prace-v-sr-vysledky-empirickeho-prieskumu-daniela-keselova-rastislav-bednarik-daniel-gerbery-darina-ondrusova-2022/

economy. We must remove persistent disinterest and enable women to fully participate and implement within the framework of the digital sector by effectively promoting ICT fields of study and job opportunities.

We must not forget about the seniors, who represent one of the population groups that Slovakia lags behind the most in digital skills. This fact was particularly evident during the COVID-19 pandemic, during which measures were defined in an effort to limit personal contact between people, preventing many seniors from fully participating in social and economic life. Conducted research[5] indicates that forced isolation and loneliness during the COVID-19 pandemic can have an impact on mental health and overall deterioration of health in seniors with a possible consequence of increased mortality compared to the normal situation outside of the COVID-19 pandemic. The digital skills of seniors have their application and importance not only during the COVID-19 pandemic but also in the perspective of the issue and support of active aging, i.e., absence of digital literacy of older people can worsen their access to public resources, and services, necessary information, tools of social participation, in paid employment or during individual or socially beneficial activities of a wide range.

During the implementation of NSDZaAP, ethical principles, the protection of human rights, and dignity will be emphasized and applied. Emphasis will be placed on strengthening social inclusion, integration of marginalized groups, or protecting the most vulnerable.

2. The current state analysis
Digital skills and Europe

The Commission began to perceive the importance of digital skills a few years after the turn of the millennium and already in the year 2009 introduced the first **Skills Week**, an activity directly intended to support digital awareness skills in the EU. EU member states use the possibilities offered by this activity and its financing differently. Some countries support the start-up phenomenon of social networks, while others go further. Slovakia has been coming as an example for several years thanks to the Digital Coalition initiative (more about the Digital Coalition initiative on page 18) by offering the general public a specific activity called the IT Fitness test. Since 2009 behind this activity stands the Academic team of doc. Ing. František Jakab, PhD., together with the IT Association of Slovakia, which later initiated the establishment of the Digital Coalition and the National Coalition for Digital Skills and Jobs of the SR (which took over the patronage of the **IT Fitness test[6]**). The IT Fitness test not only draws attention to the meaning of digital skills necessary for application in the labour market and society but also directly measures their level among the involved participants and aims to improve them. For the last 11 years, in addition to testing the level of digital skills, it has been at the same time giving pupils, students, and adults the answer to the question - of what skills will be required in the future by various job positions or studies. Thanks to the persistence of its creators, the IT Fitness test is updated every year and to this day more than 350,000 inhabitants of the SR and tens of thousands abroad have already passed it. The IT Fitness test has won several European awards. In 2022 it is already available in five language mutations and is ongoing in all of them V4 countries. Pan-European tools that schools can use for the overall evaluation of the inclusion of

---

[5] https://www.mirri.gov.sk/wp-content/uploads/2019/09/Digi_chudoba_final.pdf
https://www.ivo.sk/buxus/docs//publikacie/subory/Digitalna_gramotnost_2022.pdf

[6] https://itfitness.eu/sk/

digital technologies into the educational process and self-assessment of teachers' digital skills are SELFIE and SELFIE for TEACHERS. Both tools were created based on the initiative of the European Commission and are free of charge and available in the Slovak language. The first mentioned, SELFIE, uses a 5-point questionnaire a scale for obtaining the opinions of school leaders, teachers, and students on an anonymous basis, and collects the results in an interactive report that can identify the school's strengths and weaknesses. The SELFIE report can be used for self-reflection and as the beginning of a discussion between several actors of the school on creating an action plan for the school's digital transformation. The second tool, SELFIE for TEACHERS, directly builds on the European Framework of Digital Competence for Educators (DigCompEdu). Through the questionnaire, teachers can find out the level of their digital competencies (from A1 to C2) and at the same time, they can find the level of their own competencies and improve it based on the recommendations found in the feedback report.

The new skills and new jobs agenda are one of the seven main initiatives of the EU's long-term strategy: **Europe 2020[7]**, which entered into force in 2010. It appeared in the material's first estimate of the state of digital skills of the population: *"Approximately 80 million people have low or basic skills, but lifelong learning mostly benefits the more educated. By 2020, up to 16 million jobs will require advanced skills, while the demand for low skills will drop by 12 million jobs. Achieving a longer working life will also require the possibility of acquiring and developing new skills throughout life[8]."*

The year 2013 brought a new European digital competence framework for citizens known as **DigComp[9]**, which explained the concept of "digital competence" and offered the opportunity to evaluate your own competencies. DigComp version 2.1[10] included a comprehensive description of knowledge, skills, and attitudes that people need in five areas of competence: information and data literacy; communication and cooperation; digital content and content creation; troubleshooting and security. DigComp 2.1 also established 21 competencies of 8 different levels of professional competence built on the structure and taxonomy of the European Qualifications Framework (EQF), from "basic" to "highly specialised". March 2022 brought the long-awaited DigComp update version 2.2[11], which responds to rapid development in the field of artificial intelligence, the Internet of things, and data. The material brings 250 new examples of knowledge, skills, and attitudes. The importance of digital skills in the field of education is also enhanced by the existing version of DigCompEdu[12].

The Commission deals with professional ICT skills in more detail in the e-Competence material Framework[13].

This document was published as the European standard EN 16234-1: e-Competence Framework (e-CF). Common European framework for ICT professionals in all industries. Part 1: Framework. The document contains the European Competence Framework (hereinafter referred to as 'e-CF') covering 41 competencies that are applied in information and communication technology occupations, using a common language for competencies, skills, knowledge, and competence levels (EQF) understood across

---

[7] https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF
[8] Communication from the Commission: Europe 2020. A Strategy for Smart, Sustainable and Inclusive Growth, p. 19
[9] https://publications.jrc.ec.europa.eu/repository/handle/JRC83167
[10] https://publications.jrc.ec.europa.eu/repository/handle/JRC106281
[11] https://publications.jrc.ec.europa.eu/repository/handle/JRC128415
[12] https://publications.jrc.ec.europa.eu/repository/handle/JRC107466
[13] https://itprofessionalism.org/about-it-professionalism/competences/the-e-competence-framework/

Europe. e-CF was created and maintained under the auspices of the European Committee for Standardization (hereinafter referred to as 'CEN'). Within CEN, the European Technical Commission is responsible for maintaining the European e-CF standard CEN/TC 428 "Professions for information and communication technologies (ICT). In the year 2019, a new e-CF version was published that reflects its importance for competitiveness, transparency, and convergence of the European environment of IT skills in a global digital environment. DigComp and e-CF are mutually complemented. Since 2015, **Eurostat** has also been dealing with the measurement of digital skills regularly. The dedicated pointer (DG CNECT) in cooperation with users was developed by the Commission based on the Digital Competence Framework and in the context of the Digital Single Market Strategy[14]. Digital skills are indeed the foundation for the global competitiveness of economies and significantly support employment and growth. The Internet plays a key role in achieving the goal of obtaining high-quality education for long-term sustainable development at all levels of education including education in issues such as media competencies.

In the year 2015, the OECD published a study on **the Importance of digital skills[15]**. This material pointed to the fact that people without digital skills do not participate in the labour market, while if they work so their salary is usually lower than that of people who have digital skills.

Given the fact that many employees use ICT regularly without adequate skills, The OECD prepared a short overview of **the Skills for a Digital World[16]** in 2016, communicating the clear need for policy reforms related to the labour market and skills.

In 2016, the Commission adopted a new **European Skills Agenda[17]**, which aims to promote several measures to ensure the availability of the right training and skills support. So that the employees are equipped with the skills needed in the modern work environment, including the promotion of digital skills.

Additional measures of digital skills are included in the skills survey conducted within the **framework of the OECD programme for the international assessment of competencies for adults[18]** (hereinafter referred to as 'PIAAC') and in DESI. However, these different indicators do not provide the same results and are not always comparable due to different methodological approaches.

More often the term "digital divide" or "digital gap" defines the negative phenomenon in connection with the digital transformation of the economy and society. Adults with lower levels of digital skills face problems when looking for a job and when starting a job, they earn less than adults with higher levels of digital skills. In February 2020, the Commission announced in **Shaping Europe's Digital Future[19]** highlighted that more than 90% of jobs already require at least basic digital skills, but also pointed out that the need for digital skills goes far beyond the labour market.

It emphasized even more strongly the importance of basic digital skills for citizens worldwide during **the COVID-19 pandemic**. In **2020**, **the Commission[20]**, represented by its Vice-President Margrethe Vestager,

---

[14] https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A52015DC0192

[15] https://read.oecd-ilibrary.org/education/does-having-digital-skills-really-pay-off_5js023r0wj9v-en

[16] https://www.oecd.org/els/emp/Skills-for-a-Digital-World.pdf

[17] https://education.ec.europa.eu/news/2016/0610-education-skills-factsheet_en.htm

[18] https://education.ec.europa.eu/news/2016/0610-education-skills-factsheet_en.htm

[19] https://commission.europa.eu/select-language?destination=/node/9

[20] https://ec.europa.eu/commission/presscorner/detail/sk/IP_20_1025

stated: *"The crisis caused by the coronavirus has shown how important it is for citizens and businesses to be connected so they could communicate with each other online. We will continue to work with the member states to identify the areas where more investment is needed so that all Europeans could use the benefits of digital services and innovation."*

In the context of the **Recovery Plan for Europe[21]**, which was adopted on 27 May 2020, DESI will provide a country-specific analysis, so that member states can follow up on the digital recommendations of the European semester and set priorities for reform and investment needs. This will make it easier for them to access the €560 billion Recovery and Resilience Facility. This tool will provide member states with financial means to increase the resilience of their economies and ensure that investments and reforms support green and digital transformation.

The Commission adopted **the new Erasmus programme for the period 2021-2027[22]**, which includes basic and advanced digital skills, and which basically follows the programme from the previous period. The new programme will also support professional education and training, digital literacy, education of adults, and digital skills with special emphasis on advanced digital skills.

In September 2020, the Commission proposed a new **Digital Education Action Plan for the years 2021-2027[23]**. Among its main principles, the Action Plan states that **digital literacy is essential for life and that basic digital skills should become part of the core of transferable skills that everyone should have.** Following these guiding principles, it proposes a range of activities such as the utilization of the Erasmus+ programme to support digital transformation plans of educational institutions, the development of the European Digital Skills Certificate, and for it to be recognized and accepted by governments, employers, and other stakeholders across Europe.

The EU Council strengthened the commitment of all member states to ensure that all young people up to 25 years of age received a high-quality offer of employment, further education, apprenticeship, or internship within four months of becoming unemployed or leaving formal education. In November 2020 the Council strengthened its 2013 recommendation to increase the age group to include all young people under 30 years of age. The Council also recommended that Member States use DigComp to assess the digital skills of all young people registered in Youth Guarantee, who are unemployed, not in education, or are not in vocational training. The goal is to offer specialised training to improve digital skills to all young people, who need it[24].

At the same time, it is necessary to perceive the importance of digital skills from the point of view of balancing socio-economic differences between different social groups. Realized studies[25] show that pupils

---

[21] https://commission.europa.eu/strategy-and-policy/recovery-plan-europe_en

[22] https://www.erasmustrainingcourses.com/2021-2027-erasmus-programme.html#:~:text=The%20new%20Erasmus%2B%202021-2027,social%20cohesion%2C%20to%20driving%20innovation%2C

[23] https://education.ec.europa.eu/sk/focus-topics/digital-education/action-plan

[24] https://eur-lex.europa.eu/legal-content/SK/TXT/?uri=uriserv:OJ.C_.2020.372.01.0001.01.SPA

[25] Michela Lenzi, Frank J. Elgar, Claudia Marino, Natale Canale, Alessio Vieno, Paola Berchialla, Gonneke W. J. M. Stevens, Meyran Boniel-Nissim, Regina J. J. M. van den Eijnden & Nelli Lyyra (2022) Can an equal world reduce problematic social media use? Evidence from the Health Behavior in School-aged Children study in 43 countries, Information, Communication & Society

who come from low-income and vulnerable population groups are exposed to a greater risk of a negative phenomenon associated with the use of social networks, etc. It turns out to be necessary to implement activities in the field of increasing the digital skills of these target groups to reduce the risk of negative phenomena associated with the use of digital technologies.

Digital Europe Programme and Digital Compass until the year 2030

The Digital Europe programme is a new EU-funded programme aimed at introducing digital technologies to businesses, public administration, and citizens. Digital Europe Programme will provide strategic funding to address the following challenges and support projects in five key areas: supercomputers, artificial intelligence, cyber security, advanced digital skills, and ensuring the greatest possible use of digital technologies throughout the economy and companies, including through digital innovation HUBs. The programme has a budget of 7.5 billion euro[26].

Digital Compass 2030: The European Roadmap for the Digital Decade (hereinafter referred to as 'Digital Compass')[27] translates the EU's digital ambitions for the next decade into clear, concrete goals that set the European path of the digital decade (Digital Decade).

The COVID-19 pandemic has highlighted the importance of digitalisation for European society. Digital technologies bring new ways of learning, having fun, working, exploring, and fulfilling ambitions. They also bring new freedoms and rights and allow EU citizens to be in touch outside physical communities, geographical locations, and social roles.

However, with the transition to the digital world, there are still many challenges that need to be addressed. The EU wants to increase its strategic autonomy in the field of technology and must develop new rules and technologies to protect citizens from counterfeit products, cybercrime, and misinformation. However, the most important challenge remains to solve the digital gap and digital inclusion.

Therefore, the vision of the EU in the next decade, the digital decade, represents a digital world that gives perspective to people and businesses and is formed around a sustainable and prosperous approach in the centre of which is man and his needs. Key tools to meet these goals include cloud computing, artificial intelligence, digital identity, data, and internet connectivity.

The digital compass sets the following goals:

Digitally qualified population and highly qualified digital experts (IT specialists):

- At least **80% of all adults** (16-79) **should have basic digital skills.**
- **20 million ICT professionals with a convergence of women and men should be employed in the EU compared to 7.8 million in 2019**

---

[26] digital-strategy.ec.europa.eu/en/activities/digitalprogramme#:~:text=The%20Digital%20Europe%20Programme%20(DIGITAL,businesses%2C%20citizens%20and %20public%20administrations.&text=Follow%20the%20latest%20progress%20and%20learn%20more%2 0abou t%20getting%20involved

[27] https://commission.europa.eu/sites/default/files/communication-digital-compass-2030_en.pdf

Secure, efficient and sustainable digital infrastructures:

- All European households should have a gigabit connection, compared to 59% in years 2020 and all populated areas will be covered by 5G, an increase from 14% in 2021.
- The production of high-end and sustainable semiconductors in Europe, including processors, should represent at least 20% of world production by value, which is double the 10% in 2020.
- 10,000 climate-neutral, highly secure endpoints (which enable data processing at the edge of the network) should be deployed in the EU and distributed as such in a way to guarantee access to data with low latency.
- Europe sets to have its first high-end quantum-accelerated computer.

Digital transformation of businesses:

- Three out of four companies should use the services of cloud computing, big data, and artificial intelligence.
- More than 90% of European small and medium-sized enterprises (hereinafter referred to as 'MSP') should achieve at least a basic level of digital intensity, compared to 61% in 2019.
- There should be about 250 diamond start-ups (start-ups with a value of 1 billion dollars) in the EU, which is a 100% increase compared to 2021.

Digitalisation of public services:

- All key public services should be available online.
- All citizens will have access to their electronic health records.
- 80% of citizens should use a solution for electronic identification.

An Analysis of the European context and Slovakia (DESI, OECD)

When assessing the state of digital skills in Slovakia, the initiative that is most often used, was first presented by the Commission in the year 2014 - **Digital Economy and Society Index (DESI)[28]**. DESI serves as the main measurable indicator for comparing the fulfilment of the objectives of the EU's digital policies, of which obligations arise for Slovakia too. In addition, given the Commission's very clearly articulated emphasis on digitalisation, DESI becomes one of the key parameters for assessing member states, e.g. from the point of view of formulation reform recommendations, which is ultimately reflected in availability, prioritization, and the amount of funds allocated from EU sources to individual initiatives.

DESI has been published by the Commission since 2014. Each year, the reports include profiles of countries that help member states to determine areas for priority measures, and thematic chapters providing analysis in key areas of digital policy at the EU level.

In 2021, the Commission amended DESI to reflect two major policy initiatives that will have an impact on the digital transformation in the EU in the coming years: A mechanism to support the recovery and resilience and a Compass for the Digital Decade. DESI scores and rankings were recalculated for all countries to consider the changes in the selection of indicators and the corrections made to the initial data.

In 2022, Slovakia ranked 23rd among the 27 EU member states in the DESI rating. From the point of view of the Human capital dimension, Slovakia took 19th place, which is the same position as in the DESI report from 2021.

Slovakia is just below the EU average or around it in terms of indicators in the area of human capital. 55% of Slovaks have basic digital skills, which is slightly above the EU average, which is at the level of 54%. The share of experts in the field of information and communication technologies (ICT) in the total number of employees is 4.2%, which is just below the EU average (4.3%). Sixteen percent of experts in the field of ICT are women, the EU average is 19%. Slovakia's score in the field of electronics trade has decreased: 13% of MSP sell online, compared to 17% in 2020. In 2020, 16% of Slovak companies used electronic invoices compared to 32% in the EU. Slovakia is located under the EU average in terms of indicators in the field of digital public services. The share of users of electronic public administration among Internet users has decreased to 62% and is below the EU average at the level of 64%.

Although Slovakia achieved some progress in all areas in the past year, especially in indicators of the main Internet coverage and introduction of connectivity, there were no improvements sufficient for Slovakia to keep pace with the EU average. The digital skills of the entire population, from primary school students to adults, must improve if they are to successfully meet the challenges of digital transformations. Improving digital skills takes time and systematic implementation of measures.

The need to educate people in Slovakia and increase their level of skills so that they can work with digital technologies and use them supports several national strategies. It is because of the stated reasons that this strategic material also specialised in the field of development and support of digital skills.

Overall, Slovakia's progress in the monitored areas is limited. Public financial resources spent on stimulating digital transformation have not always achieved the desired effect. There has been some progress in the integration of digital technologies, such as a steady increase in the percentage of businesses

---

[28] https://digital-strategy.ec.europa.eu/en/policies/desi-slovakia

using cloud computing services. However, businesses must have begun to make more use of the potential of big data, artificial intelligence, and electronic systems information sharing. The average use of e-commerce is a waste of businesses opportunity.

Digitalisation of education is not reaching its potential because schools, teachers, and students lack skills and technical tools. Fast broadband and network coverage must improve to very high capacity because it is an obstacle to the wider use of digital technologies and services for households, businesses, and schools. Administrative obstacles often slow down the deployment of networks, while Slovakia has not yet transposed the provisions of the European Code of Electronic Communications. Slovakia is introducing new digital public services, but more connectivity needs to be done to improve their quality and mutuality.

People and businesses should benefit from the increased availability, efficiency, and usability responsiveness of digital public services. Digital transformation is one of the main pillars of the Recovery and Resilience Plan of the SR, while the main emphasis is placed on public services, skills, and digitalisation business. Slovakia has a good connection with the main European initiatives in the digital field and within the framework of the Recovery and Resilience Plan, it will further support several projects with the participation of several countries.

Development of human capital in DESI over the last three years:

	DESI 2020	Slovakia DESI 2021	DESI 2022	EU DESI 2022
1a1. At least basic digital skills % of the population	unlisted	unlisted	55 % 2021	54 % 2021
1a2. More than basic digital skills % of the population	unlisted	unlisted	21 % 2021	26 % 2021
1a3. At least basic skills in creating digital content[3] % of population	unlisted	unlisted	72 % 2021	66 % 2021
1b1. Specialists in the field of ICT % of employed persons aged 15-74	3.7 % 2019	4.2 % 2020	4.3 % 2021	4.5 % 2021
1b2. Female specialists in the field of ICT % ICT experts	14 % 2019	16 % 2020	15 % 2021	19 % 2021
1b3. Companies providing professional training in the field of ICT % of companies	18 % 2019	16 % 2020	16 % 2020	20 % 2020
lb4. ICT graduates % of graduates	3.9 % 2018	3.9 % 2019	4.4 % 2020	3.9 % 2020

Figure 1: Development of the human capital in DESI 2022

Slovakia is committed to improving its DESI score and position. The MIRRI SR presented a detailed strategy and an action plan[29] with specific measures to address the deficiencies identified by the DESI indicators.

The education sector is experiencing the biggest mismatch between digital skills and practice needs, as well as training ICT specialists. While currently (in 2022) the labour market lacks approximately 15 000 experts[30], and the expected number of future graduates of ICT fields in the coming years will not only not

---

[29] https://www.mirri.gov.sk/sekcie/informatizacia/digitalna-transformacia/strategia-a-akcny-plan-na-zlepsenie-postavenia-slovenska-v-indexe-desi-do-roku-2025/

[30] https://sustavapovolani.sk/uploaded_files/sri/IT_web.pdf

fill this gap, but, likely, the lack of ICT specialists will further increase. Due to the lack of digital skills and infrastructure, some schools, especially at the beginning of the pandemic, struggled with the organisation and provision of distance education. It became a priority to increase the qualifications of teachers and other employees within lower levels of the education system.

The importance of DESI increased with the publication of the new EU digital strategy in March 2021 under the title **Digital Compass to 2030: a digital decade the European Way (Digital Compass)[31]**. This strategic document sets goals in the four most fundamental areas of global digital transformations. At the same time, it defines measurable indicators for these goals, which are used in the majority of DESI indicators. The goals of the digital compass, and therefore their measurable indicators, should be reflected in a legislative act during 2021, making them legally binding for all EU member states.

Ranking according to the digital economy and society (DESI) in 2022
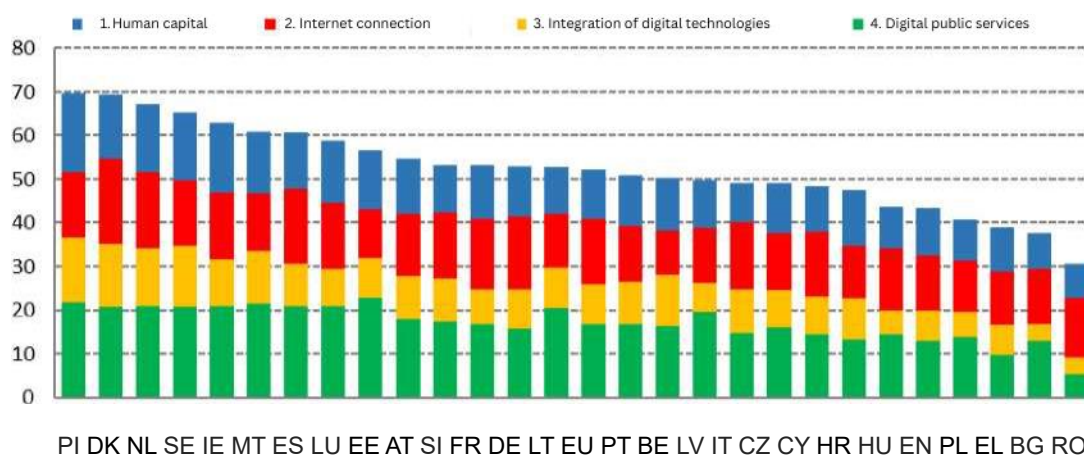
Figure 2: Ranking by DESI in 2022. Source: DESI 2022 Report, the European Commission

Slovakia presented a comprehensive material **Strategy and an action plan to improve Slovakia's position in the DESI index until 2025** (DESI Strategy)[32], which is a framework, and strategic document that responds to the long-term trend of stagnation or decline in Slovakia's rating in DESI. The Government of the Slovak Republic is committed to improving the position of Slovakia in DESI in its programme statement from March 2020. This ambition, however, is not self-serving. Its importance does not lie only in the nominal improvement of the Slovak score in DESI bridging the long-standing gap between Slovakia and most EU states. The primary vision is, in the horizon of the next five years, for Slovakia to actively develop digital trends and thanks to innovations improve the quality of life of its citizens, the conditions for business, and to the maximum extent efficiency use the full potential that digitalisation provides across the economy and society.

---

[31] https://commission.europa.eu/sites/default/files/communication-digital-compass-2030_en.pdf
[32] https://www.mirri.gov.sk/sekcie/informatizacia/digitalna-transformacia/strategia-a-akcny-plan-na-zlepsenie-postavenia-slovenska-v-indexe-desi-do-roku-2025/

The level of digital skills is influenced by many factors, such as physical infrastructure: availability of computers, and a good internet connection. This is also supported by the recent the MIRRI SR survey dedicated to digital poverty – **Unconnected**[33], which confirms that in the availability of digital infrastructure Slovakia has caught up with the EU average. Along with better accessibility, the number of Internet users also increased, however, some groups of the population still lag in the use of the Internet. From the point of view of availability especially low-income households with children and seniors lag behind digital technologies. It is also a problem with the low level of digital skills in the adult population, which reduces the chances of higher-quality employment. The availability of technology and its use has a significant impact on the quality of life in everyone's age, therefore it is important to design measures to improve digital inclusion.

Furthermore**, the analysis of the OECD[34] devoted to the importance of skills shows that while the differences between women and men are not particularly significant, education and age have an impact on digital skills.**

In most countries, many adults with low education did not have basic ICT skills yet which these skills were almost universal among tertiary-educated adults. In terms of age, ICT skills over 30 years old in the sample deteriorate gradually. Eurostat data confirms this trend (Figure 3)
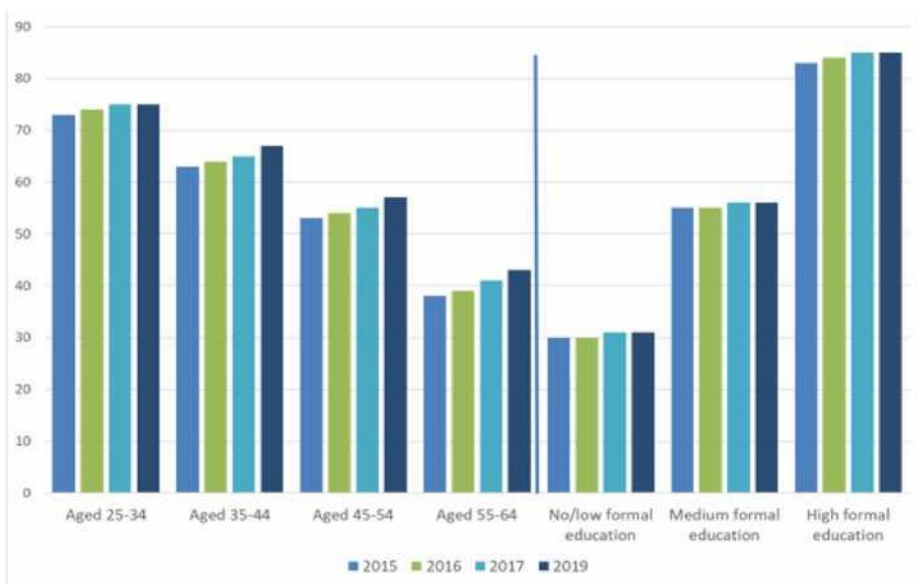
Figure 3: Percentage of the workforce aged 25 to 64 with at least basic digital skills. Source: Eurostat

Another source of data on the level of digital skills of countries is the already mentioned OECD programme for international assessment of adult competencies. **This rating is based on a survey of professional competence of adults in key skills (PIAAC) such as information processing, numeracy, problem-solving (digital skills), and how they use their skills at home, at work, and in the wider community in solving**

---

[33] https://www.mirri.gov.sk/wp-content/uploads/2019/09/Digi_chudoba_final.pdf
[34] https://www.oecd-ilibrary.org/education/skills-matter_1f029d8f-en

different types of problems commonly faced by ICT users in modern societies. The cognitive dimensions of problem solving are the main objective of the assessment and the use of ICT is secondary.

Unlike DESI, assessment involves testing rather than self-assessment, so it can provide more objective results. Of the 21 EU member states that participated, 17 states also completed a part of digital skills (Figure 4).

The results of the OECD survey are largely in line with DESI, which shows that the Nordic countries are in generally ranked best in digital skills and the top five EU countries are among the best countries in the world. **Similarly, those EU member states that score lower in the DESI are below the OECD average in this assessment as well.**

EU country – Below Level 1 and Level 1   EU country – Level 2 and 3

Non-EU country – Below Level 1 and Level 1   Non-EU country – Level 2 and 3
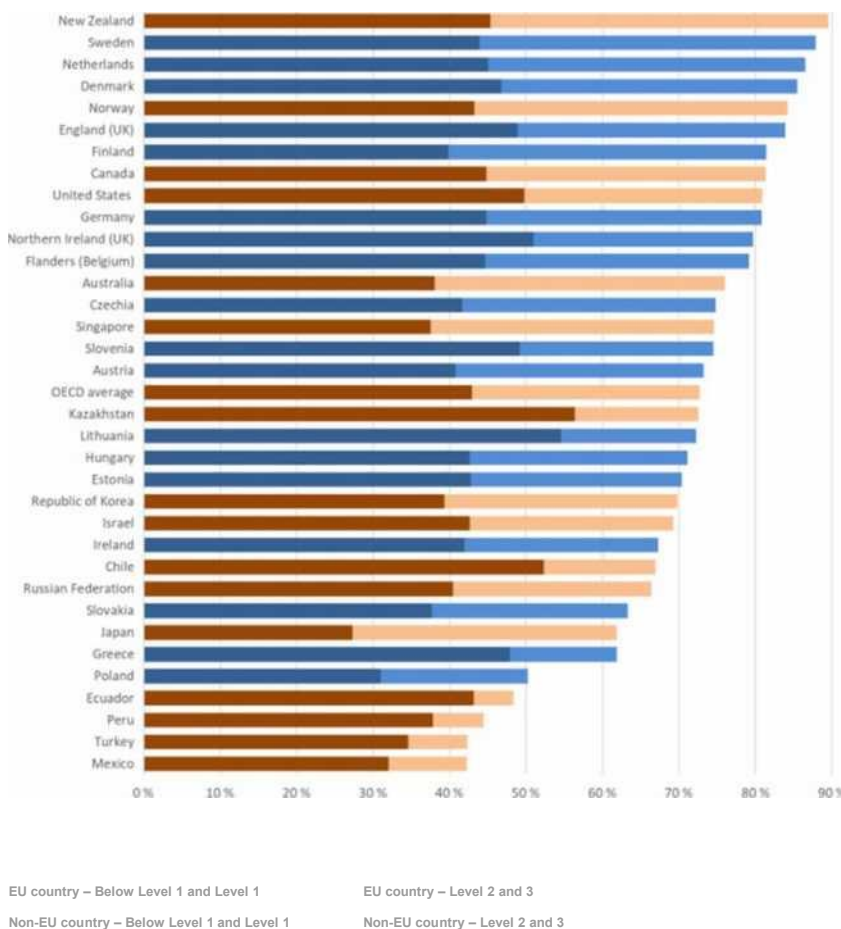
Figure 4: Levels 1 and below generally correspond to basic digital skills. Source: Eurostat

Digital skills and main challenges for Slovakia

The development of digital skills is currently not strategically captured in Slovakia and is divided among several responsible entities (the MPSVR SR, the MŠVVaŠ SR, and the MIRRI SR). There is no defined responsible body, uniform procedure, or goals in the field of digital skills development. For example, until now there is still not even a Slovak version of the European DigComp framework. However, his simplified

version was applied at least within the framework of the National Project - sector-driven innovation for the needs of system-creation occupations and their characteristics.

Slovakia is only partially involved in international network platforms dedicated to the development of digital competencies in the entire population, e.g. through the initiative of the Commission "Digital Skills and Jobs Coalition" through the initiative of the Digital Coalition. But it is missing, for example, a link to All-digital.org or more visible support of the Code Week activity or Hour of Code[35], where more active participation of Slovakia would help to improve the status regarding the achieved level of digital skills. Slovakia is the only EU country, where the Safe Internet Centre has not yet been established. The establishment of the initiative of the Digital Coalition and subsequently also of the National Coalition for Digital Skills and Jobs of the SR is a key positive step in this direction, aiming to respond to global trends affecting the labour market, the specifics and needs of the Slovak economy, as well as increasing competencies and response skills on the part of the public administration.

In Slovakia, there is no publicly funded system for the development of digital skills resources. Therefore, only 2% of citizens acquired digital skills through public programmes education in this area[36]. Education and development of digital skills are built on education within the scope of employment, or on education paid for by the employer.

The educational infrastructure for the development of digital skills is poorly developed precisely for this reason of a non-localized framework for digital skills, a lack of a digital learning platform, unprepared educational staff, and missing testing and certification places. The threats that result from this are mainly communicated by the third sector. In the year 2017, the need for changes was announced by the document of the Institute of the Educational Policy: Occupation of robots, the influence of technology changes on the labour market, and required skills in the SR[37].

A very good picture is also offered by the mentioned activity **IT Fitness test**, which annually answers the question of how they improve or worsen the digital skills of students, but also of the public. Its data is fully available for educational institutions as well. The IT Fitness Test is available for free at: https://itfitness.sk/sk/. The annual final activity report exceeds one hundred pages in content and also includes specific recommendations for improvement.[38]

It is also possible to use other tools, such as SELFIE and SELFIE for TEACHERS, either within the school or individually implement repeatedly and compare the level of digital climate or digital skills of students and teachers. The tools are free and available at:

- SELFIE: https://education.ec.europa.eu/sk/selfie/registration-procedure?
- SELFIE for TEACHERS: https://educators-go-digital.jrc.ec.europa.eu/
- **The unavailability of publicly funded educational programmes** is a barrier to the development of digital skills, especially for seniors in the post-productive age. Because of this reason, the share of people in the age group of 65-74 years old with at least basic digital skills is only 11 %, while the EU average in the same age group is 24%. Up to every fourth citizen in the age group of 65-74 has

[35] https://hourofcode.com/us/sk/learn
[36] https://www.planobnovy.sk/site/assets/files/1055/komponent_17_digitalne_slovensko_1.pdf
[37] https://www.minedu.sk/data/att/11077.pdf
[38] https://itfitness.eu/sk/stranky/zaverecna-sprava-it-fitness-test-2021/

little or no digital skills. Seniors are also more likely to face a barrier regarding the availability of technologies not only for the development of digital skills but for the overall use of digital tools[39]. They also use the computer less: according to data from 2017, only 39% of seniors used a computer at least once in the last 12 months, which is 10% less than the EU average[40].

From the perspective of seniors, the strengthening of digital skills is emphasized by and with the ongoing pandemic combined with social isolation and loneliness. Developing digital skills will enable seniors to maintain better contacts and use healthcare services and other digital services of the state and will also support the development of the so-called silver economy and the promotion of an active aging strategy. He focuses more on seniors again the MIRRI SR in the 2022 survey: Digital skills and digital equipment of seniors in Slovakia[41].

The labour market is also evaluated by DESI, which states that there is a lack of available experts in the ICT sector labour market (4.2%), as well as the very slightly increasing share of women working in ICT fields (16%) compared to the EU (19%). The share of ICT experts from the total number of employees increased to 4.2%, but despite this, it does not reach the EU average (4.3%). The share of graduates in the field of ICT is continuously growing (3.9 %) and reaches the EU average (3.9%).
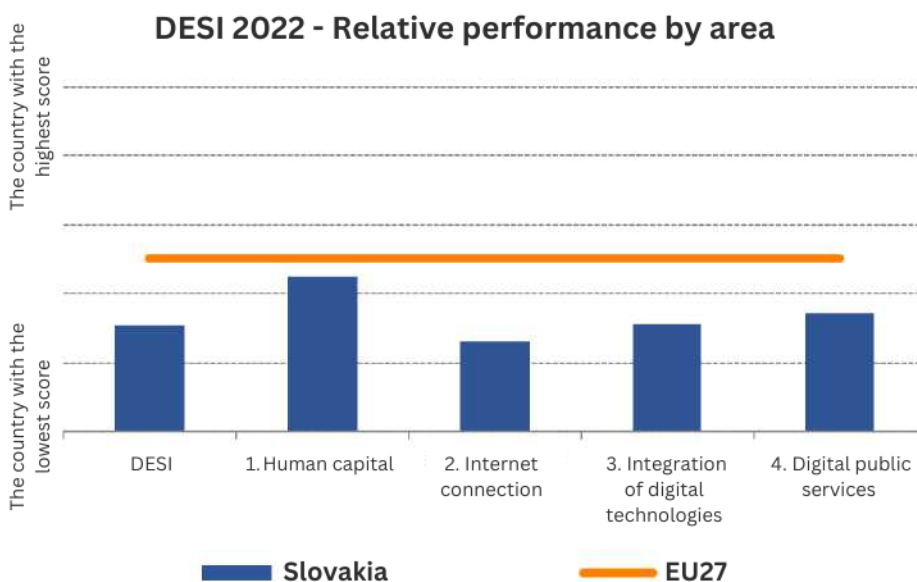
Figure 5: DESI 2022 - relative performance by area. Source: DESI 2022 index report, the European Commission

The lack of digital skills is a problem for several reasons, highlighted by current trends in the labour market, the way they are applied, and also concerning the ongoing pandemic. **The transition of a significant part**

---

[39] https://www.planobnovy.sk/site/assets/files/1055/komponent_17_digitalne_slovensko_1.pdf
[40] https://www.planobnovy.sk/site/assets/files/1055/komponent_17_digitalne_slovensko_1.pdf
[41] https://www.mirri.gov.sk/wp-content/uploads/2019/09/Vysledky-prieskumu-digitalnych-zrucnosti-a-vybavenia-seniorov.pdf

[RECOVERY] PLAN

MINISTRY OF INVESTMENTS, REGIONAL DEVELOPMENT AND INFORMATIZATION OF THE SLOVAK REPUBLIC

of the working population to the domestic work system required ensuring their access to digital communication technologies. However, their effective use is not possible without sufficient digital skills for practically the entire population.

According to OECD data, up to 64.4% of jobs in Slovakia are at risk of future automation[42] (Slovakia has been the leader of this ranking several times in a row), which places demands on employees in the form of continuous development of knowledge and skills so that they can prepare for ongoing changes in the work nature. This trend is further reinforced by the use of remote work also in professions that are less threatened by the event of automation.

The Digital Coalition Initiative and the National Coalition for Digital Skills and Jobs in the Slovak Republic

The European initiative of the Coalition for Digital Skills and Jobs[43] **brings together Member States, companies, social partners, non-profit organisations, and education providers to help solve the lack of digital skills in four areas: digital skills for all, digital skills for the workforce, digital skills for ICT professionals and digital skills in education.** National digital coalitions (however, some also ceased to exist without clear funding from EU resources) were established directly by EU member states in 2016. At the beginning of 2021, the small European digital coalition of around 550 members between December 2016 and July 2018 offered almost 11 million Europeans of all age groups (approximately half were from primary and secondary schools) the opportunity to improve their digital skills.

The Digital Coalition initiative was founded in Slovakia on September 27, 2017, and currently has 83 members from the business, state, and public spheres with more than 232 commitments in various states of fulfilment. The main goal of the Digital Coalition initiative is the mobilization of actors across the spectrum of public, private, academic, and civil organisations and institutions in Slovakia to improve the digital skills of citizens, IT specialists, employees, and in the educational process.

The goal of national digital coalitions is to support National Digital Skills Strategies. Slovakia is only getting to its national Digital Skills Strategy now, in 2022. The National Coalition for Digital Skills and Jobs of the Slovak Republic will be an important partner in its creation.

The National Coalition for Digital Skills and Jobs of the SR is an interest association of legal entities founded by the Slovak Ministry of Finance and IT Association of Slovakia. The National Coalition for Digital Skills and Jobs of the SR[44] was established on December 9, 2019, primarily to support and ensure the activities of the Digital Coalition initiative, for strengthening digital skills among all population groups (general public, business sector, public administration, and local government) and for support and provision activities and activities of the Commission's initiative called Digital Skills and Jobs Coalition[45] in Slovakia. Members of The National Coalition for Digital Skills and Jobs of the SR are: the IT Association of Slovakia, Ministry of Finance SR (hereinafter referred to as 'MF SR'), the MIRRI SR, and MŠVVaŠ SR.

---

[42] https://www.oecd.org/economy/surveys/Slovak-Republic-2022-OECD-economic-survey-overview.pdf

[43] https://digital-skills-jobs.europa.eu/en/about/digital-skills-and-jobs-coalition
[44] https://ives.minv.sk/rez/registre/pages/detailzzpo.aspx?id=224997
[45] https://digitalnakoalicia.sk/

Institutional background

To carry out effective measures in the mentioned priority areas in the short-term and in the long-term, a strengthened institutional background, which represents the basis innovation ecosystem of Slovakia is necessary. The structure of the proposed institutional background is based on priority recommendations and commitments of European policies or directly from verified implementations in other EU member states.

Conceptually, there should be mainly two levels of state involvement. Within the first level, the state would allow the controlled emergence of platforms and centres, whose activities would be directed mainly by the private, or academic sector. The second level would mean the direct involvement of the state in the sense of a balanced partnership with the private and/or academic and third sector, or the leading role of the state in case of disagreement.

Systemic support of the state for the development of innovations should be reflected in both mentioned levels and increase the digital competitiveness of Slovakia in general. The special level that this part does not explicitly define, refers to the process of cooperation between the state and various interested entities on naming opportunities and challenges of upcoming technological trends, or other important aspects of digital transformation.

Several participants are involved in the creation and implementation of this national strategy, which is depicted in diagrams of participants and implementers of this project. Their mutual cooperation and systematic coordination are very important.
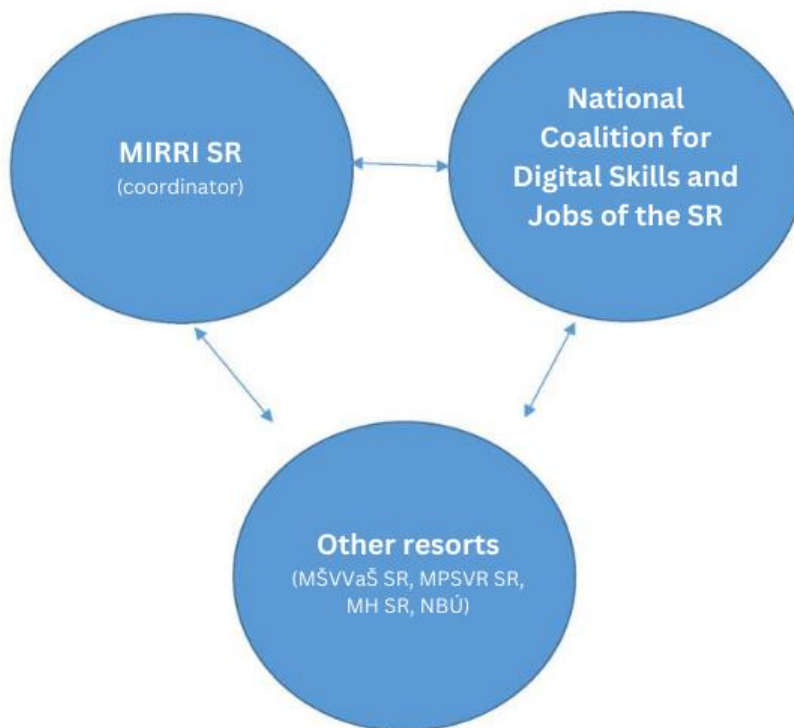
Figure 6: Main participants of the governance model

The section of the digital agenda of the MIRRI SR is responsible for coordinating individual partners and monitoring the implementation of individual measures. This working group, officially established under the Government Council of the SR for the digitalisation of public administration and the single digital market will monitor the implementation of the NSDZaAP measures. At the same time, it will receive opinions and recommendations from the Slovak government in the field of digital transformation and will politically monitor the progress of tasks.

Since it is a cross-cutting agenda, the connection with the Council will also be taken into account in the implementation of the NSDZaAP of the Government for Lifelong Education (MŠVVaŠ SR) and the Council of the Government of the SR for Competitiveness and Productivity (Ministry of Economy of the SR) and a cross-sectional working group for education. It is important that a unit is created in the individual departments that will provide documents and support for the planning and implementation of proposed measures.

A key partner in the design and implementation of the NSDZaAP is the National Coalition for Digital Skills and Jobs of the SR. The National Coalition for Digital Skills and Jobs of the Slovak Republic and its close cooperation with an alliance of sector councils provides a significant partnership from the private sector and ensures collaboration and cooperation with all social partners. This partner covers the agenda for ensuring a stable model of public administration, management, and supervision (so-called "governance") in areas of digital education and digital skills, all with the participation of public administration representatives, the business sector, academia, and civil society. It seems the cooperation of state partners and support from the MIRRI SR as a coordinator for the creation of a responsible, sustainable, transparent, and controllable financing model for the necessary project activities of the National Coalition for Digital Skills and Jobs of the Slovak Republic is necessary.

Digital skills and digital literacy

Digital literacy is the ability to effectively and safely use digital technologies to solve given problems or to create digital content. In the state educational programme for basic education, digital literacy has the status of a cross-cutting competence and is being developed into educational standards, which represent a set of specific knowledge, skills, and attitudes and they are adequately integrated into all educational areas. Basic education focuses on the acquisition of basic knowledge, attitudes, and practical skills necessary for the solution of a common problem using a computer or to create simple digital content. The purpose or product of the student's activity is essential, and the mere use of a digital tool is not enough.

The inclusion of digital literacy in the curriculum is part of the intended digital transformation of companies. Investing in digital capability and the qualifications based on it increases the probability of employment on the labour market (including the creation of new jobs) and can promote innovation, investment, productivity, and overall economic growth.

The World Economic Forum warns that other significant changes in the global economy and individual companies will be even bigger and more serious than the ones so far. Therefore, it recommends that governments throughout the world focus on the areas of emotional intelligence, creative thinking, and cooperation in education. These three areas will be the most important in the process of transition to an information society. Digital literacy should therefore be closely linked in the curriculum with these soft skills, as well as with the ability to think critically.

In the context of the national strategy of the SR, the main priorities, goals, and subsequent action plan is oriented towards the development of digital skills that are consistent with those identified in the DigComp 2.2 document. The cross-cutting topic of digital literacy has five components:

1. **Data and Information** - Finding, evaluating, and managing data, information, and digital content.
2. **Communication and collaboration** - Communication and collaboration using digital technologies, provision of information and digital content, use of digital citizenship, ethics, and digital identity management.
3. **Digital Content Creation** - Combining and transforming digital content, copyright, licensing, and programming.
4. **Security** - Protection of devices, personal data, and privacy, protection of health and welfare, and protection environment.
5. **Problem Solving** - Solving technical problems, identifying needs and technological resources, creative use of digital technologies, and identifying gaps in digital capabilities.

Digital skills and capabilities are defined in more detail by the Joint Research Centre (JRC) document under the name European Digital Competence Framework for Citizens (from the English: "The Digital Competence Framework", DigComp). Digital skills can be understood as skills that every citizen should possess on a certain level to exist in the digital age. DigComp 2.2 describes 21 competencies, divided into 5 areas:

Component	Competence
Information and data literacy	1. browsing, searching, and filtering data, information, and digital content 2. evaluation of data, information, and digital content
Communication and cooperation	4. interaction through digital technologies 5. sharing through digital technologies 6. engaging in citizenship through digital technologies 7. cooperation through digital technologies 8. Internet etiquette 9. digital Identity management
Creating digital content:	10. design, creation, and development of digital content 11. integration and redesign of digital content 12. copyrights and licenses 13. programming
Security:	14. equipment protection 15. protection of personal data and privacy 16. protection of health and well-being 17. environmental protection
Problem solving	18. technical problem solving 19. identification of needs and technological solutions 20. creative use of digital technologies 21. identification of digital capability gaps

Tab 1.1 - Digital skills according to DigComp v2.2

In the first two areas of competence, Slovakia is at the level of the EU average but significantly lags behind in the other three. And the creation of digital content and problem-solving are connected competencies with innovation activities and the creation of added value at the individual and company levels.

The situation is not favourable even in the area of safety and skill level above the basic level when the employees can deal with sophisticated types of threats reaching only 63%. The ability to protect yourself is different from industry to industry. While the share of the workforce in ICT, finance, arts and entertainment, and in the professional service sectors that have mastered elementary or higher elementary security skills is higher than the national average, in sectors such as healthcare, manufacturing, and agriculture, less than 40% of the population has at least basic skills in this competence.

The DigCompEdu framework contains 22 competencies divided into 6 domain-specific areas of education, and its goal is to name what it means to be a digitally competent educator. This one reference framework is intended for educators at all levels of education, regardless of the target group of children, pupils, or students.

3. Priority areas

From international assessments (e.g., DESI, PISA) we see that the development in the field of digital skills competence in Slovakia does not have the desired dynamics and direction of development that would allow us to maintain its competitiveness in the global market. Especially in situations, where in recent years, the digital area transforms very intensively.

Lack of digital skills, whether basic or advanced, is a barrier to digital transformation that we will have to face as a country. Using existing national and international documents and analyses on this issue, we have identified priority areas that have high relevance and validity in the Slovak environment. By solving the relevant challenges of individual priority areas in the context of digital skills, Slovakia will gain significant economic benefits and economic potential for growth.

Among the identified priority areas (outside of the proposed governance model, which represents a separate strategic area) belong:

Figure 7: The NSDZaAP priority areas

The following TOP goals were defined for individual priority areas. Appropriate measures for proposed TOP goals are described in more detail in the following text.

PRIORITY AREAS	OBJECTIVES

ICT Specialists	1. Increasing the number of ICT specialists 2. Retraining of hard-to-apply graduates from trade unions and employees at risk of job loss in different sectors so that they can apply to ICT positions of lower and medium demand 3. Increase in the number of graduates of IT fields in secondary schools and universities 4. Attraction and easier employment of ICT specialists arriving and returning from abroad 5. Focus on increasing skills in the field cyber security
Digital skills of young people and educators in the learning process	1. Increasing the number of people with at least basic digital skills 2. Adaptation of educational and study programmes and their curricula, the needs of contemporary society with a focus on skills necessary for life in a global and low-carbon world digital economy and society 3. Increasing the level of students' digital competencies as teachers at all levels of school education and increasing interest in studying ICT 4. Supporting schools in building a suitable environment for the development of digital competencies 5. To ensure the training of future teachers so that after the end of their studies they were able to use technologies in educated and had such digital skills that will make it possible for them to use technologies efficiently and effectively
Digital skills of active labour market participants	1. Increasing the number of employers supporting or providing education in digital skills 2. Improvement of Slovakia's position in the DESI evaluation in all aspects of competencies at least to the level of the EU average 3. Increasing the number and ratio of technical experts to the level of the EU average 4. Improving the adaptability of labour market participants - support for upskilling and reskilling for positions where there is the assumption of their automation and robotisation
The share of girls and women in ICT	1. Increasing the number of ICT specialists 2. Support for more active inclusion of women and girls in the digital society and economy 3. Increasing the number of women in ICT fields of study 4. Making the working environment more attractive for ICT specialists, improvement of the recruitment process, and career opportunities advancement of women in ICT fields

Digital divide and digital exclusion	1. Active work and education of disadvantaged people groups in the field of digital skills
	2. Identifying areas of the digital divide between categories of individuals and groups who are at risk of the digital divide in individual regions of Slovakia and more forceful enforcement of their solutions at the national level
	3. Increasing the availability of inclusive education a creation of a platform for the electronic inclusion of citizens of all age categories and social conditions (including people in post-productive age)

Assuming the successful implementation of NSDZaAP, which monitors the fulfilment of goals in individual priority areas, the following positives were identified:

- None of the citizens is left behind in their integration into the digital world, especially pupils from disadvantaged environments.
- Reducing the digital divide caused by gender disadvantage and thus increasing the number of women enrolled in ICT studies, and the number of female graduates and workers in ICT sectors.
- Acquiring adequate digital skills for the education of students and teachers for all levels of the educational system.
- Acquiring advanced digital skills for both employed and unemployed people.
- Reducing digital exclusion and vulnerability of children and adults from low-income, marginalized, or otherwise disadvantaged population groups.
- Ensuring that companies operating in Slovakia, especially MPS, have sufficient digital background and necessary skills to master the digital transformation process.
- Slovakia will have adequate conditions for the creation of a vocational training offer that will respond to the need for digital specialists in various production sectors (demand for these profiles grows up to 4 times faster than the offer).

The NSDZaAP is an extensive, inclusive, and multidisciplinary plan that seeks to address social and economic challenges brought about by the new digital society and economy and turn them into opportunities for growth. The created strategy focused on the development of digital skills stands out for its cross-cutting nature that affects sectoral policies across departments and requires collaboration with various areas of public administration. The defined institutional background must be fulfilled, coordinated, consistently monitored, and supported to coordinate activities public sector and also support public-private sector cooperation.

Priority 3.1: ICT specialists

In the field of ICT and the context of human resources, several fundamental problems have been identified which have an impact on the national economy and directly threaten the success of the digital transformation and long-term competitiveness of Slovakia on the global market. An important insight into this issue in the context of human resources provides a document of the sector council for the sector of information technology and telecommunications called "The Sectoral Strategy for Human Resources Development in the Information Technologies and Telecommunication Sector by the year 2030" developed

as part of the national project "Sector controlled innovations to an effective labour market in the SR" with the support of the Operational Programme Human Resources for the period 2014 - 2020.

Discussions with the professional public, employers, and studies of national strategies show that Slovak companies and public administration have long been troubled by a lack of ICT specialists and a workforce with advanced skills digital skills and/or with a lack of experience in the use of technology and/or with insufficient professional technical education[46]. The lack of ICT specialists for public administration and government management institutions threatening the proper performance of their competencies and tasks was also established in 2022 by the MF SR.

Another problem is labour productivity compared to other EU countries. The ICT sector has 76% higher labour productivity compared to other sectors in the SR and is among the sectors with the highest labour productivity. However, the ICT sector in the SR has 44% lower labour productivity than the EU average and we are among the 41% of EU countries with the lowest labour productivity in this sector. The highest productivity of the work sector is in the countries of Luxembourg, Ireland, and Sweden, where it is from 155% to 473% higher than in the SR[47].

Slovak statistics also confirm that Slovakia is facing an outflow of talented Slovak experts from STEM fields who go abroad for studies, after which they stay in abroad, or after completing their studies in Slovakia, they go abroad. Talent leak generally represents a great threat to Slovakia and its future.

The outflow of talent to study abroad is primarily due to the insufficient quality and image of the institutions of tertiary education - universities, but also the lack of growth and career opportunities in the local environment and, last but not least, the unstable economic and social situation in the country. Especially in the eastern parts of the country, there is an outflow of up to 30% of school graduates abroad. About 17% of secondary school graduates leave to study (and later a large number of them also build a life) abroad[48].

The current situation in the country shows the risks that result from the persistent absence of modern political labour mobility. Slovakia needs to create flexible and attractive conditions for employment citizens of two types of groups:

- from countries within the EU
- from countries outside of the EU, the so-called third countries

In this way, the current lack of experts in the Slovak labour market as well as to increase the international attractiveness of Slovakia as a country can be solved by gradual steps. At the same time, it is necessary to introduce modern ways and systems of employment such as multiple hours or work agreements and also less formal ways of working relationships so that the labour market of ICT specialists (but not only those) becomes flexible and enabled better use of these precious human resources.

Strategic goals
Primary strategic goal:

---

[46] https://sustavapovolani.sk/uploaded_files/sri/IT_web.pdf
[47] https://sustavapovolani.sk/uploaded_files/sri/IT_web.pdf
[48] https://www.ivo.sk/8775/sk/aktuality/unik-mozgov-migracny-potencial-mladych-na-slovensku

Strategic goal:	Increasing the number of ICT specialists
Present value:	The share of ICT experts from the total number of employees is 4.3%, which is just below EU average (4.5%).
Target value:	The share of ICT experts from the total number of employees is 5.5% (However, EC goals are 10% to year 2030[49])
Due date:	2026
Data source:	DESI
Evaluation frequency:	annually

Key performance indicators in this dimension include:

- Number of announced calls - measure 1B
- Number of graduates of ICT majors in secondary schools - measure 1C

Their specific values are listed for individual measures.

Based on the results of these analyses and surveys, the fulfilment of the following key ones will also be monitored areas:

- Retraining of hard-to-apply graduates of various fields of study and employees' sectors so that they can apply for ICT positions of lower and medium demand
- Increasing the number of graduates of IT majors from secondary schools and universities
- Attracting and easier employment for incoming ICT specialists coming and returning from abroad

through the implementation of the following measures:

MEASURES

- 1A Application of legislation for the granting of national visas (type D) in order to simplify conditions for the employment of foreigners and especially ICT specialists, as well as simplification of the regime of recognition of educational documents and professional qualifications for exercising a regulated profession
- 1B Support the development of specific digital skills to meet the objectives of the Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (SK RIS3 2021+)
- 1C Improving the quality of study and the number of ICT graduates in secondary vocational schools, IT grammar schools, and universities

Priority 3.2: Digital skills of young people and educators in the educational process

A rapidly changing world, including rapid advances in science and technology, points to the increasing requirements for digital skills and competencies. Development of digital skills and competencies so it not

---

[49] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

only represents the basis for effective digital transformation in education but also strengthens the profile of a graduate who is able to successfully participate in the events in society and succeed in the labour market.

The current educational system in Slovakia prioritizes the acquisition of knowledge and does not develop the critical thinking and soft skills of pupils. Pupils mostly only passively accept a large number of isolated knowledge from the teacher. According to research (Gaard et al. 2017), such a model is inefficient, inappropriate, and does not emphasize the student's activity and creative thinking.

The current curriculum (in the form of the State Education Programme) is conceived in terms of content and performance standards, and therefore focuses primarily on the content of education and does not emphasize on educational goals of the educational system. Does not attach sufficient importance to learning in contexts, acquiring lifelong skills, and researching current or cross-cutting topics. There is no focus on asking questions, presenting one's own opinions, discussions, and argumentation, thereby neglecting the promotion of analytical and critical thinking. The structure of the teaching process is not sufficient to cover the amount of prescribed curriculum in the State Education Programme.

One of the consequences of current education is the below-average skills of Slovak students. Results in reading (Monitoring the level of pupils' reading literacy (reading comprehension) (PIRLS) 2016[50], PISA 2018[51]) and science literacy (International Measurement of Knowledge and Skills students in mathematics and natural sciences (TIMSS) 2019[52]) are below the OECD average.

Slovak pupils also achieve poor results in the ability to solve problems and work in a team (PISA, 2015). Pupils' awareness of global topics is very weak in selected topics, below the threshold of results in most EU countries. More than a third of the students could not explain or had not encountered topics such as financial literacy (PISA 2012, 2015), global health (e.g., epidemics), climate change and warming, or the economic crisis and its impact on the global economy (PISA, 2018).

The area of education development is crucial from the point of view of future generations. Very important for the success of the whole strategy we consider an adequate institutional background. In the field of education, it is necessary that MŠVVaŠ The SR has established a dedicated unit, which will be an interdepartmental partner for the field of digital skills. Only in this way, it will be possible to meet the European goal set in the Digital Education Action Plan for 2021 – 2027 (52), namely, to reduce the number of 13-14-year-old pupils achieving poor results in programming and digital literacy below 15% by 2030. The scope of the curriculum in the field of informatics and digital skills in elementary and secondary schools necessary for further study and application in practice must be taken into account in the curricula and sufficient space must be created for its mastery. In addition to basic skills such as reading, writing, and arithmetic are other essential skills for life, digital skills are also essential to life.

Among the successful nationwide projects aimed at measuring and evaluating the digital skills of young people, it is necessary to mention above all the IT Fitness test. Evaluation of the results of 2021, compared to the previous year, showed that the results are not improving. Authors attribute this to a higher number

---

[50] https://www.minedu.sk/prve-vysledky-medzinarodneho-vyskumu-citatelskej-gramotnosti-ziakov-stvrteho-rocnika-zakladnych-skol-pirls-2016/

[51] https://www.minedu.sk/zverejnenie-vysledkov-slovenskych-ziakov-v-medzinarodnej-studii-oecd-pisa-2018

[52] https://www.minedu.sk/timss-2019-vysledky-medzinarodneho-merania-vedomosti-a-zrucnosti-ziakov-stvrteho-rocnika-zs-v-matematike-a-prirodnych-vedach/

of respondents and schools that participated in testing for the first time. Aggravation results are evident in basic IT skills and knowledge, but also in their connection with practice. According to the authors of the test, schools should focus more on the application of knowledge from several areas, but also on connecting theoretical knowledge with practical skills. Educators should assign students tasks and projects in which they have to perform activities requiring higher cognitive operations.

Pupils and students should be more creative when solving tasks and should analyze problems more thoroughly. The authors of the report state that it is still necessary to devote oneself to the development of critical thinking and evaluation information and assess its quality, credibility, and truthfulness. It seems that the pupils have little practical experience and also that they have little understanding of the structure of a text document[53].

They also have reserves in working with interactive graphs, understanding displayed information, and searching for information according to the specified criteria. According to the authors of the test, there are several factors behind the downgrading of IT skills, and they may have manifested themselves to a different degree in each school. For example, during distance learning in some schools, the teaching of informatics was missing, or it took place in an inappropriate form[54].

Strategic goals

Primary strategic goal:

Strategic goal:	Increasing the number of people with at least basic digital skills
Present value:	The share of people with at least basic digital skills is 55 %, slightly above the EU average (54 %).
Target value:	The share of people with at least basic digital skills is 60 %
Due date:	2026
Data source:	DESI
Evaluation frequency:	annually

Key performance indicators in this dimension include:

- The number of tested education actors at all three levels and the improvement of results in of five areas of testing - measure 2A
- The number of updated secondary school education programmes – measure 2B
- The number of educational programmes created - measure 2C
- The number of graduates of educational programmes – measure 2C.
- The number of attestations with the DigCompEdu standard - measures 2D.
- The number of school digital coordinators - measure 2E.
- The number of innovative study programmes - measure 2F.
- The number of outputs (publications, studies, etc.) from research - measure 2H.

---

[53] https://itfitness.eu/sk/stranky/zaverecna-sprava-it-fitness-test-2021/
[54] https://itfitness.eu/sk/stranky/zaverecna-sprava-it-fitness-test-2021/

- The number of methodological materials created - measure 2H.
- The number of trained school digital coordinators/number of support activities – measure 2H.
- The number of supported projects – measure 2H

Their specific values are listed for individual measures.

Based on the results of these analyses and surveys, the fulfilment of the following key ones will also be monitored areas:

- Adaptation of educational programmes and their curricula to the needs of contemporary society by focusing on the skills needed for life in a global and low-carbon digital economy and society
- Increasing the level of digital competencies of students at all levels of education and increasing interest in studying ICT
- Supporting schools in building a suitable environment for the development of digital competencies

through the implementation of the following measures:

MEASURES

Digital skills and competencies for the 21st century

- 2A Establishing the central competencies for the 21st century that the school will develop at the level of primary, secondary, and higher education and their inclusion in curriculum documents as part of the ongoing curriculum reform
- 2B Creating an area for primary and secondary schools as part of the planned reform of education content to develop competencies for the 21st century in formal education
- 2C Through cooperation with universities and directly managed organisations (hereinafter referred to as 'PRO') of the MŠVVaŠ SR, the creation of an offer of further education of pedagogical and professional staff in the field of digital skills and competencies upgrading according to the DigCompEdu standard and their use in the teaching process
- 2D Introducing system transparent motivational mechanisms for teaching staff and professional staff who, through innovative digital learning practices and concepts, improve results in the educational process and actively enhance your own digital competencies

Transformation of education through digital technologies (digital transformation of education)

- 2E Improving the system of support for teaching staff and professional staff in the use of digital technologies in the educational process through the newly created school digital coordinator positions, securing funding for full or part-time for this position
- 2F The implementation of educational content in connection with the digital transformation of the society to education study programmes at all three levels of higher education
- 2G The encouragement for the use of open sources, the creation of innovative educational content and pedagogical procedures, and support of proven procedures and educational programs developed in cooperation with employers with a focus on IT development and digital culture with an impact on the widest possible group of schools, teachers and pupils
- 2H The establishment of the National Centre for Digital Transformation of Education (NCDTV) in the environment of academic workplaces long-term focused on the implementation of digital

transformation of education with two centres in Bratislava and Košice with the involvement of experts from universities and experts from practice

Priority 3.3: Digital skills of active labour market participants

The maintenance and development of the competitive economy of Slovakia pose a challenge to economic entities to respond to the accelerating technological development at the global as well as the European level. Technology changes, innovation of business processes, and new business models without acquiring new skills are impossible to implement and are therefore considered a key factor of economic competitiveness in countries. Therefore, many countries approach the creation of policies, standards, processes, and structures together with resources for the development of digital skills.

The development of digital skills is also at the forefront of EU strategic programmes. Generally, digital skills are the skills needed for individuals to remain relevant and competitive in a transforming, changing digital world. With the wider introduction of automation and robotization employers are looking for advanced technology skills. The EU in the report Skills for Key Enabling Technologies in Europe[55] defines more than 100 different skills necessary for the development of selected strategic technologies in the EU.

According to analytical material PWC[56], which evaluated the state of digital skills in the corporate sphere, there is some discrepancy between how DESI assesses the state of digital competencies and how it itself corporate sphere. According to DESI, the level of general digital skills in Slovakia is similar EU average but lags behind the level of EU digital leaders. In addition, the country has one of the smallest shares of citizens with low general digital skills. According to DESI, only 55% of Slovaks have basic or better basic skills, e.g., they are able to use knowledge in at least one area competency as defined by the DSI (Digital Skills Indicator).

Despite the fact that it is 1 percentage point higher than the EU average, our country loses the entire 24 percentage points to European digital leaders (79%). In addition, only 21% of Slovaks have better than basic general digital skills in all competence areas, which is by 31 percentage points less than the European digital leaders (52%), the EU average is 26%[57].

When comparing the availability of skills across sectors of the economy, there is competence in each area the situation is very similar. While ICT, professional services, and finance always come first in the availability of skills in their labour force, agriculture, and manufacturing have the lowest labour share strength in each competence.

In the field of security, the situation is not favourable and the level of skills above the basic level, when employees can deal with sophisticated types of threats reaches only 63%. The ability to protect varies from industry to industry. While the share of the workforce in ICT, finance, arts and entertainment, and in professional services sectors who master basic or higher basic security skills, is higher than the national average, in sectors such as health, manufacturing, and agriculture less than 40% of the population has at least basic skills in this competence.

---

[55] https://op.europa.eu/en/publication-detail/-/publication/ad3f9c00-9ad4-11e6-868c-01aa75ed71a1
[56] https://www.mirri.gov.sk/aktuality/digitalna-agenda/pocitacova-gramotnost-slovenskych-firiem-je-pre-uspesnu-digitalnu-transformaciu-krajiny-klucova/index.html
[57] https://ec.europa.eu/newsroom/dae/redirection/document/88763

Strategic goals

Primary strategic goal:

Strategic goal:	Increasing the number of employers providing education (for their employees) in the area of digital skills[58]
Present value:	The share of employers providing education (for their employees) in the area of digital skills is 16%, which is under the EU average (of 20%)
Target value:	The share of employers providing education (for their own employees) in the area digital skills are
Due date:	2026
Data source:	DESI
Evaluation frequency:	annually

Key performance indicators in this dimension include:

- The number of graduates of completed training - measures 3A, 3E
- The number of graduates of courses in the field of development of basic and advanced digital skills - measure 3B and measure 3C

Their specific values are listed for individual measures.

Based on the results of these analyses and surveys, the fulfilment of the following key ones will also be monitored areas:

- Improvement of Slovakia's position in the DESI evaluation in all competencies at least to the level of the EU average
- Increase the number and ratio of technical experts to the level of the EU average
- Improving the adaptability of labour market participants - support for upskilling and reskilling, for positions that require automation and robotisation

through the implementation of the following measures:

MEASURES

- 3A Supporting the development of basic digital skills for employees, job applicants, job seekers, and the self-employed through Individual Learning Accounts (ILA[59])
- 3B Supporting the development of the active workforce digital skills among employers - encouragement of reskilling and upskilling education
- 3C The support for the education of public administration employees – taking into account RIS3 domains
- Retraining of hard-to-apply NEET graduates so that they can be applied to ICT positions of lower and medium difficulty

---

[58] This is indicator 1b3 DESI - Companies providing education in the ICT area
[59] COUNCIL RECOMMENDATION of 16 June 2022 on individual education accounts (2022/C 243/03)

- 3E The support for the development of digital skills of job applicants and job seekers – the support for reskilling and upskilling education according to the demand of employers

[RECOVERY] PLAN

Priority 3.4: Share of girls and women in ICT

Despite the growing percentage of women working in ICT since 2018, Slovakia is below the EU average. In 2020, 15.8% of ICT specialists worked in Slovakia. The most significant changes were recorded during the years 2016 and 2017 when the share of working women in this area increased by 2.8 thousand, which represents 4.7%. The results achieved by Slovakia in this area are above the average of V4 countries[60].

The considerations of girls on studying computer science are one of the key indicators of their future potential application, or career in the IT field. Based on the statements made by girls, it is possible to estimate that such potential is at the level of 20%. On the one hand, 3% of them have already decided to study computer science or some related field. On the other hand, another 18% say they are still thinking about it, but maybe they will decide otherwise. It is this group of girls that is crucial for the various motivational activities of universities and the IT sector. As previous research by the Institute for Public Affairs showed, between girls and women aged 18-26, many of their original decision to study has changed. On the other hand, up to 79% of girls are not attracted to the study of computer science at all and do not consider such a possibility at all[61].

The considerations about studying and working in the field of computer science are determined by various circumstances. Among the girls who either refuse to study (79%) or are only considering studying (18%) the most common reason is lack of interest or focus on something other than computer science. But paradoxically, it is mentioned by more girls who think about studying (56%), than those who reject it (49%).

The reasons for the girls are also different in other "why not" or "why maybe" arguments. Girls who refuse to study computer science, argue that the study is too demanding (35%) and that they are incapable of understanding computers and technology (26%). Among the less significant are arguments such as lack of information (what would she use it for, what would she do, etc.), dissuasion from people around them (family, school), inability to apply at the place of residence, enough time to make a decision, etc.

The weight of arguments is quite different for girls who are still deciding. The "spook" of the difficulty of studying (31%) or the inability to understand computers and technology (25%) resonates between them as well. However, reasons such as the lack of information about the career of an IT specialist also appear above average (24%) and talking down from people around them (family, school), e.g. when their ideas about their daughter's future profession are different and so on. (19%). Another reason is the less important location.

Women have long represented 45% of the Slovak workforce. Within the economically active population, 56% of women have a university degree, while only 43% of men. However, based on the Commission's analysis in 2018[10], Slovakia has only 9 female STEM graduates per 1,000 inhabitants aged 20-29, while the European average is at the level of 13.7. The European leaders in this area are Ireland (23.9), Poland (17.4), and France (17.3).

Increasing the number of female STEM graduates and ICT specialists has the potential to significantly help the chronic lack of manpower in ICT. More than 53% of EU companies looking to hire ICT staff reported the problem of finding competent people for the tasks of the job position sought. In the SR it is up to 60%.

---

[60] https://ec.europa.eu/eurostat/databrowser/view/isoc_sks_itsps/default/table?lang=en
[61] https://www.ivo.sk/buxus/docs//publikacie/subory/Zeny_vo_svete_IT.pdf

(data from 2017). The problem of women lagging behind in active participation in the digital economy and society is a problem for the majority of the population, as women make up the majority of the EU population (51.16%). That is why measures that could accelerate the active participation of women in the digital economy and society, to increase the number of female STEM students and ICT specialists are strategic.

In 2021, the level of Women In Digital Score (WID – Women In Digital Score[62]) in Slovakia was 47.4 points. It is calculated as a weighted average of three sub-areas:

1. Internet use (33.3%),
2. Internet user skills (33.3%),
3. Professional skills and employment (33.3%)

Women in Digital (WID) score Women
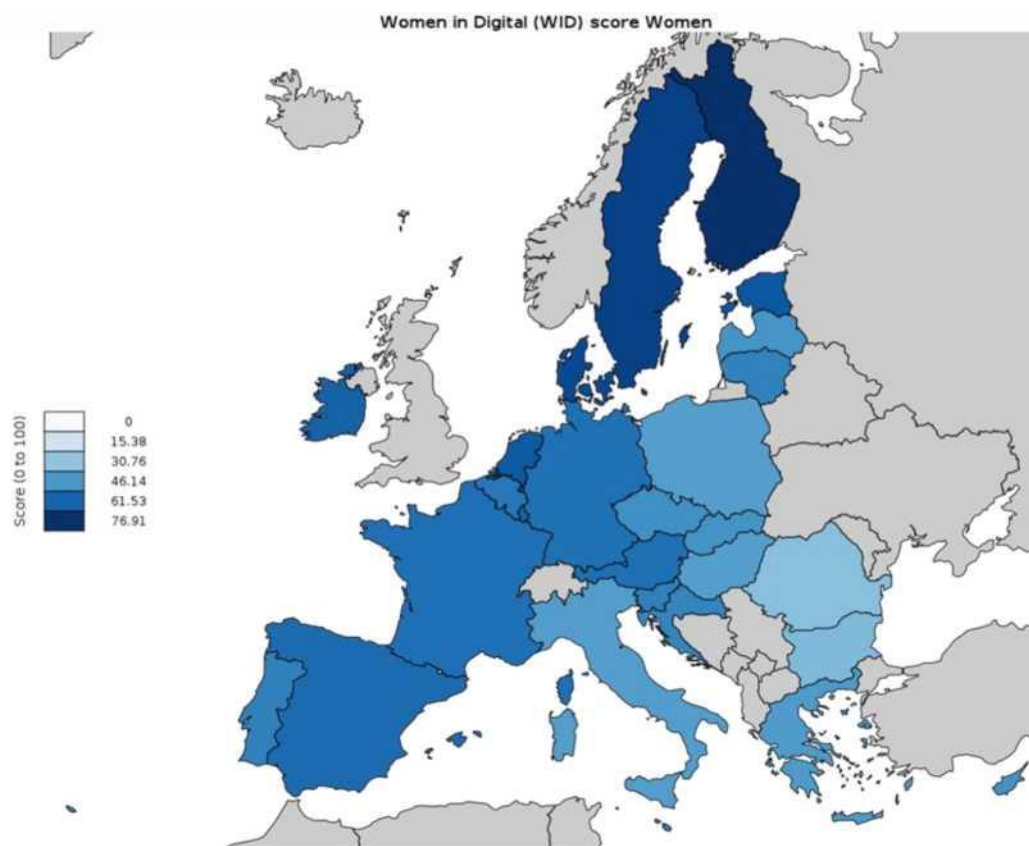
Source: European Commission

The countries with the highest WID scores in 2021 were Finland (79.6), Sweden (71.6), Denmark (69.3), Estonia (65.1), and the Netherlands (64.6).

---

[62] European Commission, Women in Digital Score, 2021 [online]

Funded
by the European Union
NextGenerationEU

[RECOVERY] PLAN

MINISTRY
OF INVESTMENTS, REGIONAL DEVELOPMENT
AND INFORMATIZATION
OF THE SLOVAK REPUBLIC

Based on TREXIMA data, in 2020, 16.9 thousand women and 89.9 thousand men worked in ICT in Slovakia[63].

The number of women working in ICT has been growing year by year since 2016, but the proportion of women in the industry is not increasing significantly. Over the last analysed year (2020), the number of women in ICT in Slovakia increased by 3.4 thousand (while from 2011 increased by a total of 5.8 thousand). This is the highest year-on-year increase in the last 10 years. For comparison, the number of men employed in ICT increased by 37.9 thousand over the same period, which represents a 6.5 times higher increase than for women. Achieving the goals of this priority through the implementation of specific activities is considered to cooperate with existing successful initiatives in this area, such as e.g., civil association Aj Ty v IT[64], which also actively participated in the creation of NSDZaAP.

Strategic goals

Primary strategic goal:

Strategic goal:	Increasing the number female ICT specialists
Present value:	Women make up to 15 % of ICT specialists, the EU average is 19 %
Target value:	The share of female ICT specialists will increase to 20%
Due date:	2026
Data source:	DESI 2022
Evaluation frequency:	annually

Key performance indicators in this dimension include:

- The number of female IT specialists placed in companies – measure 4A
- The number of traineeships for women within the adaptation programme – Action 4A
- The number of young people approached by digital career awareness activities – Action 4A
- The number of primary and secondary schools involved in popularizing the benefits and opportunities of studying ICT fields for girls – measure 4B
- The number of girls approached regarding the benefits and opportunities of studying ICT fields - measure 4B

Their specific values are listed for individual measures.

Based on the results of these analyses and surveys, the fulfilment of the following key ones will also be monitored areas:

- Encouraging more active inclusion of women and girls in the digital society and economy
- Increasing the number of women in ICT fields of study

---

[63] Women in ICT, 2021, Women's Algorithm [online]. [cit. 23/05/2022]. Available from: https://www.zenskyalgoritmus.sk/_files/ugd/9ff2bb_732d6d1af94145bda40279a3a0bb659f.pdf
[64] https://ajtyvit.ska/

- Making the work environment more attractive for female ICT specialists, improving the recruitment process and career advancement opportunities for women in ICT fields

through the implementation of the following measures:

MEASURES

- 4A Supporting the motivation of girls and women in the field of ICT in close cooperation with the National Coalition for Digital Skills and Jobs of the SR
- 4B Increasing the number of girls and women in ICT fields of study at secondary schools and universities

Priority 3.5: Digital divide and digital exclusion

At the end of the 20th century, the term digital divide mainly referred to the division between the haves and the have-nots. who do not have access to a telephone. At the beginning of the 21st century, this term began to be used mainly as a description of the division between people with and without access to the Internet and, gradually, also to describe the division between people with and without broadband access. In addition to physical access to technologies and resources, this term also includes the necessary skills for effective use of information and communication technologies.

A digital divide usually exists between users in urban areas and users in rural areas; between people with higher education and those with less education; between different socio-economic groups and from a global perspective between more and less economically or industrially developed countries. However, the last approach is also the gap between the ways of using the approach to the Internet or to the technologies themselves.

In the availability of digital infrastructure, Slovakia has caught up with the EU average. Along with better accessibility, the number of Internet users also increased, but some groups of the population still fall behind in the use of the Internet. The share of people in the 65-74 age group with at least basic digital skills is only 11%, the EU average in the same age group is 24%. In particular, low-income households with children and the elderly are lagging behind in terms of digital availability. The problem is also the low level of digital skills among the adult population, which reduces the chances of better-quality employment. The share of people with at least basic digital skills in the Slovak population is 54 %. The availability and use of technologies thanks to digital skills has a significant impact on the quality of life at any age. Digital literacy is related to the possibility of using people's own potential and their full functioning in the digitized era, which was also reflected in the policies supporting active aging, which is a prerequisite for maintaining and developing sustainable societies. Therefore, it is important to design measures to improve digital inclusion[65].

The group of seniors is among the most at-risk groups from the point of view of infection with the COVID-19 virus, except for health threats, the pandemic also increases the risk of loneliness and loss of contact with loved ones, limited access to information and health services from the senior perspective.

The COVID-19 pandemic has highlighted the importance of the digital world while also showing the problems and consequences of digital exclusion. In particular, households with school-age children felt the importance of the availability of digital technologies during the pandemic. Data from the pandemic period map household hardware ownership as well as adaptation to online communication across different social groups. During the pandemic, most schools switched to distance learning mode.

The results of the MŠVVaŠ SR[66] surveys show that 565000 pupils had access to online teaching. Teachers considered the online form of education to be the best alternative to regular education, yet 128000 pupils (18.5 %) failed to be included in online teaching. In schools with a high proportion of pupils from socially disadvantaged environment, the proportion of students who were not connected to distance learning was

---

[65] Unconnected - Digital poverty and digital inclusion in Slovakia. IDRP, MIRRI SR, 2022
[66] https://www.minedu.sk/komentar-022020-hlavne-zistenia-z-dotaznikoveho-prieskumu-v-zakladnych-a-strednych-skolach-o-priebehu-distancnej-vyucby-v-skolskom-roku-20192020/

the highest – 51.4%. The worst was the special primary schools, which have the highest proportion of pupils from socially disadvantaged backgrounds, where 90 % of pupils did not participate in online teaching.

Differences in the involvement of pupils in online education based on their belonging to socially vulnerable groups also show the relationship between social and digital inclusion. Most children from social of vulnerable groups did not participate in online classes, thereby losing almost a year of schooling. The omission of the compulsory school year will have a negative effect on the level of income in adulthood. This means that, among other obstacles, in the future, these children will be even more disadvantaged than their peers who had better access to (online) education. According to current surveys, pupils from socially disadvantaged backgrounds are more prone to addiction to social networks and insufficient resilience to hoaxes, and this places increased demands on their digital skills.

In general, it can be said that individuals or groups of people who are excluded from access to the Internet also belong to the economically and educationally weakest section of the population. These people are exposed to large social disparities, especially in terms of access to and use of technology. This inequality has led to discrimination of human rights in the early stages of the digital society internet environment. This is why the digital divide has a dual character, which can be defined not only as socio-economic but also as cultural-educational.

Among the categories of individuals and groups at risk from the digital divide, the most affected could be:

- Seniors over the age of 65 (intergenerational digital divide)
- Persons from marginalised communities and individuals with lower education
- Children and youth from socially and economically disadvantaged backgrounds
- Public administration employees - long-term care services sector and informal caregivers
- Immigrants (linguistic and cultural digital divide)
- Persons with disabilities
- Persons serving a prison sentence
- Persons with low education

From the point of view of the company and the business entity, it is also possible to identify the digital divide as the ability, or the inability of the company to successfully implement digital transformation. Measures for better digital inclusion should be targeted at children from disadvantaged backgrounds, adults with low digital skills, and seniors. The type of measures should vary depending on the characteristics of the target group. Just as the degree and type of digital skills necessary for modern life vary according to the age and individual needs of different groups, the types of barriers to their better digital inclusion also differ. The state should therefore try to implement different types of policies and approach each target group individually.

Strategic goals

Primary strategic goal:

Strategic goal:	Active work and education of persons from disadvantaged groups in the field of digital skills.
Present value:	2,300 trained people from the disadvantaged groups

Target value:	Trained together min. 250,000 persons from disadvantaged groups.
Due date:	2026
Data source:	The MIRRI SR
Evaluation frequency:	annually

Key performance indicators in this dimension include:

- The number of established digital innovation HUBs - measure 5A
- The number of graduates of the digital skills development training - measure 5B
- The number of announced calls - measure 5B
- The number of trained persons - measure 5C
- The number of graduates of the digital skills development training - measure 5D
- The number of announced calls - measure 5D

Their specific values are listed for individual measures.

Based on the results of these analyses and surveys, the fulfilment of the following key ones will also be monitored areas:

- Identifying areas of the digital divide between categories of individuals and groups who are at-risk by the digital divide in individual regions of Slovakia and stronger enforcement of their solutions at the national level
- Increasing the availability of inclusive education and creating an electronic inclusion platform for citizens of all age categories and social backgrounds

through the implementation of the following measures:

MEASURES

- 5A Increasing accessibility to inclusive education and e-inclusion of citizens of all ages and social backgrounds
- 5B Increasing the level of digital skills of seniors and representatives from other disadvantaged groups
- 5C Analysis and implementation of an appropriate approach to building digital literacy, digital education, and the use of digital solutions (including eGovernment) by people from marginalized Roma communities
- 5D Increasing the level of digital skills of children and youth from socially and economically disadvantaged backgrounds

4. Conclusion

The NSDZaAP is a strategic document that defines the goals and measures needed to raise the level of digital competencies and skills of the entire company. The material has a cross-sectoral nature and aims to synergistically connect and streamline existing or planned digital initiatives at the national level.

The material identifies and develops dozens of new tasks that address currently uncovered or insufficiently covered areas needed to improve Slovakia's DESI score in the human dimension capital, but also indirectly in all other DESI dimensions. Its preparation was based on events and developments in the world, other EU Member States, as well as on operational projects that have proved to be in Slovakia but also in the surrounding area.

The identified and proposed measures are thus based on the analysis of the development of Slovakia's assessment in DESI, but also from numerous documents from representatives of employers' unions, representatives of trade unions, the academic community, or civil society. Competent, educated, constantly learning, and progressing human capital is a necessary prerequisite for the progress of all parts of society and sectors of the economy, especially if we can motivate them so that they do not leave the country. Therefore, special attention should be paid to supporting talent as well as educating the most vulnerable groups.

The strategy addresses the identified challenges by defining strategic priorities and ambitions in each of the priority areas. The above-mentioned measures connected with concrete indicators or a group of indicators, primarily DESI, should serve to fulfil them. By implementing these measures and by consistently implementing the strategy, we expect an improvement in the evaluation of these selected indicators, which will cumulatively manifest not only to increase the overall score of Slovakia in DESI but also a potential shift of the country towards the overall achievement of the EU average.

When implementing the strategy, it is necessary to take into account that the other EU member states will do the same work on accelerating their digital transformation. They represent concrete plans and strategies, and in the same way, the Commission itself is intensifying the dialogue with individual member countries, recognising the significant gaps between countries and the lag behind the EU as a whole. Catching up on the lead that most EU countries have compared to Slovakia therefore requires a truly focused and synergistic activity, on which strategic emphasis and adequate resources will be placed. At the same time, given the complexity and interdependence of the various areas of digitalisation that need to be addressed, it is important to realize that the manifestation of the results of the individual measures will be delayed. Therefore, it is necessary to start the implementation measures in the shortest possible time.

Action plan for the years 2023 – 2026

An action plan is a detailed plan that outlines the activities and actions needed to achieve one or more goals. In order to succeed, the strategy as a whole needs to be adequately monitored and revised throughout the implementation process. The identified managers are responsible for project management of the implementation of individual actions.

An overview of the measures is included in Annex 1. Annex 2 presents a SWOT analysis of the ICT sector according to the Alliance of sector councils of the SR.

A. Institutional background

Strengthening the institutional background by further supporting the activities and pursuits of the National Coalition for Digital Skills and Jobs of Slovakia.

Indication:	0A
Description of the measure:	Ensuring continued funding for the National Coalition for Digital Skills and Jobs of the SR as a national platform. The MIRRI SR, the MŠVVaŠ SR, and the MF SR are members of the National Coalition for Digital Skills and Jobs of the SR, an interest association of legal entities that performs the function of the secretariat of the Digital Coalition Initiative as a national platform. To ensure the sustainability of the activities of the National Coalition for Digital Skills and Jobs of the SR and to support its further development, it is necessary to ensure adequate funds from public finances from all its members representing the interests of public administration. The mentioned measure will follow up on the Government Resolution 78 from February 19, 2020, on the basis of which the amount to support the activities of the Digital Coalition was determined until 2022 in the amount of 513,000 euros per year in the years 2020-2022. The required resources for the years 2023-2026 will be provided as follows: • EUR 150000 per year for the MIRRI SR through the Digital Action Plan transformation of SR for the years 2023-2026 (and not through NSDZaAP) • EUR 250000 per year for MŠVVaŠ SR via NSDZaAP • EUR 150000 per year for MF SR via NSDZaAP
The management:	The MIRRI SR
Cooperating	The MŠVVaŠ SR, the MF SR
Main expected output:	Coordination of key partners' activities in fulfilling the tasks of the National Coalition for digital skills and Jobs of the SR and in raising the level of digital skills, increasing the number of ICT specialists and facilitating the transition workforce in Slovakia for digitised occupations.

Indicator:	The number of active members of the Digital Coalition Initiative. Growth in the level of digital skills among the monitored groups.
Data source for indicator:	DK annual report, level measurements in the monitored groups
Due date:	annually
Milestones:	2023 – 100 members of the Digital Coalition initiative/increase in the number of activities of the National Coalition for Digital Skills and Jobs of the Slovak Republic by 5 % 2024 – 120 members of the Digital Coalition initiative/increase in the number of activities of the National Coalition for Digital Skills and Jobs of the Slovak Republic by 7 % 2025 – 150 members of the Digital Coalition initiative/increase in the number of activities of the National Coalition for Digital Skills and Jobs of the Slovak Republic by 10 % 2026-180 members of the Digital Coalition initiative/increase in the number of activities of the National Coalition for Digital Skills and Jobs of the Slovak Republic by 15 %
Costs:	2023— 550 000 EUR 2024— 550 000 EUR 2025— 550 000 EUR 2026— 550 000 EUR
Source of funding:	ŠR

Developing an effective model to manage and coordinate digital skills activities among relevant public administrations.

Indication:	0B
Description of the measure:	Strengthening the management model within the public administration for more effective coordination and management of support and development of digital competencies and skills in Slovakia. Coordination and management of support for the development of digital competencies and skills is highly fragmented across education. Competencies in this area are mainly divided between the MŠVVaŠ SR, the MPSVR SR, and the MIRRI SR, while other departments, such as MH SR, also play an important role. Considering the importance of the position of digital competencies and skills, their rising importance, and in the effort to achieve the set goals is necessary to introduce a more effective mechanism that will be responsible for managing this area and including consideration of enforcement powers over the relevant resorts. The new model will take into account the current setting competencies, the role of advisory bodies of the Slovak government, as well as the status of the established the National Coalition for Digital Skills and Jobs of the SR. The creation of this model will also be considered in the form of a project from EŠIF or adoption of legislative changes, especially toward strengthening the position of the National Coalition for digital skills and Jobs of the Slovak Republic. At the same time, the representative of the MIRRI SR performs the role of the National Coordinator for Digital Education and Skills in the framework of the so-called "structured dialogue" launched by the Commission in early 2022.
The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, the MOLSAF SR
Main expected output:	An effective "governance" model Establishment of an interdepartmental working group (hereinafter referred to as 'MPS') with representation of the relevant ÚOŠS
Indicator:	creating an effective management model
Data source for indicator:	Internal documentation of the MIRRI SR and materials of the Government Council for the Digitalisation of Public Administration and the Single Digital Market
Due date:	2026
Milestones:	2023 – Preparation and approval of the feasibility study, 1st meeting of the MPS 2024 – A new strengthened and more efficient "governance" model was created, and its activities were launched. Regular meetings between public administration entities 2025 – functioning of the new model according to the new setting 2026 – functioning of the new model according to the new setting
Costs:	2023 – 50 000 EU for ŠU 2023-2026-1 FTE for the MIRRI SR (EUR 45 888 per year)
Source of funding:	ŠR

A more effective connection of public administration authorities, the National Coalition for Digital Skills and Jobs of the SR, and the Alliance of Sector Councils in the field of digital skills development.

Indication:	0C
Description of the measure:	Within the NP "SECTOR-DRIVEN INNOVATIONS to an efficient labour market in the Slovak Republic," 24 sector councils worked with the aim to help prepare Slovakia and the actors of its individual sectors for challenges and opportunities brought by new megatrends, including digitisation and automation. Within the sector councils is a multilateral representation from the business sector, academia, or public administration. The sector councils have drawn up dozens to hundreds of recommendations on how to improve the situation and readiness of human capital for the challenges of the future within the framework of the Human Resources Development Strategy for individual sectors until 2030. Currently, the potential of using their outputs is consulted with the respective central offices by the state administration authorities, taking into account their scope in relation to individual sectors that will participate in their implementation. Coordination will be ensured by the Alliance of Sector Councils in compliance with the current legislative process on the Draft Act amending Act No 5/2004 on Employment Services and amending certain acts, as amended, and amending certain acts. In order to ensure efficient use of the professional expertise and resources available to the sectoral councils, the outputs of the activities of the National Coalition for Digital Skills and Jobs of the SR, the Alliance of Sector Councils in the field of Digital Skills Development and simplifying the implementation of their outputs related to the development of digital skills, it is envisaged to establish an association with legal personality of the Alliance of Sector Councils and proposes a more active cooperation by relevant public administration entities, in particular the MIRRI SR, the MŠVVaŠ SR and MPSVR SR, as well as the Digital Coalition. A wider format of cooperation will also be established under the coordination mechanism between public administrations, comprising both representatives of sector councils in the field of digital skills development and other representatives of the professional public.

The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, the MPSVR SR
Main expected output:	Establishment of MPS with a representation of relevant ÚOŠS, representatives of sectoral councils in the field of digital skills development and a wider professional public Simplified implementation of measures and recommendations by sector councils
Indicator:	The number of MPS meetings in a wider format The number of implemented actions and recommendations

Data source for indicator:	Internal documentation of the MIRRI SR
Due date:	2026
Milestones:	2023 – 1st meeting of the MPS in a wider format 2024-2026 – min. of 2 meetings of the MPS in a wider format, identification of measures and recommendations for implementation and their gradual
Costs:	There is no prospect of an impact on public finances in terms of coordination activities. The impact resulting from the implementation of individual measures and recommendations of the sectoral councils cannot be determined at the moment.
Source of funding:	N/A

1. ICT specialists

Applying legislation for the granting of national visas (type D) in order to simplify the conditions for employment of foreigners and especially specialists in the field of ICT (graduates of any of the university degrees education from foreign universities and specialists with at least three years of experience in the ICT field regardless to the achieved level of tertiary education), as well as the simplification of the regime of recognition of documents for education and professional qualifications for performing a regulated profession.

Indication:	1A
Description of the measure:	The mentioned measure is a follow-up to the reforms 1 and 2 of Component 10 of the Recovery and Resilience Plan, namely the "Reform of residence and labour legislation" and "Simplification of the regime for the recognition of qualifications and professional qualifications for the exercise of a regulated profession". The aim is to apply the relevant legislation aimed at simplifying obtaining a residence and work permits for highly qualified third-country workers, as well as recognition of completed education and professional experience abroad more quickly and easily. From the point of view of the acute lack of ICT specialists on the Slovak labor market, it is necessary that the mentioned legislation helped ensure an increase in the share of highly qualified foreigners in Slovakia, as well as foreigners with family ties in Slovakia in the field of ICT unions.
The management:	The Ministry of the Interior of the Slovak Republic (hereinafter referred to as 'MV SR')
Cooperating entities:	The MPVSaR SR, the MIRRI SR, the MŠVVaŠ SR
Main expected output:	Application of the scheme defining the range of national visa applicants (D) in the interest of the SR (in the form of a government resolution)
Indicator:	Approval of the above-mentioned reforms The number of national visas (D) assigned to foreigners in ICT fields The number of decisions on recognition of ICT education and qualifications obtained abroad

Data source for indicator:	The databases of the MV SR The databases of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023-2026 – implementation of the above-mentioned reforms to gradually increase the share of national visas (D) assigned to foreigners in ICT fields and the share of recognised ICT education and qualifications acquired abroad within shorter deadlines than it has been the case so far
Costs:	The impact on public finances cannot be quantified at the moment, as we cannot predict in advance the number of foreigners with ICT qualifications or applications for recognition of required and completed education abroad. Therefore, it is not possible to quantify the impact on the administrative costs of public administration.
Source of funding:	N/A

Support the development of specific digital skills to meet the objectives of the Research and Innovation Strategy for Smart Specialisation of the SR (SK RIS3 2021+)

Indication:	1B
Description of the measure:	Supporting the development of specific digital skills for fulfilment needs goals of the Research and Innovation Strategy for Smart Specialisation of the SR ((SK RIS3 2021+) through the declaration of mainly demand-oriented challenges. By improving advanced digital skills (working with data and databases, machine learning, advanced IT systems, IoT, cybersecurity, etc.), including industry certifications recognised by practice, the mentioned measure will support the achievement of the objectives of all strategic domains (domains) SK RIS3 2021+: — Innovative Industry for the 21st Century — Mobility for 21. Century — Digital transformation of Slovakia — A Healthy Society — Healthy food and the environment. It will also respond to the horizontal challenges specified in SK RIS3 2021+ in the field of human resources and skills, the successful handling of which is a prerequisite for ensuring a high-quality research and innovation ecosystem of the Slovak Republic.
The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, the MPSVR SR, the MH SR
Main expected output:	Minimum of 7 announced calls
Indicator:	The number of announced calls
Data source for indicator:	The internal database the MIRRI SR/ monitoring compliance of SK RIS3 2021+

Due date:	2026
Milestones:	2023-1 announced call 2024-2 announced calls 2025-2 announced calls 2026-2 announced calls
Costs:	2023 — 3 mil. EUR 2024 — 5 mil. EUR 2025 — 8 mil. EUR 2026 — 8 mil. EUR
Source of funding:	PSK – RSO1.4.2

Improving the quality of studies and the number of ICT graduates in secondary vocational schools, IT grammar schools, and universities

Indication:	1C
Description of the measure:	A. An analysis of standards in the categories of schools (SOŠ and grammar schools), where classified ICT educational programs (group of branches 25) are included from the point of view of the current needs of schools to ensure quality education in IT departments, especially concerning the salaries of IT specialists using cooperation with the Digital Coalition. B. Adjusting the level of standards based on the results of the analysis. C. An analysis of the new ŠVP "IT grammar school" in relation to the outputs from the IT Academy national project – proposal of a new field of study "A grammar school with the focus on IT". D. An analysis of the requirements of the labour market and universities for IT specialists and potential students of computer science in 5-10 years for defining the required number of graduates of secondary and higher education institutions in individual departments, using cooperation with the Alliance of Sector Councils. E. Implementation of the new field of study "A grammar school with the focus on IT" and adaptation of the regulation for this field based on the results of the analysis. F. Conditions and investments necessary to ensure increased capacity of selected secondary vocational schools and grammar schools with ICT departments. G. Conditions and investments necessary to ensure increased capacity of selected universities with ICT curricula. Modification of the subsidy scheme of VŠ. H. Implementation of support mechanisms and investments for ICT
The management:	The MŠVVaŠ SR
Cooperating entities:	The MIRRI SR

Main expected output:	50 % increase in ICT departments of secondary school graduates in 2026 compared to 2022
Indicator:	The number of ICT graduates in secondary schools
Data source for indicator:	Statistical data of the MŠVVaŠ SR
Due date:	Q4/2026
Milestones:	2023 – publication of the call and analysis 2024 – evaluation of analyses, adaptation of norms of ICT SOŠ and grammar schools, preparation of calls for investments for schools, implementation of new ŠVP IT grammar school 2025 – announcement of at least 2 calls (one secondary school, one university) 2026 – announcement of at least 2 calls (one secondary school, one university)
Costs:	The total cost cannot be accurately estimated before the analyses are evaluated, at least 250 000 EUR 2023: EUR 60000 analysis of norms (the MIRRI SR), 40 000 EUR analysis of the need to create an IT grammar school (the MIRRI SR) + 15 0000 EUR analysis of labour market requirements and universities (the MŠVVaŠ SR) 2024-2026: Costs cannot be estimated at the moment, as they will result from newly set ICT norms for SOS and grammar schools.
Source of funding:	ŠR

2. Digital skills of young people and educators in the educational process

The measures are divided into two main areas:

- Digital Skills and Competencies for the 21. Century
- Transforming education through digital technologies (digital transformation of education)

Measures within the area of „Digital skills and competencies for the 21st century"

Establishing the central competencies for the 21st century that the school will develop at the level of primary, secondary, and higher education and their inclusion in curriculum documents as part of the ongoing curriculum reform

Indication:	2A
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme 2030 and will be implemented through the following tasks: A. Development of recommended competence standards for education actors at different levels of education, based on the European Reference Frameworks in particular in the field of digital skills B. Support for regular measurement of the level of digital skills of education actors and their international certification C. Adoption of Regulation No 39/2017 of the Minister of Education, Science, Research and Sport of the SR issuing professional standards for individual categories and subcategories of pedagogical staff and professional employees of schools and school establishments
The management:	The MŠVVaŠ SR
Cooperating entities:	PRO under the MŠVVaŠ SR
Main expected output:	A. Establishment of competence standards recommendations B. 200 000 tested education actors on all three levels and year-on-year improvement of results C. Implemented modification of the minister's instruction
Indicator:	A. Establishment of competence standards recommendations B. The number of education actors tested on all three levels and year-on-year improvement of results C. Implemented modification of the minister's instruction
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023 – fulfilment of task A and C above 2023-2026 – Regular implementation of task B mentioned above to test between 40 000 and 70 000 people per year
Costs:	2023-2026 – Costs based on approved interventions
Source of funding:	PSK – PO4 (SPECIFIC OBJECTIVE WITH (E))

Creating an area for primary and secondary schools as part of the planned reform of education content to develop competencies for the 21st century in formal education

Indication:	2B
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme 2030 and will be implemented through the following tasks: A. Development and adoption of a new curriculum for primary and secondary schools, which will include the development of competencies for the 21st century (standards elaborated in measure 3.2.1 are to be translated into content and performance standards) B. The approval of the new curriculum of primary schools and the approval of such adaptation of the educational programmes of the school, ensuring that the scope of teaching in the field of computer science and digital skills in primary and secondary schools is sufficient to master further studies and apply in practice. C. Support for the implementation of the new curriculum at primary and secondary levels schools with proven programs developed in cooperation with universities and employers supporting the development of IT and digital culture
The management:	The MŠVVaŠ SR
Cooperating entities:	Pro under the MŠVVaŠ SR
Main expected output:	Created curricular reform, or updated educational programs in primary and secondary schools
Indicator:	The establishment of curriculum reform, and a number of updated educational programmes for secondary schools
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023-2026 – ongoing implementation
Costs:	No impact on public finances is expected.
Source of funding:	N/A

Through cooperation with universities and the PRO of the MŠVVaŠ SR, the creation of an offer of further education of pedagogical and professional staff in the field of increasing digital skills and competencies according to the DigCompEdu standard and their use in the teaching process

Indication:	2C
Description of the measure:	The action follows from the Action Plan for the Education Informatisation Agenda 2030 and will be implemented through the following task: A. Announcement of a call for the creation of educational programmes in the field of digital skills of pedagogical and professional staff B. Creation of educational programmes for pedagogical and professional staff on digital skills in relation to recommended standards C. Implementation of further training programmes for pedagogical and professional staff in the field of digital skills
The management:	The MŠVVaŠ SR
Cooperating entities:	The Pro MŠVVaŠ SR, universities
Main expected output:	Announced call Creation of at least 2 educational (innovative) programmes Min. of 3000 graduates of the next education programmes
Indicator:	Announced call The number of created educational programmes created The number of graduates of educational programmes
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2024 – announced call 2023-2026 – development and implementation of educational programmes
Costs:	2023-2026 – 9 million EUR
Source of funding:	PSK – PO4

Introducing system transparent motivational mechanisms for teaching staff and professional staff who, through innovative digital learning practices and concepts, improve results in the educational process and actively enhance your own digital competencies

Indication:	2D
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme until the year 2030 and will be implemented through the following task: • Incorporation of DigiCompEdu standards into attestation requirements (first attestation – min. level B2, second attestation – min. level C1)
The management:	The MŠVVaŠ SR

Cooperating entities:	Universities, the PRO MŠVVaŠ SR and other entities providing attestation
Main expected output:	Incorporated DigCompEdu standards Min. 70 attestation requirements with DigCompEdu standard
Indicator:	The number of attestations with DigCompEdu standard
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2024 – Incorporation of standards 2025-2026 – implementation of attestations with incorporated standards
Costs:	No impact on public finances is expected.
Source of funding:	N/A

At the same time, at the level **of primary and secondary schools**, it is proposed, under the supervision of the MŠVVaŠ SR and with the necessary active cooperation with the founders of individual schools, to implement the following measures according to the Action Plan for the Education Informatisation Programme until the year 2030:

- To analyse the state of digital skills and competencies of pupils, teaching staff and legal representatives, including their development processes in the school environment.

- To develop a programme to increase transferable digital skills and competencies of pupils using education and testing systems that are compatible with the European DigComp 2.2 framework. (e.g. ICDL). Implement it within the framework of the School Education Programme in selected general educational institutions and at the SOŠ also in professional subjects, or in non-formal education of the school.

- To develop and to implement a teacher professional development and prevention programme with an emphasis on the development of digital skills.

- To develop specific digital skills of pupils, legal representatives, teaching staff, professional staff and other staff in electronic communication of educational actors, ensuring remote teaching during an emergency, state of emergency, and the functioning of the school as a digital school.

At the level of **higher education institutions**, the MŠVŠ SR is recommended to promote and provide possible cooperation in the implementation of the following measures resulting from the Action Plan for the Education Informatisation Programme until the year 2030:

- To improve the system to support teaching staff and professional staff in the use of digital technologies in the educational process through the newly created position of the school digital coordinator, ensure full-time or part-time funding for this position.

- To implement educational content in the learning content of study programmes at all three levels of higher education in relation to the digital transformation of society.

- To promote the use of open resources, the creation of innovative educational content and pedagogies.

- To set up a National Centre for the Digital Transformation of Education (NCDTV) in academia environment focused on implementing the digital transformation of education with two centres:

in Bratislava and Košice.

- To ensure a system of education for university staff according to the specific needs of their respective categories (higher education teachers, researchers, artistic staff and other staff, in particular administrative staff).

- To ensure that each curriculum includes the development of transferable and specific digital competencies in line with European standards and the needs of practice (the digital skills standard will be part of the accreditation of the study programme).

  In the training of future teachers, accurately distinguish the development of digital skills (at all levels and in all subjects) and preparation for teaching informatics, in primary education for all future teachers, at higher levels in the corresponding study programmes.

Every pedagogical graduate must meet the standard of digital skills of a teacher in relation to education in approbation (the digital skills standard will be part of the accreditation of the study programme). At the same time, the development of the digital skills of future teachers must be linked to the practical part of their studies.

Measures within the area of „Transformation of education through digital technologies (digital transformation in education)"

Improving the system of support for teaching staff and professional staff in the use of digital technologies in the educational process through the newly created school digital coordinator positions, securing funding for full or part-time for this position

Indication:	2E
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme until the year 2030 and will be implemented through the following task: • Analysis of needs and interest in the position of the school digital school coordinator • Updating the Workshop Catalogue • Preparation of professional standard for the school digital coordinator • Allocation of resources for individual school years This measure concerns the establishment and permanent support of school digital coordinators in primary and secondary schools. Regarding digital coordinators in colleges and universities, the establishment of this institute is recommended, but it is left to the full competence of these institutions.
The management:	The MŠVVaŠ SR
Cooperating entities:	__
Main expected output:	Performed analysis Setting up a minimum of 400 school digital coordinators per year
Indicator:	Performed needs analysis Updated Workshop Catalogue The number of school digital coordinators

Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2024 – performed analysis and updated workshop catalogue 2023-2026 – establishment of at least 400 school digital coordinators per year
Costs:	2023 – 2026 – the cost of school digital coordinators for the period 67 million EUR
Source of funding:	PSK – PO4

The implementation of educational content in connection with the digital transformation of the society to education study programmes at all three levels of higher education in ties to the digital transformation of society

Indication:	2F
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme until the year 2030 and will be implemented through the following task: • Public debate with representatives of universities, representations universities and the Slovak Accreditation Agency for Higher Education on the possibilities of implementing digital education into study programmes • Proposal for legal regulation: Amendment of the MŠVVaŠ Decree No. 244/2019 Coll. Z. on the system of study disciplines of the SR • Implementation of measures into internal quality systems of universities • Innovation of study programmes linked to the digital transformation of society
The management:	The MŠVVaŠ SR
Cooperating entities:	VS
Main expected output:	Implementation of digital education in study programmes
Indicator:	Holding a public debate The number of innovated study programmes
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023 – execution and conclusion of the public consultation 2024 – proposal and realization of legislation 2024-2026 – implementation
Costs:	It is currently not possible to determine the impact on public finances.
Source of funding:	N/A

The encouragement for the use of open sources, the creation of innovative educational content and pedagogical procedures, and support of proven procedures and educational programs developed in cooperation with employers with a focus on IT development and digital culture with an impact on the widest possible group of schools, teachers and pupils

Indication:	2G
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme until the year 2030 and will be implemented through the following task: • Analysis of the current state of digital educational content, prerequisites and weaknesses in terms of schools in terms of readiness for the digital transformation of education
	• Use of open resources, creation or database upgrade of the educational content (linked to educational standards of subjects) supported by digital technologies and innovative pedagogical procedures, including appropriate methodologies • Integration of digital technologies and innovative pedagogical procedures for teaching of all subjects • Collection, processing and use of educational data process (anonymised data published as open data – datasets in machine-processable format with public license) • Creation of digital curriculum[67], new subjects and contents for available hours with a focus on the digital transformation of society
The management:	The MŠVVaŠ SR
Cooperating entities:	NIVAM/VS (NCDTV)
Main expected output:	Creating a digital curriculum. Readiness for fully hybrid/online education as requested by the EK
Indicator:	Performed analysis Creating a digital curriculum
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2025
Milestones:	2023/2024 – performed analysis 2025 – the creation of a digital curriculum 2025-2026 – implementation
Costs:	2023-2026 – 8 million EUR
Source of funding:	PSK – PO4

---

[67] The term digital curriculum will be defined within the analysis forming part of the measure.

The establishment of the National Centre for Digital Transformation of Education (NCDTV) in the environment of academic workplaces long-term focused on the implementation of digital transformation of education with two centres in Bratislava and Košice with the involvement of experts from universities and experts from practice

Indication:	2H
Description of the measure:	The measure results from the Action Plan for the Education Informatisation Programme until the year 2030 and will be implemented through the following task: • Creating a personnel infrastructure from top educators; methodologies, researchers and content creators • The creation of analyses, expertise, standards, recommendations, criteria and mechanisms for the implementation of measures on the digital transformation of education • Preparation, implementation and quality certification of educational content; pedagogical practices, schools and teachers of digital excellence through PRO MŠVVaŠ SR • Implementation and support of educational research in the field of digital transformations of education • Creation of methodological materials for the support of digital transformations • Education and permanent support for school digital coordinators at primary schools and secondary schools • Creation and management of a grant scheme for the support of digital transformations – support of project intentions of schools and teachers to implementation of the digital transformation of education, to create a implementation of innovative cells and local networks of schools and teachers with the given goal
The management:	The MŠVVaŠ SR
Cooperating entities:	Universities, PRO MŠVVaŠ SR
Main expected output:	Creation of a National Centre for the Digital Transformation of Education
Indicator:	The number of outputs (publications, studies, etc.) from research The number of created methodological materials The number of school digital coordinators trained/the number of support groups The number of supported projects
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2024
Milestones:	2023-2024 – the creation of NCDTV, its staffing and establishment of a plan of activities for the coming years, launch of NCDTV activities 2024 – Continued implementation of NCDTV activities
Costs:	2023-2026 - 2 million EUR per year
Source of funding:	PSK – PO4

At the same time, it is proposed, **at the level of primary and secondary schools**, under the supervision of the MŠVVaŠ SR and with the necessary active cooperation with the founders of individual schools, to implement the following measures according to the Action Plan for the Education Informatisation Programme until the year 2030:

- Analyse the state of education with the supported by digital technologies and identify the potential of the school for the transformation of education and the school itself from the point of view of education actors, including taking into account inclusion needs.
- Develop and implement the School's Digital Transformation Programme – vision and action plan.
- Establish the position of a school digital coordinator.
- Adapt the school education programme to digital transformation.
- Create a professional teacher community aiming to improve teaching through digital technology, using appropriate methodologies and pedagogical practices.
- Create a community-based school system to develop active cooperation with legal representatives in the digital transformation.
- Through networks and partnerships, mainstream school into open concepts and systems for the digital transformation of society.

At the level of **universities,** the MŠVŠ SR is recommended to promote and provide possible cooperation in the implementation of the following measures resulting from the Action Plan for the Education Informatisation Programme until the year 2030:

- In the context of digital transformation, innovate the education of university students.

- In the context of digital transformation, innovate the training of future teachers.

3. Digital skills of active labour market participants

Supporting the development of basic digital skills for employees, job applicants, job seekers, and the self-employed through Individual Learning Accounts (ILAs)

Indication:	3A
Description of the measure:	The use of the Individual Learning Accounts (ILA) tool to support the basic digital skills of employees, job applicants, job seekers and self-employed (excluding public administration entities).
The management:	The MŠVVaŠ SR
Cooperating entities:	The MIRRI SR, the MoLSAF SR, The Alliance of Sectoral Councils, The National Coalition for Digital Skills and Jobs of the Slovak Republic
Main expected output:	At least 6 300 graduates in the basic and digital skills development through the use of ILA
Indicator:	The number of graduates of the conducted trainings.
Data source for indicator:	The databases of the MIRRI SR, the MŠVVaŠ SR, and the MPSVR SR
Due date:	2026
Milestones:	2023 – Preparation and launch of the pilot operation of the ILA system specifically for digital skills 2024 – 300 pilot course graduates 2025 – 1000 course graduates 2026-5,000 course graduates
Costs: (indicative)	2024 – 100 000 EUR 2025 – 250 000 EUR 2026 – 1 100 000 EUR
Source of funding:	PSK – PO4 (SPECIFIC OBJECTIVE WITH (G))

Supporting the development of the active workforce digital skills among employers - encouragement of reskilling and upskilling education

Indication:	3B
Description of the measure:	Support for the development of digital skills of the active workforce among employers – support of reskilling and upskilling programmes (outside the ILA scheme)

	The support will be aimed at subsidising employer-organised training for employees, which will contribute to their better adaptability to changes in the labour market, focusing on the development of digital skills. This measure will also build on the results of the survey on the digital literacy of employees of Slovak companies[68]. Education organised by employers for employees in order to prepare them for changed conditions for carrying out work activities due to changes in technological processes, digitalisation, automation and robotisation (support in the form of DOP, as part of a wider challenge to support training with the employer).
The management:	The MPSVR SR
Cooperating entities:	The MIRRI SR, The MŠVVaŠ SR, The National Coalition for Digital Skills and Jobs of the SR
Main expected output:	At least 7000 graduates in basic and advanced digital skills development
Indicator:	1a1, 1a2, 1a3, 2a1, 2a2 DESI
Data source for indicator:	The internal databases of the MPSVR SR a the MIRRI SR, DESI (Eurostat)
Due date:	2026
Milestones:	2023 – Preparing and launching the call 2024 – 2000 course graduates 2025 – 2,500 course graduates 2026 – 2,500 course graduates
Costs:	2023 — 150 000EUR 2024 — 350 000EUR 2025 — 550 000EUR 2026 — 550 000EUR
Source of funding:	PSK – PO4 (ŠC WITH (D))

---

[68] https://www.mirri.gov.sk/aktuality/digitalna-agenda/pocitacova-gramotnost-slovenskych-firiem-je-pre-uspesnu-digitalnu-transformaciu-krajiny-klucova/index.html

The support for the education of public administration employees – taking into account RIS3 domains

Indication:	3C
Description of the measure:	The support for the development of digital skills of public administration employees.
	The support will be aimed at subsidizing organized education by the employer (public administration entity) for employees who it will contribute to their better adaptability to the changes required by the transformation of work in public administration with a focus on the development of digital skills with regard to RIS3 domains. The support will take two forms: • provision of financial contributions to job seekers (labour market persons) in order to acquire/change the skills needed to remain in the labour market or improve their value in the labour market; and • training organised by employers for employees with the aim is to prepare them for changed working conditions due to changes in technological processes, automation and robotisation.
The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, Alliance of Sector Councils, National Coalition for Digital Skills and Jobs of the SR, the MV SR
Main expected output:	At least 7 000 graduates of digital skills development courses with regard to RIS3 domains
Indicator:	1a1, 1a2, 1a3, 2a1, 2a2 DESI
Data source for indicator:	The internal databases of the MPSVR SR and the MIRRI SR
Due date:	2026
Milestones:	2023 – Establishment and launch of a support scheme, 500 course graduates 2024 – 1500 course graduates 2025 – 2,500 course graduates 2026 – 2,500 course graduates
Costs:	2023 — 150 000 EUR 2024 — 350 000EUR 2025 — 550 000EUR 2026 — 550 000 EUR
Source of funding:	PSK – 1.4.2

Retraining of hard-to-apply NEET graduates so that they can be applied to ICT positions of lower and medium difficulty

Indication:	3D
Description of the measure:	Around 14 000 hard-to-employ young people and graduates (disadvantaged in the labour market) are added annually to the labour market, with the project aiming to place at least 20 % of them on the labour market per year. The target groups for the implementation of the measure are: NEET – The term NEET[69] is used to refer to young people not employed, nor are they in the process of education or training aged from 15 to 30 years old. These are natural persons who are kept in the register of jobseekers, but also natural persons who are not registered in the register of job applicants. Currently, 14.2 % of the population aged 15-29 years are NEET. In August 2022, they amounted to 41 667 people (unemployed under age 29, as reported by the ÚPSVaR). Intensive courses of several months (a combination of face-to-face and online) with a duration of at least a month to three months ending with an exam, based on which the graduate will receive an exit certificate attesting to his competence in ICT positions of lower and medium difficulty. Similar courses currently cost EUR 850 – EUR 1 500 per person. We assume that the labor market currently lacks 15,000 ICT workers specialists. This deficit will deepen by at least another thousand positions every year (the current education system is unable to produce adequate numbers and thus we need to extract them from the resources of the existing workforce), which will seriously jeopardise the performance of not only ICT but also other sectors to undergo the digital transformation in this crucial period. The measure targets so-called NEET groups with the goal to retrain and bring around 5000 people to the labour market in the ICT sector (and in IT positions in other sectors).
The management:	The MPSVaR SR
Cooperating entities:	The MIRRI SR, The MŠVVaŠ SR, The Alliance of Sector Councils, The National Coalition for Digital Skills and Jobs of the Slovak Republic
Main expected output:	Increasing the applicability of hard-to-apply graduates, reducing the shortage of ICT specialists
Indicator:	1a1, 1a2, 1a3, 2a1, 2a2 DESI
Data source for indicator:	The internal databases of the MPSVaR SR and the MIRRI SR
Due date:	2026

---

[69] https://www.eurofound.europa.eu/sk/topic/neets

Milestones:	2023 - 300 graduates
	2024 – 1 500 graduates
	2025 - 1 500 graduates
	2026 - 1 500 graduates
Costs:	2023 – EUR 1000000 (preparation, analysis of labour market needs and available educational programmes, requirements for their extension and preparation of the methodology as well as the new educational programmes themselves)
	2023 – 480 000 (pilot project to retrain the first 300 graduates)
	2024 – 2 500 000 EUR
	2025 – 2 500 000 EUR
	2026 – 2 500 000 EUR
Source of funding:	PSK – PO4 (MS WITH (A))

The support for the development of digital skills of job applicants and job seekers – the support for reskilling and upskilling education according to the demand of employers

Indication:	3E
Description of the measure:	Providing financial contributions to acquire/change the digital skills needed for active participation in the labour market for people seeking jobs (jobseeker) or to acquire/change the digital skills needed to remain in the labour market or improve the labour market situation of people interested in changing employment (jobs applicants)
The management:	The MPSVR SR
Cooperating entities:	The MIRRI SR, The MŠVVaŠ SR, The Alliance of Sector Councils, The National Coalition for Digital Skills and Jobs of the SR
Main expected output:	At least 20 000 graduates in digital skills development courses
Indicator:	The Number of graduates trained
Data source for indicator:	The databases of the MPSVR SR, the MIRRI SR a the MŠVVaŠ SR
Due date:	2026
Milestones:	2023 – the first 1 000 course graduates
	2024 – 5 000 course graduates
	2025 – 7 500 course graduates
	2026 - 9 500 course graduates

Costs:	2023 – 600 000 EUR
	2024 – 3 000 000 EUR
	2025 – 4 500 000 EUR
	2026 – 5 000 000 EUR
Source of funding:	PSK – PO4 (SPECIFIC OBJECTIVE WITH (A)+ SPECIFIC OBJECTIVE WITH (D))

4.Share of girls and women in ICT

Supporting the motivation of girls and women in the field of ICT in close cooperation with the National Coalition for Digital Skills and Jobs of the SR

Indication:	4A
Description of the measure:	**Increasing the digital skills of girls and women for better labour market uptake in Slovakia** In the context of the transformation towards a digital economy, there are significantly fewer women than men in Slovakia, but also in the European market. Failure to address this digital divide will lead to the loss of talent for women, innovation and entrepreneurship – and will further deepen it. The common ambition of the MIRRI SR and the National Coalition for Digital Skills and Jobs is to develop the digital skills and competencies of girls and women at risk of exclusion from the labour market by improving their employability. The MIRRI SR will therefore cooperate closely with the National Coalition for Digital Skills and Jobs of the SR through the following measures: • **Platforms for women in the digital age** Creation of an online platform to connect the interests of several parties from schools, employers through training providers with women and girls. The aim is to raise awareness of digital skills and the gender gap and to promote specific innovative partnerships. • **Career centre for female IT Specialists and adaptation programme in companies for women in the digital field** A career centre will be created for female STEM graduates who do not have sufficient experience with applications on the market and for women after a career break who have been increasing their ICT skills but haven't really worked in the given field and do not have sufficient enough ICT contacts to for application. • **The Adaptation Programme for Women** Connecting workplaces and women under the programme, through existing initiatives where, based on an analysis of the working environment of the company involved, jobs are found suitable for women in career breaks or career transitions.

	• **Women's Digital Skills Analysis Centre** The creation of a new organizational unit focused on impact analysis of digital transformation, especially with a focus on women, evaluating a collecting data obtained from the Platform, proposing and recommending changes processes related to digital transformation, and the placement of women on the labor market, which is an inevitable prerequisite for their removal disproportions in the digital transformation within Slovakia, and that digital transformation was an effective tool for the development of Slovakia and contributed to the improvement of state services. • **Support for activities that are oriented towards career support for girls and women** Financial support for events, workshops, conferences and other types of activities aimed at the career support of women and girls in the field of ICT. The main prerequisite for the successful implementation of the measures is cooperation and partnership with relevant departments.
The management:	The MIRRI SR
Cooperating entities:	The National Coalition for Digital Skills and Jobs of the SR, the MPSVR SR, the MŠVVaŠ SR
Main expected output:	• The platform for women in the digital age • The career centre for female IT specialists • The adaptation programme for women • Women's digital skills analysis centre
Indicator:	Realisation of the main expected outputs
Data source for indicator:	Statistics from the online platform Annual Report of Women's Digital Skills Analysis Centre
Due date:	2026
Milestones:	2023 – Preparation within the framework of the expert group with pilot subjects a development of a feasibility study 2024 – Establishment of a Career Centre for female IT Specialists, Creation of the Women's Digital Skills Analysis Centre, Launch of the Platform, Campaigns in 4 pilot schools, 4 webinars to share experiences with reach of 500 girls and women 2025 – Pilot placement of 20 female IT specialists in companies, 10 internships for women under the adaptation programme, 1 report on women's digital skills 2026 - 3,000 young people approached by digital career awareness-raising activities, 50 employers presented with innovative solutions, 1 000 young girls and women evaluated by the instrument profiling
Costs:	2023 – 50 000 EUR for the feasibility study 2024 - 2026 – 750 000 EUR per year, with the exact costs will be determined after carrying out the feasibility study
Source of funding:	ŠR (2023) / PSK – PO4 - 4P1 SO(C) (2024 – 2026)

Increasing the number of girls and women in ICT fields of study in secondary schools and universities

Indication:	4B
Description of the measure:	Increasing the number of girls and women and encouraging them for field of ICT is necessary in order to prevent and avoid prejudice as early as possible, at an early age. It is therefore proposed, as an appropriate measure, to already popularise the advantages and benefits of ICT work for girls and future women in primary and secondary schools. Close cooperation with school digital coordinators as well as career counsellors in schools is essential for the success of this task. The stated efforts need to be supported by an appropriate communication campaign precisely addressed to the given target group.
The management:	The MŠVVaŠ SR
Cooperating entities:	The MIRRI SR, the MPSVR SR, the National Coalition for Digital Skills and Jobs of the SR
Main expected output:	Involvement of 80 % of all primary and secondary schools Increase of interest in STEM studies for girls by 1 % each year compared to the previous year until an optimal ratio is reached Communication campaign addressed to the target group
Indicator:	The number of involved primary and secondary schools The number of contacted girls
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023 – the creation of a cooperation mechanism with primary and secondary schools, as well as a curriculum of the said popularisation and communication campaign 2024 – addressing all primary and secondary schools by the MŠVVaŠ SR, the number of actively participation of primary and secondary schools 25 % 2025 – the number of actively participation of primary and secondary schools 50 % 2026 – the number of actively participation of primary and secondary schools 80 %
Costs:	2023-2026: 250 000 EUR per year

Source of funding:	PSK – PO4 - 4P1 SO(C)

In order to make the working environment for female ICT specialists more attractive and to improve the recruitment process and career opportunities of women in ICT disciplines, efforts to improve the digital literacy, competencies, and skills of girls and women in the SR will also take into account the implementation of the following recommendations by the professional public. The relevant departments, in particular the MIRRI SR, the MŠVVaŠ SR, and the MPSVR SR, will provide adequate cooperation in the implementation of the following recommendations for employers as well as for other public authorities. In cooperation with the National Coalition for Digital Skills and Jobs of the Slovak Republic, the MIRRI SR will present an information, contact, and coordination point for assistance in the implementation of the recommendations below.

Based on the recommendations of the expert working group, actions have been developed which are categorised in two areas:

Recommendations for Employers:

- Increase the availability of work placements, build partnerships with universities, offer so-called employee *shadowing* and other work experience for different age groups of applicants.
- Create the so-called *alumni* status for former employees. Similar to active retirement, the status of female graduates would help women who have gone on maternity leave or have interrupted their careers to stay up to date. Companies can use their advice and guidance and fund their further training to maintain their professional status.
- Provide flexible working hours/environment. We have too high proportions of women working full-time. Small and medium-sized enterprises, corporations, and public institutions still have large reserves in the flexibility of women's employment. Flexibility of working hours remains the most sought-after benefit of mothers returning to work after parental leave. According to a 2020 Women in the Workplace report[11], telecommuting mothers report more efficient time management, time flexibility, and three times higher probability of balance of private, family and work life than those that report work inefficiencies and schedule inflexibility. However, according to the most recent data from 2020 European Working Conditions Survey (EWCS) of the to Eurofound[12] foundation, Slovakia ranked in the penultimate position within the European Union.
- Offer corporate kindergartens/childcare support – mothers and fathers who know that their child is nearby and well cared for are more able to devote themselves to work. This solution would also save parents the time that they would have otherwise spent on the transfer to and from the nursery school.
- Enable *mentoring* in the workplace. Mentoring proves to accelerate career growth, increases skills, reduces staff turnover and benefits everyone.
- Address unconscious biases. Include education on diversity and inclusion in employee training plans to help address sexism, discrimination and micro-aggressions in the workplace.
- Ensure that inclusion is part of company processes (e.g. recruitment *checklists*, objective evaluation of employee performance, etc.)
- Pay employees based on their skills and potential, not gender, thus addressing the pay gap between men and women. It is possible to apply for equal salary certification (Equal Salary Certification) in Slovakia provided by PwC[13].

Recommendations for self-governments and government of the Slovak Republic:

- Eliminate the penalisation of career breaks, e.g. by restructuring pension plans, by changing the calculation of the maternity allowance to encourage women to work between births at least part-time. The employment rate of young women with young children in Slovakia is among the lowest in the EU. According to a report of the OECD Economic Survey carried out in Slovakia in 2022, the employment rate of mothers aged 20 - 49 years old with two children under six years old is 40 %. By comparison, the EU average is almost 70 %.[14]
- Publish regular reports with a detailed list of career opportunities in the ICT sector and forecasts of the development of the Slovak labour market. This information would benefit many actors: educational organisations in the preparation of education plans; schools when opening specialised fields of study; parents who influence their children in choosing a career path; young people considering career opportunities; employees who wish to retrain; potential investors and many others.
- Increase the ICT normative category of disciplines (group of disciplines 25) for secondary vocational schools to at least level 7 (today 2-3) and ensure that schools are able to adequately motivate, acquire quality and stabilise for pedagogical activity in the school of teachers in the field of mathematics and information work (particularly informatics) and vocational and practical ICT teachers and technical directions of secondary vocational schools.
- Support non-profit organisations that focus on digital education, upskilling, and courses for early-stage programmers, informants, and analysts, taking into account those targeting women specifically.
- Open an active dialogue between companies, universities, secondary schools, educational institutions, and the public. Facilitate the exchange of knowledge and good practices. Create communication channels and promote cooperation, especially in regions with high potential for ICT application.
- Request statistics on the demand for ICT specialists from ICT firms as part of statistical reports (e.g., the need for software developers according to a specific programming language) from regional ICT clusters and regularly publish outputs to the general public.

Digital divide and digital exclusion

Increasing accessibility to inclusive education and e-inclusion of citizens of all ages and social backgrounds

Indication:	5A
Description of the measure:	In order to promote lifelong learning among people from disadvantaged groups, increase their competitiveness in the labour market and help them improve their quality of life overall, the creation of 'digital HUBs' will be considered as part of one stop shops. Digital HUB combines the principles of community and youth work centres with the possibilities of using digital technologies. HUB's space is flexible in its activities, relevant in its offer, and holistic in its approach. It allows people the opportunity to develop their potential, skills, and knowledge in a way tailored to their individual needs. Digital HUB can integrate into existing services and objects. HUBu equipment: • WiFi so that people can use the space for their needs free of charge. • Tablets – computers and accessories placed so that their people could freely use them. • Tea and coffee so that people and volunteers can relax. • Community list of organisations/groups/activities to see what's happening it happens in the area. Staff composition of HUB: • The HUB (community centre) management, which provides for its activity. • Professional staff who master digital technologies and work with people from disadvantaged groups. • Founder (for HUB activities, provides public or private resources). • Volunteers who are willing to participate in HUB activities. • Members of local expert groups (non-specialist) personnel) wishing to provide and disseminate information on an agreement with HUB. Support of professional staff to work with digital technologies foresees the form of a demand challenge. A minimum of 0.5 FTE professional staff per HUB will be supported. In terms of setting up and equipping HUBs, interconnection with existing or emerging infrastructure will be preferred.
The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, the MPSVaR SR
Main expected output:	Analysis Functional network of digital HUBs in community and youth work centres providing services for people from disadvantaged groups

Indicator:	The number of established digital HUBs The number of people using digital HUB services (will be determined after the establishment and launch of the pilot HUB operation)
Data source for indicator:	The internal database of the MIRRI SR
Due date:	2026
Milestones:	2023 – Analysis and establishment of a pilot digital HUB 2024 – Establishment of an additional minimum of 10 digital HUBs 2025 – Minimum of 50 functioning digital HUBs 2026 – 100 digital HUBs in operation
Costs:	2023 – 50 000 EUR 2024 – 110 000 EUR 2025 – 600 000 EUR 2026 – 1 100 000 EUR
Source of funding:	PSK – PO4 – SPECIFIC OBJECTIVE WITH (A) (professional staff) PSK – PO4 – SPECIFIC OBJECTIVE RSO4.3 (investment in material and technical equipment of community centres)

Increasing the level of digital skills of seniors and representatives from other disadvantaged groups

Indication:	5B
Description of the measure:	The aim of this measure is to increase the level of digital skills by: - the use of an online learning platform developed in cooperation with the National Coalition for Digital Skills and Jobs of the SR within the framework of the national project entitled "Improving the digital skills of seniors and disadvantaged groups in public administration."40 The aim is to create a comprehensive testing and education tool that will contribute to the more significant improvement of the digital skills of disadvantaged groups. - providing training in the framework of the Recovery and Resilience Plan (POO) project "Improving the digital skills of seniors and distributing Senior Tablets[70]"
	- Launching calls with the possibility of applying for support for education lecturers, instructors, methodologists, or assistants who provide health education to disadvantaged citizens. Also, calls with the option of requesting support for the education of health-disadvantaged citizens to a greater extent they could use software tools and applications. The purchase of hardware and software equipment, such as interpreting equipment or assisted support aids, should also be eligible for the call. Education, testing, and the actual raising of digital skills will be affected by approximately 1.5 million public administration employees over the age of 55, disabled and old-age pensioners under the age of 65, senior citizens over 65, and persons with severe disabilities.
The management:	The MIRRI SR
Cooperating entities:	The MŠVVaŠ SR, the MPSVR SR, the MV SR
Main expected output:	Minimum of 250 000 trained representatives from disadvantaged groups Minimum of 1 announced annual call
Indicator:	The number of digital skills development graduates The number of announced calls
Data source for indicator:	The internal database of the MIRRI SR
Due date:	2026

---

[70] https://www.digitalniseniori.gov.sk/

Funded
 by the European Union
NextGenerationEU

[RECOVERY] PLAN

MINISTRY
OF INVESTMENTS, REGIONAL DEVELOPMENT
AND INFORMATIZATION
OF THE SLOVAK REPUBLIC

Milestones:	2023 – 30,000 trained representatives from disadvantaged groups in a given year 2024 – 50,000 trained representatives from disadvantaged groups in a given year 2025 – 70,000 trained representatives from disadvantaged groups in a given year 2026 – 100,000 trained representatives from disadvantaged groups in a given year
Costs:	2023 – 15 million EUR 2024 – 23 million EUR 2025 – 23 million EUR 2026 – 23 million EUR
Source of funding:	PSK – PO4/POO Component 17

Analysis and implementation of an appropriate approach to building digital literacy, digital education, and the use of digital solutions (including eGovernment) by people from marginalized Roma communities

Indication:	5C
Description of the measure:	The aim of this measure will be to assess, identify and subsequently apply an appropriate approach to building digital literacy, digital education, and the use of digital solutions (including eGovernment) for the diverse needs of a diversified population of marginalised Roma communities (hereinafter referred to as 'MRC'). The measure will assess the appropriateness of the different measures and approaches, taking into account the needs of the selected population group (Atlas of Roma communities) as well as the technical and software itself. As a first step, based on the identified target groups, the measure will assess and then apply an appropriate approach in order to educate representatives of MRC in order to maximise the use of a mobile phones with smart features and internet connectivity. The aim is to obtain verified and guaranteed information (on potential job opportunities, seasonal work or occasional assistance, transport information such as timetables and others), online purchase of tickets for transport, and electronic purchase of goods and services. Collection and processing of information regarding the storage and use of financial resources such as internet banking, digital wallet, communication with the public sector or healthcare providers (for example, ordering with a doctor), official agenda, participation in elections, various types of registrations, etc. It will also include access to education on the basics of cybersecurity, internet security, and prevention of non-substantiated addictions (online gambling). The duration of the pilot project will be 12 months, with subsequent scaling of the project. The pilot group for verifying the appropriate approach would be up to 300 people; then, the optimal model would apply to around 10 % of the target group, estimated at 30-40000 citizens. National Coalition for Digital Skills and Jobs of the SR, in cooperation with other partners representing the target group's interests, such as the Office of the Plenipotentiary of the Government of the Slovak Republic for Roma communities, would be considered a project implementer.
The management:	The Office of the Plenipotentiary of the Government of the Slovak Republic for Roma Communities
Cooperating entities:	The MIRRI SR, the MPSVaR

Main expected output:	Minimum of 300 trained persons within the framework of the pilot project Minimum of 30000 subsequently trained persons within the framework of the national project
Indicator:	The number of trained persons
Data source for indicator:	The internal database of trainers
Due date:	2026
Milestones:	2023 – Feasibility study, preparation of the pilot project, pilot project announcement, launch and implementation of the pilot project 2024 – implementation of the pilot project, completion and evaluation of the pilot project, preparation and launch of a national project on a larger scale, 300 trained persons 2025 – implementation of a national project in a larger range, 5 000 trained people 2026 (and after that) – continuation of the national project in order to achieve the value of at least 30 000 trained persons from the MRC subsequently within the framework of the national project
Costs:	2023 – 150 000 EUR 2024 –50 0000 EUR 2025 – 2.5 million EUR 2026 - 4 million EUR (annually)
Source of funding:	PSK – PO4

Increasing the level of digital skills of children and youth from socially and economically disadvantaged backgrounds.

Indication:	5D
Description of the measure:	The aim of this measure is to increase the level of digital skills of the target group: children and youth from socially and economically disadvantaged backgrounds, through: - the use of an online learning platform developed in cooperation with The National Coalition for Digital Skills and Jobs of the SR, within the framework of the national project entitled "Improving the digital skills of Seniors and disadvantaged groups in public administration.[71]" - the development of methodology, recommendations for education, and the creation of educational content for the online platform mentioned above - training of lecturers and trainers, instructors, methodologies, teachers, assistants who educate disadvantaged citizens from the target group - calls for provision of training by external providers education for the target group through the above platforms that promote the increase of digital skills and child training are assumed in the form of clubs, summer schools, etc. About 110 000 children and young people from socially and economically disadvantaged backgrounds will be affected by education, testing, and upskilling.
	National Coalition for Digital Skills and Jobs of the SR, in cooperation with other partners representing the target group's interests, such as the Office of the Plenipotentiary of the Government of the Slovak Republic for Roma Communities, would be considered a project implementer. When launching calls, the project will take into account the fact that the target group comes from different linguistic minorities. The measure in question is a follow-up to the approved project that contributes to Slovak pupils, the Digital Pupil. The measure can be reassessed based on the success of this project.
The management:	The MŠVVaŠ SR
Cooperating entities:	MIRRI, MPSVR SR, the Office of the Plenipotentiary of the Government of the Slovak Republic for Roma Communities
Main expected output:	Preparation of at least 100 lecturers, minimum of 18 000 trained representatives from disadvantaged groups Minimum of 1 annually announced call

---

[71] https://www.mirri.gov.sk/aktuality/digitalna-agenda/vicepremierka-remisova-zlepsit-digitalne-zrucnosti-seniorov-a-znevyhodnenych-skupin-zamestnancov-pomoze-novy-narodny-projekt/index.html

Indicator:	The number of graduates of the digital skills development training The number of announced calls
Data source for indicator:	The internal database of the MŠVVaŠ SR
Due date:	2026
Milestones:	2023 – Creation of methodology, education recommendations, educational content for the platform, training of lecturers and trainers, instructors, methodologists, teachers and assistants, and at least 100 trained lecturers. 2024 – 4 000 trained representatives from disadvantaged groups in a given year 2025 – 4 000 trained representatives from disadvantaged groups in a given year 2026 - 9 000 trained representatives from disadvantaged groups in a given year
Costs:	2023 – 0.5 million EUR 2024 – 2.2 million EUR 2025 – 2.2 million EUR 2026 – 5 million EUR
Source of funding:	PSK – PO4

Existing strategic documents

The process of designing a strategy for the development of digital skills stands out for its cross-cutting nature, which affects sectoral policies across departments and requires cooperation in various areas of public administration. As can be seen, the issue of digital competencies is identified and perceived as important as well in other national and strategic documents. Documents created for a specific industry, department, or a specific problem domain are almost always at least partially intertwined with the issue of digital transformation or digital competencies, and problems or the proposal of potential goals and measures appear cross-sectionally in several of them. Among others, it is worth mentioning, for example:

- The 2030 Strategy for Digital Transformation of Slovakia,
- The Action Plan for the digital transformation of Slovakia for 2019 – 2022,
- The proposal of national priorities for the implementation of the 2023 Agenda,
- Vision and development strategy of Slovakia 2030 – a long-term strategy for sustainable development of the Slovak Republic - Slovakia 2030 - new wording,
- Revision of expenditure on computerization 2.06,
- Operational Programme Integrated Infrastructure,
- Action plan for the intelligent industry of the Slovak Republic,
- The economic policy strategy of the Slovak Republic until the year 2030,
- The Action Plan for Open Data Strategy

- National Broadband Plan of Slovakia,
- The support for the development of 5G networks in Slovakia for the years 2020–2025
- The strategy and Action Plan to improve Slovakia's position in the DESI index until 2025,
- The Strategy for Digital Transformation of Slovakia until the Year 2030
- The National Concept of Informatisation of Public Administration 2021-2026,
- The Education Informatisation Programme by 2030;
- The Action Plan of the Education Informatisation Agenda 2022-2030
- The upcoming Action Plan for the Digital Transformation of Slovakia 2023-2026,
- The National Active Ageing Programme 2021-2030

The main aim is that these documents complement each other at the interdepartmental level. They increase the emphasis and awareness and the need for solutions to Slovakia's individual problems in these current dynamic times.

The following strategies have made a significant positive shift in defining goals for strengthening digital skills beyond universities:

- *The Sectoral Strategy for Human Resources Development in the Information Technologies and Telecommunication Sector by the year 2030*, which was created as a result of the implementation of the National Project of Sector-Driven Innovations to an Efficient Labour Market in the Slovak Republic,
- *The Digital Education Action Plan for 2021-2027 (EU)*,
- The Digital Compass 2030: European Roadmap for the Digital Decade,
- The Reference Framework for the Digital Competence DIGCOMP 2.1,
- The Digital Economy and Society Index 2021 (DESI),
- Vision and strategy of development of Slovakia until 2030 - a long-term strategy of sustainable development of the Slovak Republic - Slovakia 2030,
- The Recovery and Resilience Plan of the Slovak Republic.

Secondary relevant sources for building quality didactic and methodological materials for education at the university:

- The OECD National Skills Strategy for Slovakia
- The Strategy for Lifelong Learning and Counselling for the years 2021-2030
- The results of the IT Fitness test and recommendations of the National Coalition for Digital Skills and Jobs of the SR
- The educational methodological materials of the National Project: *IT Academy – Education for 21. Century*

The follow-up activities implemented within individual ministries and subordinate institutions should respect the long-term objectives defined by European and national legislation and strategic documents for developing digital competencies in local implementation plans. The degree of success depends on the willingness to implement these strategies in a natural university environment and the degree of control of their implementation.

Attachments

Annexes:

- Annex 1 – An overview of the measures
- Annex 2 – SWOT analysis of the ICT sector (according to ASR SR)

Funded
 by the European Union
NextGenerationEU

[RECOVERY] PLAN

MINISTRY
OF INVESTMENTS, REGIONAL DEVELOPMENT
AND INFORMATIZATION
OF THE SLOVAK REPUBLIC

Annex 1 – An overview of the measures

PRIORITY	OBJECTIVE	MEASURE	ID
Institutional background	Creating a functional governance model	Strengthening the institutional background by further supporting the activities and pursuits of the National Coalition for Digital Skills and Jobs of SR	0A
		Developing an effective model to manage and coordinate digital skills activities among relevant public administrations	0B
		More efficient connection of public administration entities, the National Coalition for Digital Skills and Jobs of the SR, and the Alliance of Sector Councils in the field of Digital Skills Development	0C
ICT specialists	Increasing the number of ICT specialists	Applying legislation for issuing national visas (type D) in order to simplify the conditions for employing foreigners and, in particular, ICT specialists, as well as simplifying the regime for the recognition of diplomas and professional qualifications for the exercise of a regulated profession	1A
		Support the development of specific digital skills to meet the objectives of the Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (SK RIS3 2021+).	1B
		Improving the quality of study and the number of ICT graduates in secondary vocational schools, IT grammar schools, and universities.	1C
Digital skills of young people and educators in the educational process	Increasing the number of people with at least basic digital skills	Establishing the central competencies for the 21st century that the school will develop at the level of primary, secondary, and higher education and their inclusion in curriculum documents as part of the ongoing curriculum reform	2A
		Creating an area for primary and secondary schools as part of the planned reform of education content to develop competencies for the 21st century in formal education	2B
	Increasing digital competencies to all levels of education	Through cooperation with universities and the PRO of the MŠVVaŠ SR, the creation of an offer of further education of pedagogical and professional staff in the field of increasing digital skills and competencies according to the DigCompEdu standard and their use in the teaching process	2C
		Introducing system transparent motivational mechanisms for teaching staff and professional staff who, through innovative digital learning practices and concepts, improve results in the educational process and actively enhance your own digital competencies	2D

	Building an environment for the development of digital competencies	Improving the system of support for teaching staff and professional staff in the use of digital technologies in the educational process through the newly created school digital coordinator positions, securing funding for full or part-time for this position	2E
		The implementation of educational content in connection with the digital transformation of the society to education study programmes at all three levels of higher education	2F
	Improving Slovakia's position in DESI	The encouragement for the use of open sources, the creation of innovative educational content and pedagogical procedures, and support of proven procedures and educational programs developed in cooperation with employers with a focus on IT development and digital culture with an impact on the widest possible group of schools, teachers and pupils	2G
		The establishment of the National Centre for Digital Transformation of Education (NCDTV) in the environment of academic workplaces long-term focused on the implementation of digital transformation of education with two centres in Bratislava and Košice with the involvement of experts from universities and experts from practice	2H
Digital skills of active labour market participants	**Increasing the number of employers providing education (for their employees) in the area of digital skills**	Supporting the development of basic digital skills for employees, job applicants, job seekers, and the self-employed through Individual Learning Accounts (ILAs)	3A
		Supporting the development of the active workforce digital skills among employers - encouragement of reskilling and upskilling education	3B
	Improving the adaptability of labour market participants	The support for the education of public administration employees – taking into account RIS3 domains	3C
		Retraining of hard-to-apply NEET graduates so that they can be applied to ICT positions of lower and medium difficulty	3D
		The support for the development of digital skills of job applicants and job seekers – the support for reskilling and upskilling education according to the demand of employers	3E
Share of girls a women in ICT	**Increasing the number of female specialists ICT**	Supporting the motivation of girls and women in the field of ICT in close cooperation with the National Coalition for Digital Skills and Jobs of the SR	4A

	Improving the environment for female ICT specialists	Increasing the number of girls and women in ICT fields of study in secondary schools and universities	4B
Digital divide and digital exclusion	**Active work and education of persons from disadvantaged groups in the field of digital skills.**	Increasing accessibility to inclusive education and e-inclusion of citizens of all ages and social backgrounds	5A
		Increasing the level of digital skills of seniors and representatives from other disadvantaged groups	5B
		Analysis and implementation of an appropriate approach to building digital literacy, digital education, and the use of digital solutions (including eGovernment) by people from marginalized Roma communities	5C
		Increasing the level of digital skills of children and youth from socially and economically disadvantaged backgrounds	5D

Annex 2 – SWOT analysis of the ICT sector (according to ASR SR)

SWOT: Strengths

1. [SWOT.S1] A skilled workforce driven by growth and salary opportunities in the sector

2. [SWOT.S2] Good potential for the development of ICT education (both formal and lifelong)

There are currently several initiatives aimed at improving and enriching ICT education at all levels of schools (primary school, secondary schools, universities); academic programs can be cited as an example (e.g., Cisco Networking Academy,48 Microsoft Innovative Educator, etc.), various partner initiatives by companies and schools (dual education implemented by Deutsche Telekom IT Solutions), national or demand-oriented EU-funded projects (e.g., IT Academy – Education for the 21st Century). Slovak pupils/students have excellent results from IoT and robotics in high school professional activities competitions, student scientific and professional activities, and international competitions (e.g., RoboCup junior, 49 Robocup, First Lego League50).

In the field of continuing education in ICT, several educational institutions in Slovakia provide quality educational content in IT, e.g., GOPAS (with nationwide scope) or institutions with regional scope (ELCT, calendula, etc.).

3.[SWOT.S3] Associations supporting the ICT sector at the national and regional level

The IT Association of Slovakia (ITAS) 51 is the largest Slovak professional association of the most important domestic and foreign companies operating in ICT. Founded in 1999, the Association currently brings together more than 100 member companies, which together employ almost 30000 people.

The Digital Coalition, 52 founded in 2017 by ITAS and supported by ÚPVII, is a successful example of activation across a spectrum of public, private, academic, and civic organizations and institutions in Slovakia to improve citizens' digital skills. Itas implements various projects aimed at the digital transformation of the private and public sectors supporting educational initiatives and verification of IT skills to the public.

Cluster Z@ict 53 was established in 2008 to stimulate development in the field of employment and quality of education and thus to increase the competitiveness of ICT institutions and companies in the region of Žilina region. Z@ict also aims to raise awareness of the ICT sector and create excellent working conditions and support the competitiveness of development and research institutions in the region. The cluster brings together twelve founding members from the private, academic, and public sectors.

The Košice IT Valley 54 cluster plays an important role in the development of the IT industry in the Košice region. Its vision is to create regional partnerships of IT companies, educational institutions, and regional authorities that will contribute to improving education, creating a broad portfolio of job opportunities for a skilled workforce. Furthermore, the cluster is interested in developing a unified strategy to achieve prosperity in the region of Eastern Slovakia, ensuring a gradual improvement of the quality of life of its inhabitants. The cluster, established in 2007, currently has 53 members, and its activities focus on education, innovation, and cooperation. It was the first in Central Europe to be certified as "Cluster Management Excellence Label GOLD" in 2015.

4. [SWOT.S4] Continuous increase in broadband mobile internet coverage:

In Slovakia, 98.4 % of populated areas are covered by 4G mobile networks. The mobile broadband take-up rate is 67 % of the population.

SWOT: Weaknesses

1. [SWOT.W1] Outdated and slightly flexible education system:

As pointed out by Slovak IT companies and academic institutions, such as TUKE, the current model of study in Slovakia is based on the so-called "push" system consisting of mass education. Its lack is a significant uncertainty in the application of graduates, as priority is given to knowledge, and less effort is devoted to their transformation into solutions or the development of analytical thinking. There is also a wide gap between existing knowledge and the knowledge-performance gap. The formal education system is insufficiently flexible and unable to respond to technological and sociological developments. Introducing new subjects, fields of study, and directions is lengthy. The training system for future teachers is equally inefficient. Pedagogical faculties do not exploit the possibilities of modern approaches to education or technological possibilities for education. It is essential to link teacher training with practice (especially in IT fields).

2. [SWOT.W2] Low and decreasing share of students and graduates of information and communication technology, science, engineering and mathematics (STEM):

The McKinsey report states that the proportion of male university graduates in STEM is alarmingly low (6.7 %), with the proportion of female graduates in these disciplines (0.6 %) even more alarming. In general, Slovakia has a significant shortage of digital technology experts.

3. [SWOT.W3] Lack of design specialists (business IT consultants, IT architects, data analysts), development (programming), support (security):

Discussions with the professional public and studies of national strategies show that Slovak companies and public administration have long suffered from a lack of ICT specialists and workforce with advanced digital skills and/or lack of experience in the use of technologies and/or with insufficient technical training.

4. [SWOT.W4] Insufficient level of investment in telecommunications networks in locations with high investment costs and low return on investment.

The provision of high-speed broadband coverage for 'white spots' (i.e., municipalities with internet speeds below 30 Mbps) remains one of Slovakia's long-standing connectivity problems. Fear of insufficient financial support from the state and lack of use of EU funds to ensure equal access to modern infrastructure and digital services for all.

SWOT: Opportunities

1. [SWOT.O1] Comprehensive systemic change and digitalisation of education accelerated by the COVID-19 pandemic:

Slovak and European statistics, analyses, and discussions with the professional public confirm that Slovakia urgently needs a comprehensive systemic change in education that will ensure that primary, secondary, and higher education offer qualitative and quantitative more subjects and disciplines in which pupils and students acquire advanced digital and technological skills and acquire quality education. In the same way, the education system must be adapted to respect the demands of the labor market in the digital age. The COVID-19 pandemic has accelerated this development and shown real opportunities, strengths, and weaknesses.

2. [SWOT.O2] Social Order for Improvement of Lifelong Learning:

Both employees and employers are beginning to realise that they need to constantly work on their skills to succeed in global competition and adapt to changes in the labour market. Examples of best practices from abroad and digital strategies of other countries show that one of the most effective opportunities to improve the digital skills and competencies of the population is to support the provision of training, training, courses, lifelong and formal education, retraining and other forms of educational support and training for the development and modernisation of digital skills by both Slovak companies and the state (e.g., retraining for the unemployed).

3. [SWOT.O3] New ways to attract and retain talent as a result of the digitalisation of the economy and society:

Slovakia's results in international indices (DESI, OECD) show that a country needs talented professionals in various fields for a successful digital transformation. Therefore, Slovakia should work to build its attractiveness from three perspectives: firstly, to make the country attractive enough for Slovaks not to go abroad to study and work; secondly, to inspire Slovaks abroad to return home; and thirdly, that the country promotes the acquisition of talent from other countries through a modern labour mobility policy and the creation of interesting and attractive conditions to live.

4. [SWOT.O4] Digitalisation of industry (Industry 4.0) and company (smart cities, e-mobility, eHealth):

Policy support and focus on the preparation of strategic materials. At the same time, in the context of the COVID-19 pandemic, costs are being optimised in foreign markets, and an opportunity is being created for Slovak ICT companies to take over contracts and stabilise human resources, particularly in support and system administration.

5. [SWOT.O5] Return of Slovaks living and working abroad:

The COVID-19 pandemic, the ways in which health systems operate, and measures in different countries around the world in response to the disease have led to an increased rate of return of Slovaks to their homeland, including a skilled workforce. There is a possibility that some of them would remain in Slovakia and not return to the countries where it operated before the outbreak of the pandemic.

6. [SWOT.O6] European Union initiatives for the development of digital skills and the digital economy:

One of the EU's strategic priorities for the coming period is to support the development of digital skills for citizens and employees and the development of the digital economy to achieve sustainable growth. Programmes such as Digital Europe will have sufficient financial allocations to fund these priorities.

7. [SWOT.O7] Building a gigabit society and the emergence of new 5G technologies:

Based on the analysis of the telecommunications market, the construction of Gigabit optical infrastructure and the construction of 5G mobile networks prove to be essential prerequisites for the development of the national economy, as the telecoms sector currently drives the entire digital economy and society. The development of mobile networks in Slovakia in the coming years is conditional on the gradual deployment of new 5th-generation technologies, with the simultaneous development of optical networks that have the potential to meet the communication demands of the gigabit society for the needs of ensuring the mobility of users, as well as for the development of new and innovative services and applications in the field of connected vehicles, Internet of Things, etc.

SWOT: Threats

1. [SWOT.T1] Talent outflow STEM focus:

Slovak statistics confirm that Slovakia faces the outflow of talented Slovak experts from STEM disciplines who leave to study abroad, after which they stay abroad, respectively after graduating in Slovakia, they leave abroad. In general, talent leakage poses a major threat to Slovakia and its future.

2. [SWOT.T2] Increasing regional disparities:

National analyses and statistics point out that disparities between different regions of Slovakia continue to widen, which poses a significant economic, political, and social risk.

3. [SWOT.T3] Lack of modern labour mobility:

The current state of play in the country shows the risks arising from the continued absence of a modern labour mobility policy. Slovakia needs to create flexible and attractive conditions for two types of groups: for the employment of citizens from countries within the EU and for the employment of non-EU citizens, so-called third countries. In this way, gradual steps can address the current lack of professionals in the Slovak labour market and increase the international attractiveness of Slovakia as a country.

4. [SWOT.T4] Reducing foreign demand for Slovak ICT sector services due to the economic recession caused by the COVID-19 pandemic:

The COVID-19 pandemic is changing the doctrine of digital transformation in Europe. If the contagion were to recur and lead to greater economic uncertainty, this could lead to a halt of some long-term digitalisation projects in industry and a decline in demand for ICT sector services in Slovakia.

5. [SWOT.T5] The administrative and investment difficulty of building a new communication infrastructure:

Availability of a sufficiently powerful and high-quality communication infrastructure for the use of modern electronic communications services in the gigabit society for all residents of Slovakia, businesses, and public institutions, regardless of their current place of residence or location. Due to non-commercial sites that are geographically complex, network providers may not be able to cover the investment and operational costs of building this ambitious infrastructure.

6. [SWOT.T6] Increasing resistance of some activists to building mobile networks:

Transparency of information on safety and the impact of new technologies on public health. Any risks that new technologies pose to the health and safety of citizens must be adequately assessed. Citizens must be assured that the electromagnetic field of antennas does not pose a threat to their health in the everyday environment. The awareness-raising campaign must be based on digital literacy, education, and transparency and provide citizens with clear information from credible sources on public exposure to electromagnetic fields when deploying 5G technology, enabling citizens to critically evaluate available information.

7.[SWOT.T7] Threat to cybersecurity and data security:

The penetration of digital technologies and opening services to innovative electronic processes increase the cyber vulnerability of public and private networks.

Summary of analysis results

The information technology and telecommunications sector (ITaT) is one of the sectors with an average contribution to production (3.2 %) and GDP (4.3 %) in the Slovak Republic. The sector's share in production and GDP is growing steadily every year and has increased by 1 p.b. since 2020. However, this situation is not specific to Slovakia, and the sector is growing in importance in most EU countries. In fact, this sector's share of GDP in Slovakia is slightly above the EU average. In the European comparison, Ireland stands out strongly, where the sector's share of GDP is 11 % and even 17 % in production. This is mainly due to the headquarters of Google's European headquarters in that country. Also, here is a beautiful example of how a low tax burden actually helps the economy and investment.

The sector is mainly specific to a significant share of value added in production. More than half (54 %) of production actually adds value. From the private sector, only banking has a higher share of value-added.

In terms of this indicator, we are above the EU average. The sector's investments represent 3 % of all investments in the Slovak Republic and have a slightly increasing trend (an increase of 23 % since 2014). The main investment item is machinery and movables, which account for 28 % of the sector's total investment, and software, with a share of 21 %. Telecommunications accounts for two-thirds of the sector's investment activity. Almost 99 % of businesses in the sector are small entrepreneurs with up to 19 employees. Their contribution to the sector's GDP is 23 %, and 33 % of all working sectors work in them.

However, the dominant category is employers with thousands or more employees. Currently, there are six such in the sector, generating 33 % of the sector's GDP and employing 23 % of all employees in the sector. Only 10 % of businesses in the sector have foreign ownership. These are mostly large companies, employing up to 56 % of all workers in the sector. In the sector, there is the sixth highest proportion of employees working in foreign companies. Around 60 thousand people work in the sector, about 12 % of which are natural persons – entrepreneurs.

Twice as many people work in the sector as they were 20 years ago and account for 2.5 % of total employment in the Slovak Republic (in 2001, this share was 1.5 %). The share of employment in Slovakia is above the average in EU countries. It is the highest in Estonia at 3.8 %. Men make up 81 % of employees in sector-specific jobs. 70 % of employees have a university degree. Only public administration and education have a higher share of university-educated employees. The average gross monthly wage in the sector is EUR 2236 – it is 77 % higher than the average gross monthly wage in the whole economy of the Slovak Republic.

It has increased by 37 % since 2010. This is the sector with the highest average wages in Slovakia. Foreign companies mainly draw wages, where the wage level is 14 % higher than in domestic companies. On average, the employee produces 60.5 thousand euros in value added annually, the third highest of all sectors after banking and energy. However, this productivity is the sixth lowest compared to other EU countries. Only Slovenia, Poland, Hungary, Croatia, and Bulgaria have lower labour productivity in the sector.

Wage levels are primarily driven by labour productivity, accounting for an average of 41 % of labour productivity in EU countries. In Slovakia, this share is 35 %. Lower is in Luxembourg, Ireland, and Italy, and in the sector, the highest wages and the third highest labour productivity of all sectors. Hourly wage is 90 % of the sector's hourly labour productivity. This proportion is among the lowest in Europe. The sector employs 2.5 % of all workers in Slovakia.

Over the past 20 years, the number of employees in the sector has doubled, and it is the most dynamically

growing sector in the Slovak Republic. 63 in Cyprus (at 36 % in the Czech Republic). This is also one of the main reasons why we are still an interesting country for foreign investment in this sector. Wages are still relatively low compared to labour productivity. As the dependency between labour productivity and wage levels is high, labour productivity growth is one of the essential prerequisites for further wage growth.

The regeneration of the economy in 2021 and in particular in 2022 will also bring with it a number of new jobs in the sector. Over the period 2021-2025, around 14 thousand employees in the sector will be needed in addition to those currently working. Around 75 % of job opportunities will be created by economic expansion, i.e., the creation of new jobs. These labour market needs are determined on the basis of guaranteed employment by the Sectoral Council. However, of the graduates coming to the labour market from the corresponding fields of education, only about five thousand of them are expected to apply in this sector by 2025, and for these reasons, the sector will continue to face labour shortages in the future.

The jobs with the highest labour market needs in the sector will include System Programmer, Application Programmer, Telecommunication Services and Infrastructure Technician, and Telecommunications Equipment Technician until 2025. These jobs will account for 35 % of the labour market needs of the sector. More than half of the jobs in the sector can be characterised by a low risk of replacing technology in the next 20 years. Overall, replacing technology with 18 % of the work activities currently carried out by employees will be possible. This is the sector with the lowest level of this indicator (the Slovak average is 58 %).

The fact that an activity can be replaced by technology does not mean that it will. And if it is replaced by technology, this does not mean job loss and dismissal of an employee. In fact, the underlying market principles and profitable incentives for businesses will prevent automation and robotisation from having an extreme impact on the labour market and employees. The transition to new technologies will be continuous and fluid in the long term.

Information sources

1. Slovakia in the Digital Economy and Society Index, DESI country profile (SK) https://digital-strategy.ec.europa.eu/en/policies/desi-slovakia

2. Human Resources Development Strategy for individual sectors until 2030, Sector Council for Information Technology and Telecommunications, https://www.sri.sk/uploads/strategy/final_documents/itweb-620638c1011a2.pdf

3. The Ministry of Education, Science, Research and Sports of the Slovak Republic, Lifelong Education, available online: https://www.minedu.sk/celozivotne-vzdelavanie/

4. Roman HRMO - Ivan TUREK, DRAFT OF KEY COMPETENCIES SYSTEM, Department of Engineering Pedagogy and Psychology, Faculty of Materials Technology, STU, available online: https://www.mtf.stuba.sk/buxus/docs/internetovy_casopis/2003/2/hrmo2.pdf

5. https://euc-word-edit.officeapps.live.com/we/wordeditorframe.aspx?ui=sk%2DSK&rs=en%2DUS&wopisrc=https%3A%2F%2Fupvi-my.sharepoint.com%2Fpersonal%2Fgustav_budinsky_mirri_gov_en%2F_vti_bin%2Fwopi.ashx%2Ffiles%2Fae477f5d18f14f898cbcc918dcfaac825&wdenableroaming=1&MSCC=1&wdodb=1&hid=0D58EBD6-E619-40B7-8E8B—28F963F0D359&wdorigin=Sharing&jsapipi=1&jsapiver=v1&newsession=1&corrid=060e7d07-e972-474a-9301—880c01f70bc6bc6&usid=060e7d07-e972-474a-9301-880c01f70bc6&sftc=1&mtf=1&sfp=1&instantedit=1&wopicomplete=1&wdredirectionreason=Unified_SingleFlush&rct=Medium &ctp=LeastProtected#_ftn1

6. SR recovery plan, component 7. Available online: https://www.planobnovy.sk/site/assets/files/1046/komponent_07_vzdelavanie-21-storocie_1.pdf

7. FORMAL vs. INFORMAL vs. INFORMAL learning. Available online: https://alkp.sk/formalne-vs-neformalne-vs-informalne-ucenie-sa/

8. Does having digital skills really pay off?, Adult skills in focus, OECD, 2015

9. Skills for a Digital Word, 2016 Ministerial Meeting on the Digital Economy, OECD 3. COM(2020) 67 final (https://ec.europa.eu/info/sites/default/files/communication-shaping-europesdigital-future-feb2020_en_3.pdf)

10. Press release of the European Commission from 11 June 2020 (https://ec.europa.eu/commission/presscorner/detail/sk/IP_20_1025)

11. Europe 2020: A strategy for smart, sustainable and inclusive growth, COM(2010) 2020 final

12. Ferrari, Anusca: DIGCOMP: A Framework for Developing and Understanding Digital Competence in Europe, JRC, 2013

13. Carretero, S.; Vuorikari, R. and Punie, Y. (2017). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use

14. ICT for work: Digital skills in the workplace, Final report, 2017: ISBN 978-92-79-67761-8

15. European skills and jobs survey (ESJS), Cedefop

16. The great divide: Digitalisation and digital skill gaps in the EU workforce, ESJsurvey Insights, No 9, Thessaloniki: Greece , Cedefop (2016)

17. Results from the publication: OECD (2019), Skills Matter: Additional Results from the Survey of Adult Skills, OECD Skills Studies

18. Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training ("ET 2020") 93

19. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A Digital Agenda for Europe; COM(2010) 245 final

20. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – An Agenda for new skills and jobs: A European contribution towards full employment; COM(2010) 682 final

21. Council recommendation of 30 October 2020 on A Bridge to Jobs – Reinforcing the Youth Guarantee and replacing the Council Recommendation of 22 April 2013 on establishing a Youth Guarantee (2020/C 372/01).

22. Community-led Event Outcome paper The Italian Digital Skills Strategy and its implementation. July 2021

23. Plan nacional de competencias digitales (https://portal.mineco.gob.es/RecursosArticulo/mineco/ministerio/ficheros/210127_plan_n acional_de_competencias_digitales.pdf) 18. SKILLNET Ireland annual report 2020 (https://www.skillnetireland.ie/publication/annual-report-2020/)

24. EU measures to tackle low levels of digital skills - https://www.eca.europa.eu/lists/ecadocuments/rw21_02/rw_digital_skills_sk.pdf

25. https://www.employment.gov.sk/sk/ministerstvo/rada-vlady-sr-prava-seniorov/narodnyprogram-aktivneho-starnutia.html

26. https://www.mfsr.sk/files/archiv/1/Plan_obnovy_a_odolnosti.pdf

27. Final report, Contractor CallQuest, s.r.o., 1/2022

28. Unconnected. Digital poverty and digital inclusion in Slovakia. Binka Ľ. Hamarová, MIRRI. Available online: https://www.mirri.gov.sk/wp-content/uploads/2019/09/Digi_chudoba_final.pdf
29. https://www.mirri.gov.sk/sekcie/informatizacia/jednotny-digitalny-trh/index-digitalnej-ekonomiky-a-spolocnosti/index.html

30. VELŠIC, Marián. DIGITAL LITERACY IN SLOVAKIA 2020, Institute for Public Affairs, Bratislava, 2020, ISBN 978–80–89345–81-6

31. Age_group_2018 – 2020_districts (Statistical Office of the Slovak Republic)

32. DigcompEDU (digital-competence.eu)

33. Main findings of the questionnaire survey in primary and secondary schools on the course of distance teaching V school year 2019/2020, available: https://www.minedu.sk/komentar-022020-hlavne-zistenia-z-dotaznikoveho-prieskumu-v-zakladnych-a-strednych-skolach-o-priebehu-distancnejvyucby-v-skolskom-roku-20192020/

34. https://www.minedu.sk/program-informatizacie-skolstva-do-roku-2030/

35. https://www.minedu.sk/akcny-plan-informatizacie-a-digitalnej-transformacie-vzdelavania-v-sr-na-obdobie-2021-2024/

36. https://itakademia.sk/

37. https://education.ec.europa.eu/sk/node/1736

38. https://www.minedu.sk/np-edit/

39. https://www.planobnovy.sk/site/assets/files/1046/komponent_07_vzdelavanie-21-storocie_1.pdf

40. https://www.jaslovensko.sk/ucitel/zakladne-skoly/vzdelavacie-programy/digikoordinatori/

41. https://itfitness.eu/media/files/c8/29/c829bd58-280b-4e07-bb56-a9080d646b90/final_it_fitness_test_2021_zaverecna_sprava.pdf

42. Statistical Yearbook – Colleges 2021/2022. Centre of Scientific and Technical Information of the Slovak Republic. Cit. 25.6.2022, pub. 26.1.2022. URL: https://www.cvtisr.sk/cvti-sr-vedecka-kniznica/informacie-o-skolstve/statistiky/statisticka-rocenka-publikacia/statisticka-rocenka-vysoke-skoly.html?page_id=9596#

43. Slovakia – The Legatum Prosperity Index 2021. The Legatum Institute Foundation. Cit. 25.6.2022, pub. 15.2.2022. URL: https://www.prosperity.com/globe/slovakia

44. PISA National Report 2018 – NUCEM. National Institute of Certified Measurements of Education. Cit. 26.6.2022, pub. 3.12.2019. URL: https://www.nucem.sk/dl/4636/Narodna_sprava_PISA_2018.pdf

45. Th analysis of findings on the state of education in Slovakia. That makes sense. MESA10. Cit. 26.6.2022, pub. 2019. URL: https://analyza.todarozum.sk/analyza-zisteni-o-stave-skolstva-na-slovensku.pdf

46. Strategy for the development of human resources in the Information Technology and Telecommunications sector up to the year 2030. SRI. Cit. 26.6.2022, pub. 11.3.2022. URL: https://www.sustavapovolani.sk/2022/03/sektorova-strategia-rozvoja-ludskych-zdrojov-v-sektore-ikt-v-horizonte-roku-2030/

47. Support to the CIO Office of the Slovak Republic to implement action plans in the area of digital skills. PWC. Cit: 26.6.2022, pub. 4.3.2020. URL: https://www.mirri.gov.sk/wp-content/uploads/2020/03/D5_2_Final_study.pdf

48. The Digital Education Action Plan for 2021 – 2027. European Commission. Cit. 26.6.2022, pub. 7.5.2021. URL: https://education.ec.europa.eu/sk/focus-topics/digital%20education/digital-education-action-plan

49. The Digital Compass 2030: The European Roadmap for the Digital Decade. European Commission. Cit. 27.6.2022, pub. 9.3.2021. URL: https://ec.europa.eu/info/sites/default/files/communicationdigital-compass-2030_en.pdf

50. The Digital Economy and Society Index (DESI). European Commission. Cit. 26.6.2022, pub. 7.6.2022. URL: https://digital-strategy.ec.europa.eu/en/policies/desi

51. Vision and development strategy of Slovakia 2030. The Ministry of Investment, Regional Development and Informatisation of the Slovak Republic. Cit. 25.6.2022, pub. 1.12.2020. URL: https://www.mirri.gov.sk/wp-content/uploads/2021/01/Slovensko-2030.pdf

52. Recovery plan - a road map to a better Slovakia. The Ministry of Finance of the Slovak Republic. Cit. 22.6.2022, pub. 7.5.2021. URL: https://www.mfsr.sk/files/archiv/1/Plan_obnovy_a_odolnosti.pdf

53. OECD National Skills Strategy for Slovakia. The Ministry of Education, Science, Research and Sport of the Slovak Republic. Cit. 26.6.2022, pub. 28.1.2020. URL: https://www.minedu.sk/data/att/15735.pdf

54. The Strategy for the Lifelong Learning and Guidance for the Years 2021 – 2030. The Ministry of Education, Science, Research and Sport of the Slovak Republic. Cit. 27.6.2022, pub. 24.11.2021. URL: https://www.minedu.sk/data/att/22182.pdf

55. IT Fitness test 2021. The Digital Coalition. URL: https://itfitness.eu/media/files/c8/29/c829bd58-280b-4e07-bb56-a9080d646b90/final_it_fitness_test_2021_zaverecna_sprava.pdf

56. IT Academy - education for the 21st century. Centre for scientific and technical information of the Slovak Republic. URL: https://itakademia.sk/

57. The National Cybersecurity Strategy for the years 2021 to 2025 https://www.nbu.gov.sk/wp-content/uploads/kyberneticka-bezpecnost/Narodna-strategia-kybernetickej-bezpecnosti.pdf

58. LP/2022/323 Decree of the National Security Office establishing knowledge standards in the field of cyber security (own material)

59. https://www.slov-lex.sk/legislativne-procesy/SK/LP/2022/323

60. https://www.slov-lex.sk/legislativne-procesy?p_p_id=processDetail_WAR_portletsel&p_p_lifecycle=2&p_p_state=normal&p_p_mode=view&p_p_cacheability=cacheLevelPage&p_p_col_id=column-2&p_p_col_count=1&_processDetail_WAR_portletsel_fileCooaddr=COO.2145.1000.3.5002960&_processDetail_WAR_portletsel_file=2_vlastny_material.docx&_processDetail_WAR_portletsel_action=getFile

61. Institutional background for increasing Slovakia's innovative performance, including strengthening the ability to use new EU digital funds (The Action Plan for the Digital Transformation)

62. https://ivpr.gov.sk/vplyv-robotizacie-automatizacie-a-digitalizacie-na-trh-prace-v-sr-vysledky-empirickeho-prieskumu-daniela-keselova-rastislav-bednarik-daniel-gerbery-darina-ondrusova-2022/

63. COUNCIL RECOMMENDATION of 16 June 2022 on individual education accounts (2022/C 243/03)

64. https://www.minedu.sk/timss-2019-vysledky-medzinarodneho-merania-vedomosti-a-zrucnosti-ziakov-stvrteho-rocnika-zs-v-matematike-a-prirodnych-vedach

65. Recovery plan in the SR, Component 17. Available online: https://www.planobnovy.sk/site/assets/files/1055/komponent_17_digitalne_slovensko_1.pdf

66. https://www.ivo.sk/8775/sk/aktuality/unik-mozgov-migracny-potencial-mladych-na-slovensku

67. https://www.minedu.sk/zverejnenie-vysledkov-slovenskych-ziakov-v-medzinarodnej-studii-oecd-pisa-2018/

68. https://www.ivo.sk/buxus/docs//publikacie/subory/Zeny_vo_svete_IT.pdf

69. https://ec.europa.eu/eurostat/databrowser/view/isoc_sks_itsps/default/table?lang=en

70. https://ec.europa.eu/newsroom/dae/redirection/document/88763

71. The National Cybersecurity Strategy for the years 2021 to 2025 https://www.nbu.gov.sk/wp-content/uploads/kyberneticka-bezpecnost/Akcny-plan-kybernetickej-bezpecnosti.pdf

72. VELŠIC, Marián. DIGITAL LITERACY IN SLOVAKIA 2020, Institute for Public Affairs, Bratislava, 2020, ISBN 978–80–89345–81-6. Available online: https://www.ivo.sk/buxus/docs//publikacie/subory/Digitalna_gramotnost_2022.pd