Action plan for the digital transformation of Slovakia for 2019 – 2022

Action plan for transformation of Slovakia into a successful digital country and development of the digital single market

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Summary

The Action plan for the digital transformation of Slovakia for 2019-2022 (hereinafter as the "Action Plan") is based and directly follows up the 2030 Digital Transformation Strategy for Slovakia (hereinafter as the "Strategy").

The Action Plan includes measures whose implementation can be started in the short-time horizon, i.e. from Q3 2019 until the end of 2022. Their funding is bound to the 2014 – 2020 Programming Period. Successful implementation of the Action Plan requires a broad political support beyond the time limit of the current government administration mandate.

The report on implementation of the Action Plan will be submitted to the Government of the Slovak Republic always as of 30 September of 2020, 2021 and 2022. Any future action plans will be prepared based on the performance of this Action Plan, as well as based on the global focus and priorities of the EU. The entity in charge of the monitoring of performance of different measures and setting of further measures for the following periods is the Directorate General for Digital Agenda of the ODPMII.

This unit will perform monitoring of achieving measurable goals of different measures in the digital agenda that will be based on the national legislation and relevant standards as well as leading European indexes. The unit will set, in cooperation with relevant ministries and, possibly, with the expert public, measurable indicators for set goals and the manner of data collection for its evaluation in regular intervals. Thus, it will systematically monitor the procedure for designing and implementing measures of the Action Plan. Based on results of the monitoring, it will possible to update the plan of implementation of the Action Plan.

Measures are broken down to the following strategic areas (strategic goals), in which Slovakia can reach significant success in the monitored time horizon. They cover all areas of the vision of the digital transformation of Slovakia, i.e. **economy, society and education, public administration, territorial development and research**:

1. We will support the digital transformation of schools and education in order to improve the quality and preconditions for employment and acquisition of digital skills and competences necessary for the digital era,
2. We will establish the basis for modern data and digital economy,
3. We will improve abilities of the public administration to innovate and use the data,
4. We will support development of artificial intelligence.

Measures of the Action Plan are, based on their nature, divided into three groups:

- **Regulation:** Definition of concepts, preparation of strategies and proposal of the legislation framework.
- **Structure:** Structural measures that will make possible to get prepared for the implementation in practice and for experimenting, enhancement of the technological capacity and human resources, connecting communities.
- **Projects:** Implementation of relevant measures in practice by means of projects and initiatives.

In order to carry out effective measures in the aforementioned priority areas, it is necessary, from the short-term perspective, to strengthen the institutional background that represents the basis of the innovative ecosystem. The proposal results from priority recommendations and commitments of European policies or directly from arrangements of Member States. Its ambition is to create or strengthen existing institutional background so that Slovakia could effectively use directly managed programmes of the EU as well as European structural and investment funds in the 2021-2027 period. The success of the Strategy and related Action Plan will, to large extent, depend on effective international cooperation and sharing best practices. At the same time, affected Slovak ministries must align themselves with it. For the purposes of meeting the goal pursued by the Strategy, it will be important for relevant central state administration authorities to have the possibility to adjust their own structure and institutional competences.

Introduction

The Action Plan of the digital transformation of Slovakia for 2019 – 2022 implements the **2030 Digital Transformation Strategy for Slovakia,** covering measures that can be implemented in the **short-term time horizon**, i.e. from September 2019 until the end of 2022. Their funding is bound to the 2014 – 2020 Programming Period. A successful implementation of measures of the Action Plan requires a broad political support beyond the mandate of the current government.

In the field of innovative technologies and in the process of digital transformation, the period of three years is a relatively long period of time. During the three years, there will be, very likely, a change of basic starting points, the area of the digital agenda will move forward dramatically and the meaning and use of new technologies and their direction will show in full. Therefore, our main intention is to remove any obstacles hindering from beneficial and responsible deployment of digital innovations into practice in priority areas and create solid preconditions for further development.

The report on implementation of the Action Plan will be submitted to the Government of the Slovak Republic always as of the end of September. And, based on the performance of this Action Plan, as well as based on the global focus and priorities of the EU, there will be future action plans prepared resulting from adopted and updated Strategy.

The Action Plan has been prepared in accordance with applicable Slovak legislation and different measures will respect and comply with the legislation of the Slovak Republic and regulations and directives of the European Union (hereinafter only as the "EU"). The Action Plan will, in line with the Constitution of the Slovak Republic and all international commitments, respect rights of all citizens of the Slovak Republic, including disadvantaged groups and minorities.

Strategic areas of the digital transformation of Slovakia

The measures are divided into the following strategic areas **(strategic goals),** in which Slovakia can reach tangible success in the monitored period of time. They cover all aspects of the vision of the digital transformation of Slovakia, i.e. **economy, society and education, public administration, territorial development and science, research and innovations**:

1. We will support digital transformation of schools and education in order to improve the quality and chances of employment and acquire digital skills and competences necessary for the digital era,
2. We will create the basis for modern digital and data economy and for the digital transformation of the economy in general,
3. We will improve abilities of the public administration to innovate and use the data for the benefit of citizens,
4. We will support the development of artificial intelligence.

Institutional background to increase the innovative effectiveness of Slovakia, including strengthening of the ability to use new digital funds of the EU

In order to carry out effective measures in the aforementioned priority areas, it is, in the short-term horizon, necessary to strengthen institutional background that constitutes the basis of the innovation ecosystem. The proposal results from priority recommendations and obligations of European policies or directly from agreements of the Member States. **Its ambition is to create or strengthen current institutional background so that Slovakia could effectively use directly managed EU programmes as well as European Structural and Investment Funds the 2021-2027 period.** Specific sources from directly managed programmes such as the Connected Europe Facility, Digital Europe Programme and Horizon Europe **provide Slovakia with unprecedented possibility to receive significant financial means.**

From the conceptual viewpoint, there should be, in particular, **two levels of state engagement,** based on its active participation. At the **first level**, the state will enable **controlled setting up of platforms**

and centres, whose activities will be guided primarily by the private or academic sector. **The second level** will mean **direct engagement of the state** in the sense of balanced partnership with the private or/and academic sector or in the form of leading role of the government if agreed. Both above levels should receive systemic support from the government to develop innovations and increase digital competitiveness of Slovakia in general. A specific level not explicitly defined in this part concern the participative process in the cooperation between the state and various interested entities in defining opportunities and challenges of approaching technological trends or other important aspects of the digital transformation.

The chapter about the institutional background is not definite. The action plan introduces more institutional measures that are, however, from the viewpoint of their meaning, placed directly in its thematic chapters – part Organisation.

The digital transformation, due to its cross-sectional nature, concerns competences of a whole range of ministries, central public administration authorities and other relevant stakeholders. Due to its significant overlaps to international and European policies as well as possibilities of funding from the Multiannual Financial Framework 2021-2027, an especially important role will be that of the Ministry of Foreign and European Affairs as the central state administration authority for foreign policy. The Strategy as well as its Action Plan reflect several legislative and strategic documents of the EU, including activities concerning the support to innovations. The success of the Strategy and related Action Plan will, to large extent, depend on effective international cooperation and sharing best practices. For the purposes of the Strategy implementation, it will be necessary for the relevant central state administration authorities, which are in charge of different measures, to have the possibility to flexibly adjust their own structures as well as institutional scope of competences. However, it is not ambition of this Strategy to define particular means of coping with this challenge as approaches of different ministries to meeting different objectives can differ.

A Ensuring direct political support to priority areas of the Action Plan

Description of the measure	Concerned ministries and other central state administration authorities will adjust their own structures in order to support meeting prioritized areas of the Action Plan in the scope of competences of the institution. For the Action Plan to be successful, it is extremely important for the concerned ministries to identify themselves with the "ownership" of the topic as well as of priorities whose account, if possible, should be under direct political management. Concerned units at those ministries will also act as the contact points for taking accounts of tasks of the Action Plan. If there are more of them, the optimum solution is to specify the shared contact point. Example 1: Ministry of Education, Science, Research and Sport of the Slovak Republic, due to the complexity and social importance of competences for the digital era, digital skills and the digital transformation of education and schools and, for the purposes of cooperation in the Digital coalition, will set up a separate unit that will such cross-sectional themes in a systemic manner and that will, at the same time, implement state policies in this field. Setting up, managing activities and outputs of such unit should fall under competences of the political and strategic representative of the ministry. Example 2: Ministry of Finance of the Slovak Republic (MF SR), in connection to activities of the Centre for financial innovations, will increase its organisational capacity in the field of financial innovations in order to support and promote financial innovations. Its ambition is to strengthen the position of the Ministry of Finance of the Slovak Republic as the contact point for the field of financial innovations for the public administration and business entities and promote Slovakia as the regional leader in the field of innovations in the financial market.
In charge	Relevant ministries

Deadline / duration / measure implementation /	31 December 2019, continuously.
Main expected output	Adjustment of the organisational structure of the ministry with the overlap to political influence
Source of funding	No direct additional expenditure is expected
Reference	No
Dependence on other AP measures	No

For the purposes of supporting the development of digital skills and competences for the needs of practice and education, there was, in 2017, the National coalition for digital skills and jobs in the Slovak Republic (**Digital Coalition**) set up based on the initiative of the IT Association of Slovakia and with the support of the ODPMII. The Digital Coalition is a successful example of activation across a whole range of public, private, academic and civil organisation and institutions in Slovakia in order to improve digital skills of citizens.

B Support to activities of the Digital Coalition

Description of the measure	It is based on extension of approved measure No. 13 of Chapter 3.3 of the Action Plan for Smart Industry in the Slovak Republic. As we perceive the Digital Coalition as one of instruments for cooperative implementation of goals of the digital transformation of Slovakia, it is in our interest to support its activities by setting up a new legal entity, with the participation of the government as a founding member and partner to the IT Association of Slovakia. A strengthened Digital Coalition could thus take part in implementation of national, regional, European and international policies. It is expected that the Digital Coalition will be very actively involved also in the network of other digital coalitions in EU Member States and it will directly apply for support for EU funds, including directly managed programmes. One of key intentions of the Digital Coalition is to make education in digital technologies topical, effective and provide Slovak citizens with the opportunity to develop their own digital skills and competences in the whole course of their lives to enable them be successful in the labour market and use digital technologies for the performance of their work and to ensure high quality of their lives. Digital Coalition: ▪ Mobilizes all of those who assume obligations to provide education and re-qualify employees or entrepreneurs in any sector, such as health care, agriculture, education, retail, services or manufacturing, ▪ Mobilizes experts, organisations and associations active in the field of digital skills and jobs focused on education, qualification enhancement or requalification of the labour force and enable citizens acquire digital skills necessary for their lives, ▪ Initiates preparation of a comprehensive national strategy in the field of digital skills, ▪ Brings best procedures in Europe and worldwide in acquiring digital skills for Slovakia, ▪ Provides information about available resources to support the development of digital skills (European Structural and Investment Funds, Erasmus, Youth Employment Initiative, etc.), ▪ Takes part in preparation and implementation of state policies in the field of digital skills and competences, ▪ Takes part in international activities and projects in the in the field of digital skills and competences. The support to activities should rest in:

	▪ Promotion of activities of the Digital Coalition, ▪ Financial, material, personnel and structural support to activities of the Digital Coalition, ▪ Communication with members of the Digital Coalition in order to support them in performing their commitments, ▪ Updating and revising goals and activities of the Digital Coalition in order to adjust its focus and contribution for the needs of the digital economy.
In charge	ODPMII and IT Association of Slovakia in cooperation with the MF SR, Ministry of Education, Ministry of Labour as well as members of the Digital Coalition
Deadline / duration / measure implementation /	30 September 2019, continuously. The implementation of the measure has not reached the expected scope.
Main expected output	Setting up of the Digital Coalition as legal entity (second level of the state participation). Performance of the measure description.
Source of funding	State budget / EU funds
Reference	Yes. Thematic enhancement is based on the draft regulation on introducing the Digital Europe Programme (No. 10167/18+ADD1, ADD2, ADD3). Moreover, digital coalitions in Member States will be able to spend funds for performance of objectives of public importance from current CEF-Telekom Programme (Regulation 283/2014).
Dependence on other AP measures	Yes. See Chapter I.

Slovakia is one of the last four EU Member States (together with Bulgaria, Romania and Malta) that have not developed, as of the date of adoption of this Action Plan, a network of support centres called **Digital Innovation Hubs**[1] (DIHs). It is such digital innovation hubs that provide a unique opportunity to ensure full use of digital technologies in economy and society. Companies, above all small and medium enterprises, as well as public sector entities, acquire access to the use of innovative and digital technologies, such as application possibilities of artificial intelligence, computing time for high-speed computers to increase their competitiveness and, equally, they can receive consultancy about how to successfully digitalise their own processes. Therefore, we will support setting up of the network of DIHs in Slovak regions with a significant impact on the business sector, public administration as well as the academia.

C Initiating, support to setting up and connecting DIHs in Slovakia

Description of the measure	It refers to enhancement of approved measure No. 12, chap. 3 of the Smart Industry Action Plan. Based on results of the currently prepared feasibility study, prepare, support and connect DIHs that will serve as single point of contact for services that will provide industrial companies with access to latest digital solutions, most advanced industrial experiments, sets of human and industrial competences. The so called European DIH (EDIH) will coordinate and provide the following services from the central level: ▪ Networking (connecting supply and demand in the field of innovations and connecting Slovak companies to foreign groupings dealing with similar issues),

[1] Digital Innovation hubs are single points of contact that can help companies – in particular small and medium enterprises to improve their business, production processes, products and services by means of digital technologies and thus make them prepared for a successful implementation of the digital transformation.

	▪ Financing (assistance in preparing applications for grants from local sources and EU source, assistance in managing projects as well as assistance in acquiring risk capital and investors in general), ▪ Human resources development (use of the Digital Coalition sources and platform). The European DIH will be surrounded by ecosystem providing testbeds and offering particular solutions in the field of digital innovations for the industry. In the ecosystem, it will be possible to carry out activities such as "test before invest" and innovative projects. If it is possible, also technical universities will get involved in the build-up of the EDIH. To set up EDIH in Slovakia by the end of 2020 in the sense of results of currently prepared feasibility study – Prepare rules and measures for development of the DIH ecosystem and invite potential partner institutions and companies to join. Provide coordination of activities of the DIH with activities of the Digital Coalition.
In charge	ODPMII in cooperation with the Ministry of Economy and IT Association of Slovakia
Deadline / duration / measure implementation /	31 December 2020, continuously. The implementation of the measure has not started yet.
Main expected output	Setting up the EDIH
Source of funding	State budget / EU funds
Reference	Yes. Resulting from draft regulation on introducing the Digital Europe Programme (No. 10167/18 + ADD 1, ADD 2, ADD 3).
Dependence on other AP measures	No. however, it is related to the Smart Industry Action Plan in the Slovak Republic.

In order to increase reasonable use of smart intelligence, it is necessary to set areas for which artificial intelligence will be beneficial, consider the scope of its deployment and adopt binding rules for its use while reflecting general moral principles. For the purposes of dealing with such tasks, including the support to the basic research and its connection to its application use, there will be support provided to the set up and activities of **platforms of research and utilisation of artificial intelligence**, which will combine interests of the business, academic and government sectors and will closely cooperate with top research centres abroad. The government will specifically support activities of those entities that can combine interests of a broad group of various stakeholders and opinion leaders in order to reach the excellence. At the same time, it will try to prevent brain drain of national experts out of Slovakia.

D Support to setting up and activities of a platform for research and utilisation of artificial intelligence

Description of the measure	Set up a Slovak platform for research and utilisation of artificial intelligence that will play the role of central contact point for academic research teams and research centres in industry, business and public sector as well innovation labs. By setting up such platforms, we will create and strengthen strong feedback between research centres, universities based on the use of artificial intelligence in industry and public administration. Provide benefit to the society by pointing out at problems and offering solutions acquired by scientific research in selected fields of artificial intelligence aimed at areas with potential transfer of knowledge into practice. Take part in shaping positions of the Slovak Republic in different fields of artificial intelligence and public policies in general. Strengthen education and ethical principles in the field of artificial intelligence.

	Take part in international projects in the field of artificial intelligence in order to maximise utilisation of sources of directly managed EU programmes as well as other EU funds. Strengthen the talent in the field of artificial intelligence as well as more in general for IT and thus: ▪ Reduce the drain of young people from Slovakia, provide them with a competitive alternative in strongly developing area with a huge potential, ▪ Attract people who left back to Slovakia with the offer of an attractive, top level scientific facility, ▪ Acquire talents from abroad, make Slovakia attractive for them in the short-term and long-term run, ▪ Engage talents to the virtual centre of excellence in artificial intelligence, ▪ Produce skills in the field of artificial intelligence by means of basic and applied research at excellent level by combining existing capacities in this field in Slovakia, ▪ Support education of experts in the field of artificial intelligence, ▪ Connect academic, private and public sector, especially by transferring knowledge from the academic sector up to application of results in practice, ▪ Take part in handling tasks resulting from the needs of the society and practice with artificial intelligence, including public administration, ▪ Predict new events connected to artificial intelligence that can be relevant for the society at national, regional, European and international level, ▪ Contribute to the transition to low-carbon and circular economy, Activities of the platform will be further supported by: ▪ Promotion of activities of platforms for research and utilisation of artificial intelligence, ▪ Communication with members of platforms for research and utilisation of artificial intelligence in order to support them in performing their commitments. Those activities form the basis of tasks and objectives of the platform for research and utilisation of artificial intelligence, whereas their list is not final.
In charge	ODPMII in cooperation with relevant ministries that will be in charge of applied use of artificial intelligence
Deadline / duration / measure implementation /	31 December 2019, continuously. The measure implementation started after approval of the 2030 Digital Transformation Strategy for Slovakia.
Main expected output	Setting up of the platform/platforms for research and utilisation of artificial intelligence in order to increase innovation capacities of the Slovak Republic
Source of funding	State budget / EU funds
Reference	Yes. It results from draft regulation on introducing the Digital Europe Programme (No. 10167/18 + ADD 1, ADD 2, ADD 3). And it also results from various strategic documents of the Commission and the Council of the EU.
Dependence on other AP measures	Yes. See Chapter 4.

Due to the potential of the blockchain technology and its increasing use by public administration in the EU as well as in many other developed countries of the world, it is reasonable to provide systemic support to the research, testing, deployment and subsequent monitoring of this technology. In cases where testing and experimenting demonstrated benefits of this technology compared to more traditional solutions, its gradual deployment will be considered also reflecting the "value for money" principle. Therefore, the government will support setting up and activities of platforms for research, development and use of the blockchain technology that will combine interests of the business, academic and public sectors. Depending on results of task tiled "Testing the use of the blockchain technology in public administration in pilot projects" and the relevant feasibility study, the government will provide detailed proposals of systemic support measures.

E Support to setting up and activities of the platform for research and utilisation of the blockchain technology

Description of the measure	Set up a Slovak platform for research and utilisation of the blockchain technology that will play the role of the central contact point for academic research teams and research centres in industry and business sector as well innovation labs. By setting up such platform, we will create and strengthen strong feedback between research centres, universities, private sector as well as innovations based on the use of the blockchain technology in industry and public administration Support educating experts in the field of the blockchain technology due to the multidisciplinary nature of the technology. Connect the academic, private and public sector, in particular by means of transferring knowledge from the academic sector up to application of research results for the use in the private sector and public administration. Take part in tasks resulting from the needs of the society, including the public administration, in connection to application of the blockchain technology. Analyse benefits as well as risks of deployment of the blockchain technology in public administration and private sector compared to traditional technology solutions. Analyse and identify suitable pilot projects for testing the blockchain technology in industry and public administration. Take part in international projects in the field of the blockchain technology in order to maximise utilisation of resources from directly managed EU programmes as well as other EU funds. Those activities form the basis of tasks and objectives of the platform for research and utilisation of the blockchain technology, whereas their list is not final.
In charge	ODPMII in cooperation with relevant ministries that will be in charge of innovations using the blockchain technology
Deadline / duration / measure implementation /	30 June 2020, continuously. The implementation of the measure has not started yet.
Main expected output	Setting up of the platform/platforms for research and utilisation of the blockchain technology in order to increase innovation capacities of the Slovak Republic
Source of funding	State budget / EU funds
Reference	Yes. It results from draft regulation on introducing the Digital Europe Programme (No. 10167/18 + ADD 1, ADD 2, ADD 3). And it also results from various strategic documents of the Commission and the Council of the EU.

Dependence on other AP measures	No.

For full use of innovative technologies, it is necessary to provide support in the form of high-capacity hardware. Setting up of the **national high-performance computing (HPC) competence centre** will provide access to expert knowledge, sharing of best practices and enhance possibilities of the use of computing time for industry and public administration. Users will be able to use the opportunity to write machine code, optimise algorithms and use general consultancy on the use of HPC. Moreover, that will provide significant room for co-funding of its activities from directly managed EU programmes as well as form the ESIF. Setting up the national high-performance computing competence centre has the strategic and legislative support from the EU.

At the end of 2018, the Slovak republic joined EU Member States and associated members and became a part of the EuroHPC (European High Performance Computing Joint Undertaking) Initiative whose goal is to build a comprehensive infrastructure and integral ecosystem of supercomputers in Europe and develop research activities in the field of big data processing and artificial intelligence, including computing architecture for machine learning using the deep learning method. **The Nation Competence Centre for High Performance Computing will take over the tasks and commitments resulting from the EuroHPC Initiative and similar activities**.

The Knowledge economy based on innovations and high added value is one of the key priorities of modern European states, whose objective is to remove the dependence on traditional industrial sectors (such as mechanical engineering) and create competitive advantage compared to other countries and regions. The Slovak Republic needs to significantly support its innovation potential. In the private sector, as well as in the academia, science and research, there are capabilities in the form of successful teams, projects and companies. A remaining challenge is to set up preconditions for intensive development of capabilities in a strong global competition.

Currently, the Slovak investments into science and research are at the lowest level from among V4 countries (total amount as well as calculated per capita) and, in the European context, we even belong to the worst ones. In 2018, the share of science and research in the GDP amounted to app. 0.8% and it is obvious that the political goal to reach the amount of 3% in 2020 will not be met. **Investment incentive to the HPC could significantly help Slovakia launch the leverage effect of other similar investments and attract innovation corporate cluster**. Setting up such centre is subject to adoption of relevant EU legislation (Council Regulation (EU) 2018/1488, establishing the European High Performance Computing Joint Undertaking). As the setup of the aforementioned national centre will require more systemic preparation, Slovakia will, until then, **support establishment of platforms for research and use of high-performance computers at the national level as well as for international purposes.**

F Support to setting up and activities of national high-performance computing competence centre

Description of the measure	In March 2017, the European Commission (hereinafter only as the "Commission") adopted the EuroHPC Declaration. It is an agreement in which signatory countries undertook to cooperate with each other as well as with the Commission regarding purchasing, building and deploying integrated infrastructure for latest high-performance computing equipment. Access of Slovakia to the EuroHPC was recommended by the Council of the Government of the Slovak republic for Science, technology and Innovations. National policies and measure sin this field will be coordinated by the national high-performance computing competence centre, whose primary task will be to build a network of stakeholders from public administration, academia as well as private sector. Objectives: ▪ Make the Slovak Republic become a respected partner in the European High Performance Computing Initiative as well as in new technologies and big data processing using artificial intelligence (big AI). ▪ Strengthen the position of Slovakia as an active member and innovative leader in the *EuroHPC – Joint Undertaking* project carried out with a

	significant capacity of funding from the EU funds including directly managed funds. ▪ Provide for implementation of financial and project commitments of the Slovak Republic after accessing the EuroHPC joint undertaking. ▪ Set up a national ecosystem in the form of public-private partnership that combines private, academic and public sector in the field of high-performance computers and deep learning technology for application using artificial intelligence as necessary mechanism for European and global competitiveness. National high-performance computing competence centre will implement the government policy in the field of high-performance computing as well as high performance computing operations. It will create a systemic framework for development and support to the HPC and artificial intelligence ecosystem. Efficient use of EU funds including directly managed programmes for the development of joint projects in the international context. Provide the EuroHPC with qualitative partnership, performance of agreed tasks including providing of high-performance computing and machine time of the national solution. Among possible future tasks of the centre are: dissemination of HPC application for a broad spectrum of users, in particular companies; provide access to scientific and technical expertise by means of application focus of the HPC and providing capacities for storing data for super innovative solutions; training of capabilities for using HPC solutions; fast growth of awareness of the possibilities and necessity of using the HPC; top level global technological transfer at the local level.
In charge	ODPMII in cooperation with the Slovak Academy of Sciences and other stakeholders
Deadline / duration / measure implementation /	31 December 2019, continuously. The implementation of the measure has not started yet.
Main expected output	Setting up platforms/platform for research and utilisation of supercomputers in the national context as well as for international purposes. Setting of the national high-performance computing competence centre with its legal capacity.
Source of funding	Setting up and operation – state budget, development – EU funds
Reference	Yes. Based on Council Regulation (EU) 2018/1488, establishing the European High Performance Computing Joint Undertaking. It results from draft regulation on introducing the Digital Europe Programme (No. 10167/18 + ADD 1, ADD 2, ADD 3).
Dependence on other AP measures	No.

Last but not least, it is necessary to pay attention to cyber security. Every institution and every citizen can be targets of cyber attacks. The government must make sure that the level of protection of provided online services safeguarded their reliable and secure providing. Building cyber security is necessary and it is being built at four levels in Slovakia – institutional, legislative and strategic, operational and technical and personal. Therefore, it will be necessary to review and strengthen the functioning model of cooperation in the field of cyber security among relevant public authorities, private sector and the academia. Along with the above, there is a need for a continuous process of building public awareness of cyber security as well as targeted support to other activities in this field, including science and research, standardisation, building expert capacities and education and coordination with other centres in the EU. Therefore, we propose setting up of the **national competence centre for cyber security**. Its establishment will provide significant room for funding its activities from directly managed EU

programmes as well as from the European Structural and Investment Funds. Setting up such centre results from the EU legislation (proposal for a regulation of the European Parliament and the Council establishing the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres).

G Support to setting up and activities of the national competence and coordination centre for cyber security

Description of the measure	National competence and coordination centre for cyber security should perform the following tasks: ▪ Support to the European competence centre in reaching its goals and, in particular, in coordinating the community of cyber security competences, ▪ Strengthening of cyber security capacities of the country, knowledge and infrastructure for different industries, public sector and the research community, ▪ Contribution to general deployment of cyber security products and solutions in the economy as such, ▪ Improvement of the understanding of cyber security and contribution to completing missing skills in the field of cyber security, ▪ Contribution to strengthening of cyber security research and development in the Union, including facilitation and acceleration of processes of standardisation and certification, in particular, in the field of cyber security certification systems in the sense of adopted regulation – Act on cyber security, ▪ Support to participation of the sector and other stakeholders, at the level of Member States, in cross-border projects, ▪ In cooperation with the European competence centre, contribution to identifying and looking for solutions of cyber security challenges in different fields, cooperation in the development of new technologies in the field of cyber security, including encryption, ▪ Acting as the contact point with the community of cyber security competences, other national competence centres and the European competence centre, ▪ Effort to make synergies with relevant activities at the national and regional level, ▪ Execution of special activities for which the European competence centre provided grants, including providing financial support to third parties, according to Article 204 of the new regulation on budgetary rules of the EU under the terms specified in relevant agreements on the grant, ▪ Promotion and dissemination of relevant results of activities of the network, community of cyber security competences and the competence centre at national or regional level, ▪ Evaluation of applications from entities residing in Slovakia for accessing the community of cyber security competences, ▪ Cooperation of national competence and coordination centres, ▪ Evaluation of the use of artificial intelligence in the field of cyber security for the purposes of automation of security procedures, identification and mitigation of incidents, ▪ Support to education of future experts and building capacities. <u>Mechanisms of implementation:</u> ▪ Carry out survey of current research tasks in the field of security, ▪ Set up research and implementation partnerships with organisations operating in the field of security at the national and regional level ▪ Propose innovative procedures for solutions of identified research tasks using the technology of machine learning and artificial intelligence

	▪ Increase the ability to mitigate incidents by implementing and utilising proposed procedures The goal of the joint research activity is to increase the awareness of activities of the National competence centre, cooperation in identifying and dealing with actual security problems and extensions of possibilities and abilities of the office to carry out its mission and increase security of the cyber space.
In charge	National Security Authority in cooperation with the ODPMII
Deadline / duration / measure implementation /	31 December 2020, continuously. The implementation of the measure has not started yet.
Main expected output	Setting up the national competence and coordination centre for cyber security with its legal capacity.
Source of funding	Establishment and operation – state budget, development – EU funds
Reference	Yes. Based on proposal for a regulation of the European Parliament and the Council establishing the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres. It also results from draft regulation on introducing the Digital Europe Programme (No. 10167/18 + ADD 1, ADD 2, ADD 3).
Dependence on other AP measures	No

Coordination of tasks and activities of the Acton Plan

Working level: establishment of a working group for the digital transformation

Monitoring of performance of different measures as well as setting of the Action Plan for the following period will be carried out by the **Directorate General for Digital Agenda at the ODPMII** (hereinafter as the "DGDA"). The aforementioned unit will set measurable indicators for set goals and the method of data collection for their evaluation in regular intervals, in cooperation with relevant ministries and the expert public. Based on results of the monitoring, it will be possible to update the Action Plan in the future. The organisational unit will also give recommendations for more effective implementation of tasks carried out by other ministries, above all in problematic areas.

Along with that, there will be **working group for the digital transformation** (hereinafter as the "Working Group") at the ODPMII in order to provide assistance to the DGDA in implementing measures of the Action Plan and it will also include affected ministries and main stakeholders. For this purpose, the DGDA will prepare the **Statute of the Working Group** that will be of a light and flexible nature and that will define its tasks. One of its tasks will also be to evaluate new technological trends, as well as other objective effects that may have impact on the topicality of the Action Plan. The Working Group will also take part in early evaluation of relevant measures from the viewpoint of their actual benefit. If necessary, the Working Group will take part in preparation of Slovak positions for the purposes of negotiations in committees and working groups of EU institutions, it will recommend innovations in different areas and assist in implementation of changes. It is expected that the Working Group will be proactive and it will come up with new features and ideas. The functioning and intensity of the Working Group will be determined by the DGDA based on the plan of activities and tasks. That plan will also serve as the basis for reporting.

Based on progress reports, the DGDA will prepare Information about performance of the Action Plan prior to sessions of the Council of the Government of the Slovak Republic for Digitalization of the Public Administration and Digital Single Market. It will inform about the progress regularly, in a transparent and comprehensible format. Subsequently, the Information about performance of the Action Plan will be submitted to the Government of the Slovak Republic (every year as of 30 September).

For its activities, the Working Group can also invite the expert public, academia or representatives of industry and civil society. Proposed measures of the Action Plan cover a broad range of social areas.

Therefore, it is necessary to have relevant views and look for balance among eligible interests of participating parties. For the overall success of implementation of the Action Plan, it is necessary to have open and regular communication with the public about implementation processes.

Communication will be provided using the website and social networks of the ODPMII that will publish all reports and news related to implementation of the Action Plan. The goal is to make the public aware of what is being prepared and to provide the public with the possibility to express their attitudes and opinions. The owner of the document will provide information about changes so that relevant entities can get thoroughly and sufficiently prepared.

Political level: Council of the Government of the Slovak Republic for Digitalization of the Public Administration and Digital Single Market

The Council of the Government of the Slovak Republic for Digitalization of the Public Administration and Digital Single Market (hereinafter as the "Council") as the advisory, coordinating and initiating body of the Government of the Slovak republic for matters concerning informatization, digital single market and digitalization of the public administration will, at the political level, monitor performance of measures of the Action Plan. At the same time, it will be preparing standpoints and recommendations for the Government of the Slovak Republic. At regular session, members of the Council will be informed about performance of measures as well as about preparation of the next action plan for the following period. The Council will provide political supervision over the procedure of performance of tasks. The Council will also discuss possible disputable issues in order to find consensus and political support for solutions selected as the best ones based on objective evidence.

Implementation of the Action Plan

Measures in the Action Plan are broken down to three groups, based on their nature:

- **Regulation:** Definition of concepts, preparation of the strategy and legislative framework draft.
- **Organisation:** Structural measures that will enable preparation for the implementation in practice and experimenting, strengthening of the technological capacity and human resources, connecting communities.
- **Projects:** Implementation of relevant measures in practice in the form of projects and initiatives.

Regulation for the 21st century

In order to support significant transformation of the society and building of a vital data economy in Slovakia, it is necessary to combine conceptual thinking and long-term vision with implementation of experiments in order to achieve optimum level of innovations of public policies. Public policies are important because they make it possible to concentrate the energy of the public sector on solutions of the most important problems.

Current legislation often does not count with new technologies. An important way how to modernize economy and public administration is to set legislative frameworks for the needs of the 21st century, either by means of simplifying, removing obsolete rules or adopting new concepts, if it is effective (for example, in the field of data use).

In proposing solutions of problems, we prefer **simplifying and removing current regulations** wherever it is possible. We perceive the digital single market as an opportunity how to adjust regulatory frameworks to the digital era and eliminate unnecessary and double rules. All new proposals must be thoroughly evaluated. We support, above all, pan-European solutions and electronic support to demonstrate compliance with regulations, thus, new rules should lead to harmonisation and removals of unnecessary regulations at the national level and prevent occurrence of the so called unjustified "gold plating".[2] Matters concerning ex post evaluation of regulations, "one-in one-out" principle (when new regulation is adopted, one existing regulation will be cancelled), gold plating and dynamic regulations are treated more in detail in RIA 2020 – Strategy for better regulation. In the process of implementation of the Action Plan, there will be methodologies prepared for deploying such tools of better regulation into practice.

On a continuous basis, we will **introduce dynamic regulation** in different sectors that will enable affected entities to experiment and innovate procedures in order to achieve the expected goal of the regulation. Dynamic regulation does not prescribe any precise procedure of how to keep it and leaves more freedom to the business sector. It is suitable especially for very fast developing sectors, such as digital and platform economy.

There is an experimental regulatory concept, so called **regulatory sandbox** used for the purposes of testing new regulatory measures prior to their general deployment. In it, the government will propose controlled experiments where companies can legally operate in the new manner, while state administration employees will continuously evaluate results, consult with consumers and market participants and acquire knowledge for broader initiatives.

Stress on personal data protection

The intent of the Action Plan also encompasses building trust of persons using digital technologies, ensuring protection of shared data and setting conditions for creating responsible and adequate process of digital transformation. Specific attention in implementation of proposed measures of this Action Plan will be paid to protection of fundamental rights and freedoms of natural persons, in particular right to privacy in connection to personal data processing and compliance with requirements put on personal data protection in relevant European[3] as well as national legislation[4]. Before the process of implementation of those measures referred to in this Action Plan, when personal data is processed (in

[2] Gold-plating is a pejorative expression referring to undesired expansion of the content of EU directives in a manner that introduces new regulatory burden without adequate benefits for national legislation and competitiveness.
[3] Regulation of the European Parliament and of the Council (EU) 2016/679 of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation (O.J. EU L 119, 4 May 2016).
[4] In particular, Act No. 18/2018 Coll. on personal data protection and on amendment to other acts as amended.

particular setting up and deployment of new information systems and technologies), the data protection impact assessment will be made in the sense of Art. 35 of the General Data Protection Regulation and prior consultation with the supervisory authority will be used in the sense of Art. 36 of the General Data Protection Regulation prior to the data processing, if the data protection impact assessment implies that such processing could lead to high risk unless the controller adopts measures to mitigate the risk.

When introducing innovative technologies that will work with personal data, consideration will be paid to deployment of innovative tools for application of rights of affected persons and compliance with the notification obligations as well as recommendation and guidelines of the European Data Protection Board (EDPB) [5].

Referring to only a part of obligations from the GDPR and the Data Protection Act in the Action Plan does not affect other obligations resulting from the aforementioned and other relevant regulations.

Innovation laboratories as the new means of performing public administration in the digital era

The preferred way how to achieve substantial changes is introduction of innovation laboratories for various sectors of public administration. Innovation laboratories will be in charge of:

- Proposing solutions of problems in the particular sector,
- Proposing changes of policies and recommendations in the particular sector (e.g. legislation amendments),
- Proposing new concepts, pilot projects and experiments,
- Making experiments (including experimental verification of regulations),
- Monitoring effectiveness of regulatory modes.

In innovation laboratories, there will be partnerships made between public, private and academic sectors and ecosystems will be set up (or be parts of the ecosystem).

Innovation laboratories are necessary in all important areas where we want to achieve improvement of effectiveness of public policies. It is continuation of the concept of analytical units in public administration that has been set up to large extent already. While analytical units are able to offer independent viewpoints, high quality analytical documents, assessments of policies and recommendations, innovation laboratories will bring results in experimenting and verifying ideas that will be subsequently prepared for implementation in practice. An important aspect of the concept of innovation laboratories is ensuring funding for promising projects, connection of stakeholders from various sectors and assistance in acquiring capital for innovative companies and institutions that can handle identified problems in particular sectors.

System of evaluation of preliminary performance of the Action Plan

For an effective implementation of the Action Plan, it makes sense to set relevant indicators for different measures that will make it possible to evaluate success of performance. The overall ambition goes deeper than simple reporting if the task was met in the sense of relevant resolution of the government.

Digital transformation of Slovakia is a long-term process including lots of impacts that are hard to calculate. They affect not only internal coordination of dozens of public administration institutions that often act as sovereign "silos" as well as eternal elements influencing the focus of the public sector at the national level as well as more global direction in international environment. The 2030 Strategy for Digital Transformation of Slovakia has set the vision until 2030, reflecting the dynamics of development in ICT sector, onset of new technologies as well as prioritizing of digital policies at national, European and international levels using the key tool – short-term action plans.

It is a well-known fact that the present Commission evaluates, on annual basis, success of countries from the viewpoint of the level of digital economy and society using DESI index (Digital Economy and Society Index). Updated index for 2019 was published in June and Slovakia ranked 21st out of the total 28, with most evaluated indicators oscillating under the EU average. Compared to 2018 we went down one place, not only due to updating the calculation and methodology, even despite the fact we grew in majority of segments (most significantly in digital public services). The main reason is that other EU

[5] European Data Protection Board (EDPB) has been set up on the basis of Art. 68 of the Regulation.

Member States are growing faster. A more detailed description of DESI is provided in the Strategy. Evaluation of the Slovak position in the DESI index for 2019 can be found in Annex 1.

Organisation for Economic Cooperation and Development (OECD) also issues its own index (Going Digital Toolkit), which processed data from developed countries in the past years. The situation there is similar to DESI. The government can directly influence an interesting part of evaluated areas, however, not all of them as it does not have direct influence on the level of digitalisation of companies or use of services and means of internet by the population, for example. However, by means of various stimuli as well as suitably set initiatives, the government can support increasing the level of those areas. Both, DESI and Going Digital Toolkit, talk about the level of key areas of the digital transformation in the country, while it is possible to conclude that the most successful countries in Europe and world-wide are best prepared for it. Evaluation of the Slovak position in the OECD Going Digital Toolkit index can be found in Annex 2.

From the viewpoint of the current Action Plan, in particular, the dynamics of the social situation at the time of its approval, it seems that the best solution is to make use of agreed managing mechanism, i.e. working group for the digital transformation as well as the Council of the Government for Digitalisation of Public Administration and Digital Single Market that will analyse, in detail, the purposefulness and expected status of different measures. The key task will be to prepare measurable indicators, including starting and target values as well as risks. We propose setting aforementioned indices DESI and Going Digital Toolkit as reference goals, taking into account that they get updated every year. In this respect, it will be necessary to remember that even performance of majority of measures of the Action Plan will not enable to reach the monitored indicator to full extent (100%), however, it can significantly increase the Slovak assessment. Many measures of the Action Plan has the impact on strengthening of such key indicators, in general, such as the share of science, research and innovations on the GDP, growth of the level of digital economy, number of citizens engaged in programmes for increasing digital skills and increasing the level of digitalisation of companies especially SMEs, in the national economy. Exact setting as well as the level of expectation of indicators performance should be, anyway, subject to expert debate.

However, it is obvious that the performance of measures of the Action Plan will significantly contribute to increasing of the digital level of our country and help to improve indicators.

Technologies used in the Action Plan

The process of the digital transformation focuses on several technological trends thanks to which it is possible to achieve success in the digital transformation of economy sectors. It is necessary to reasonably consider capacity possibility of Slovakia and the perspective of future development of the trends in Slovakia. If we, as a small country, want to succeed, we must focus on technologies:

- That at the beginning of their broader deployment, especially in the EU and whose initial testing and pilot projects demonstrated their prevailingly beneficial potential,
- Which do not require significant investments exceeding possibilities of the country,
- For which there are existing capacities (in the early stage),
- Where we can attract talents from abroad relatively fast,
- To which it is possible to apply principles of openness and free access,
- That enable multiple use.

Openness, free access, multiple use are the qualities that will help to meet criteria for success of projects and, at the same time, they are signs of a modern civil society. Looking at the current trends that meet such requirements, it seems that the most effective approach is to support the following priority technologies and areas in the broader sense of the meaning.

– **Artificial intelligence[6]:** to let us use the state-of-the-art technologies and find sufficient utilisation for them. Talking about artificial intelligence in Slovakia, we mean two important factors. On the part of the supply, we need existence of a sufficient number of companies that can create and provide services using the artificial intelligence technology that can design and

[6] Artificial intelligence – systems or algorithms that are able to monitor their environment, learn and adopt or propose decisions based on learned knowledge and acquired experience.

implement new business models and that will be competitive also from international viewpoint. From the viewpoint of the demand, we need our companies to apply sophisticated solutions and innovations in their processes in the form of new solutions, optimising of existing activities and thus save costs and operate at higher level of productivity.

- **Data and privacy protection**: to let us create functional basis for a prosperous data economy, in which consumers have rights and are safe. Data presents the key means to support each existing sector. It is necessary to create a comprehensive ecosystem of partners from the private, public and academic sector that can propose services and bring real applications. We also need high quality data sets. The basic requirement for functioning of data economy is creating a sufficient number of data sources on the commercial basis and ensuring a transparent system of its administration as well as securing such sources and data so that it is understood and protected as key social resource with the goal of protecting people and the society from misuse or unauthorised access and use of such data.
- **Supercomputers (HPC)[7] –** to provide us with access to high performance computing and storage capacity that also effectively uses resources and is the cornerstone of success in the digital era.
- **Fixed and mobile next generation networks –** to let us have access to ultra-fast broadband connection, enhancement of new generation technologies and to let us transfer data without limitation of the transmitting capacity. Subsequently, it is necessary to build 5G networks[8] to support autonomous and connected mobility and smart transportation systems.
- **Internet of Things (IoT)[9] –** to let us use technologies for which we, as a country, are already showing promising potential. In particular, the content of education at various basic and secondary schools and universities in Slovakia has already been extended with IoT, thanks to which Slovak pupils and students have excellent performance in IoT and robotics. In Slovakia, there are several companies with rich know-how and experience in this field.
- **Blockchain[10] -** to let us consider alternative methods in order to build infrastructure, architecture and trust in providing public digital services, increase transparency in providing access to public data, provide trustworthy and auditable records, consider possible savings, analyse possibilities of higher effectiveness and efficiency of information systems as well as clearly define formal processes and relations in institutions in the form of automated digital processes.

Data economy will be built on the principle that if it is possible to separate personal data from other data, rights and obligations resulting from the General Data Protection Regulation will be fully applicable to any data also in the case personal data constitute only a small part of the data set.

[7] Supercomputers are thousands of processors working on analysing billions of data concurrently, in real time, and thus making computations and analyses significantly faster than ordinary computers.

[8] 5G network – fifth generation network that differs from currently used LTE network by tis performance and transmitting speed. In that network, data is transferred by means of higher frequency range, which helps to transfer data faster.

[9] Internet of Things is devices that communicate with humans and with each other over the Internet.

[10] Blockchain technology is infrastructure that enables various distributed software applications save, store and provide access to data in a way that guarantees high level of accessibility and integrity of such data (data is authentic, undeniable, it is not possible to modify data and such data is practically impossible to damage), and – if desirable – also confidentiality.

1. We will support digital transformation of schools and education in order to improve the quality and preconditions for employments and acquisition of digital skills and competences necessary for the digital era

Strategic objective *We will support digital transformation of schools and education in order to improve the quality and preconditions for employments and acquisition of digital skills and competences necessary for the digital era* is composed of two themes:

1.1 Education and digital skills,

1.2 Modernization and opening of the labour market.

High quality education is the cornerstone of every successful society and modern state and it is the starting point for future prosperity of the country. The current time necessarily requires increasingly higher literacy of people in all age categories. Due to the fact that this trend will intensify it is necessary to improve educational processes and, above all, adjust them to the needs of the digital era. It applies to all levels of education of pupils and students as well as education of employees and further education of adults and seniors.

1.1 Education and digital skills

In the long run, Slovak companies as well as public administration, have been suffering from shortage of labour with basic as well as advanced digital skills[11], with sufficient experience in the use of technologies or insufficient technical background and education. Based on results of the DESI index for 2018[12], we can evaluate that 59 % Slovaks have at least the basic level of digital skills, which is slightly above the EU average (57 %).

Ambition

We will introduce more effective support to education in the digital era by means of courses for students and teachers with the focus on understanding the importance of the function of data, forming and maintaining the secure digital identity of persons and companies, analysis and classification of information as well as basic skills required for deeper understanding of information technologies (e.g. program coding starting in early years). We will prepare the Programme for Informatization of Education with the Outlook Until 2030 with the emphasis on competences for the digital era and digital transformation of education and schools. We will design the support to development of digital skills and competences for the digital era from the early age to make everyone equipped with the set of key competences for human and digital world. Along with that, we will support the use of digital technologies in order to increase the success of the process of education. We will focus on setting up the system for lifelong improvement of digital skills. In cooperation with the Digital Coalition, we will prepare an analysis of the condition of digital skills in Slovakia with proposals of particular measures and we will set up an effective mechanism to counter disinformation.

Regulation

Particular measures of the Action Plan refer, in many cases, to already approved measures of the Smart Industry Action Plan, however, the content of the Action Plan has a broader scope and includes the entire digital economy and society. The particular part of the Action Plan is a follow up to the National

[11] Skills means a set of activities that a person can perform and use in limited and precisely defined contexts. Competences are a set of certain preconditions for so called correct activity in the given situation.

[12] Digital Economy and Society Index (DESI) 2018, Country Report Slovakia: http://ec.europa.eu/information_society/newsroom/image/document/2018-20/sk-desi_2018-country-profile_eng_B4415E7E-9154-E26E-7B403212919F3F7C_52238.pdf (17.1.2019)

Programme for Development of Education. Besides that, implementation of several measures will be based on the currently prepared Programme for Informatization of Education Until 2030.

1.1.1 Preparation of the Programme for Informatization of Education until 2030

Description of the measure	It refers to enhancement of approved measure No. 12, chap. 3 of the Smart Industry Action Plan with the focus on competences for the digital era and the digital transformation of education and schools. Strategic areas for preparation of the Programme for Informatization of education with the Outlook until 2030 for regional schools, universities and life-long education are: ▪ ICT infrastructure from the central to regional level, ▪ Electronic services and information system of the ministry, ▪ Digital technologies for innovations and improvement of the quality of education, ▪ Development of competences and skills for the digital transformation, ▪ Transformation of schools into digital schools, improvement of the management using data and ICT, ▪ Security in the information space. Goals and measures ensuring the digital transformation of education and schools will be further elaborated in legislative and organisational measures that will enable reaching objectives of the programme by means of projects and initiates, experimental verification of new procedures and their implementation in practice, strengthening of human resources and technological equipment, improvement of cooperation and application of best practices by connecting communities in education.
In charge	Ministry of Education
Deadline / duration / measure implementation /	31 December 2019 and continuously. The implementation of the measure has started.
Source of funding	State budget
Main expected output	Strategic document – Programme for Informatization of Education Until 2030
Reference	Smart Industry Action Plan in the Slovak Republic.
Dependence on other AP measures	No

1.1.2 Systemic change of the system of education preparing employees for the needs of economy

Description of the measure	The measure materially enhances measure No. 4 Chapter 3.3 of the Smart Industry Action Plan for the entire digital economy as well as the society. Preparation of proposals for improving the quality of the system of education in order to prepare such graduates that are needed in Slovakia, with the focus on key economic sectors and, subsequently, for national priorities resulting from Agenda 2030. Key tasks for systems of regional education, university education and life-long education: ▪ Increasing the share of employed graduates who work in the field of their study and make use of the competence profile they acquired by their education, ▪ Increasing the share of employed graduates who do not need to go through employer's induction training programme to develop general skills, ▪ Promotion and support to high-quality study of IT, mathematics and, in general, technical and natural sciences. Update of the concept of IT and mathematics education and increase of competences for the digital era starting at primary schools,

	▪ Support to teaching of algorithmic thinking, development of reading, mathematics and natural science literacy, digital skills, creativity, critical thinking, team work, empathy, building high quality social relations and use of the exploration approach in education, ▪ Creating and continuous updating of profiles of graduates and study majors at secondary vocational schools and universities in cooperation with the academia and employers for the needs of the labour market and the digital economy, ▪ Systemic reform of education – introduction of more flexible and shorter forms of tertiary education, participation of employers in the setting of study majors and profiles of graduates, change of the system of universities management in order to meet needs of the labour market in strategic decision making, ▪ Introduction of a new system of education and further development of experts for the labour market and the digital economy, based on integration of theoretical education and training in the workplace with acquiring practical skills with advanced technologies (bachelor study majors, alternative higher vocational – specialised education without limitation of later education), ▪ Setting up and application of broadly applicable profiles of graduates and their competences across sectors and qualifications with the potential for adaptation to changes in the process of digital transformation, ▪ Enhancement of competences of Sectoral Councils as platforms for cooperation between the academia, government and relevant industries in setting up and updating curricula, ▪ Preparation of proposals for improvements in the system of management, financing and forms of education and support to the growth of competences of teachers and other school employees leading to an increase of desired competences of pupils and students to let the system of education meet labour market needs in the digital economy. Findings from measure No. 1.1.7. will be used as applicable, ▪ Improvement of the diagnostics of talents and work with gifted youth as the material requirement to support innovative competent labour force for the digital economy, ▪ Based on the UN Convention, Optional Protocol to the UN Convention on the Rights of Persons with Disabilities and following measures, in the preparation for the needs of practice on the equal basis with other persons with disabilities, provide access to information and communication, including information and communications technologies and systems, including communication with the public sector and services provided to the public. Prepare necessary general conditions in the system of education in the Programme for Informatization of Education with the Outlook Until 2030 for the digital transformation of education and schools: ▪ Propose completion and consolidation of the new organisation and education culture that will make it possible to increase the level of personalisation of education processes, ▪ Prepare and verify, in a pilot project, preparing setting up such conditions for schools to help them move away from the obsolete administrative mode of operation to a proactive mode characterised by autonomy, self-reflection, self-management, self-evaluation and cooperation leading to education harmony and schools as knowledge organisations – for a higher quality of education,

	▪ Support evaluation of the development of social capital in the context of the society and, in particular, system of education, to renew the trust in the system, culture of relations and social recognition – in particular concerning teachers and for the maximum utilisation of the personal potential young people have when entering the system of education. ▪ To support the digital transformation of education and schools by preparing a reference model of "digital school" in the Programme for Informatization of Education with the Outlook Until 2030 that will be based on current trends of EU Member States in the field of digital transformation of education and schools and increasing competences of teachers for the digital era, recommendations of the Commission and will reflect conditions of Slovakia. The refence model will map the process of the digital transformation of schools from the viewpoint of primary affects areas and education participants, ▪ Prepare transformation of university education for the needs of the information society in cooperation with universities.
In charge	Ministry of Education in cooperation with the Ministry of Labour (Sectoral Councils Alliance)
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has started.
Source of funding	State budget / EU funds
Main expected output	Proposal of a systemic change of the system of education
Reference	Smart Industry Action Plan.
Dependence on other AP measures	1.1.1

1.1.3 Life-long education – comprehensive systemic change, strategy and implementation of legislative measures

Description of the measure	The measure extends measure No. 9 Chapter 3.3 of the Smart Industry Action Plan for the entire digital economy as well as the society. A modern digital economy must absolutely necessarily respond to new qualifications. It is only possible in cooperation with employers while it is important to: ▪ Ensure effective coordination of entities operating in the system of life-long education by means of motivational features. ▪ Set multi-source funding (combination of private and public sources) of the system of life-long education and, at the same time, enable decision making about the use of funds in the competence of those that are directly affected – employees, the unemployed looking for jobs based on acquiring new skills, employers. Use the tools such as personal accounts or education vouchers. ▪ Reflect new requirements on the labour market connected to the development of digital technologies in the National System of Jobs and its further elaboration for future jobs. ▪ Support education, training and transfer of knowledge – development of practical and new highly specialised skills of graduates and employees, especially in industrial practice. ▪ Prepare, introduce and implement, in cooperation with universities and the Office of Labour, Social Affairs and Family, systemic measures by means of new national projects such as "Education for job seekers" and "Education for young job seekers" and other targeted trainings providing development of human resources, their competences for needs of the labour market with better reflection of individual needs of individuals responding to the education market offers in connection to the labour market demand,

	▪ Increase digital skills and competences of the employed. Above all, it is supposed to support motivation to get educated and develop one's knowledge and skills and, if necessary, the need to change the original qualification acquired during the preparation for the job in the school system, i.e. the willingness to requalify, if the situation in the labour market requires so.
In charge	Ministry of Education in cooperation with the Ministry of Labour (Sectoral Councils Alliance)
Deadline / duration / measure implementation /	31 December 2019. The implementation of the measure has started.
Source of funding	State budget / EU funds
Main expected output	Proposal of a systemic change of life-long education
Reference	Smart Industry Action Plan.
Dependence on other AP measures	1.1.1

Organisation

1.1.4 Setting up a working group in order to build a coordinated mechanism to counter disinformation

Description of the measure	Intentional, systemic and extensive dissemination of disinformation is one of the most serious challenges for European democracy and societies. In December 2018, the European Commission presented the Action Plan Against Disinformation, whose main purpose is to strengthen existing as well as build new mechanisms to eliminate this dangerous phenomenon, including artificial intelligence applications. Due to the above, it is necessary for Slovakia to introduce a coordinated mechanism to strengthen activities aimed at increasing general awareness of the public of the negative impact of disinformation and fake news, at increasing media literacy and at supporting independent media and high-quality journalism. The government must strengthen its own means and capacities to counter disinformation and cooperate with specialists from the public, private and civil sectors in uncovering, analysing and publishing disinformation campaigns. One possible tool of cooperation is setting up multidisciplinary teams of independent information verifiers and research employees who will uncover disinformation campaigns on social networks. The Ministry of Foreign and European Affairs of the Slovak Republic (MFA), as the first central state administration body, set up its department of strategic communication in 2017 and its key rile is and continue to be to identify, monitor and rebut disinformation concerning foreign policy. In this effort, the MFA also cooperates with the civil society. Besides that, the MFA (ad hoc) summons inter-department consultancy group to counter disinformation. In March 2019, the EU launched operation of the Rapid Alert System, which was built on secure digital platform where member States can share information about on-going foreign disinformation campaigns and coordinate their responses. To set up the national mechanism to counter disinformation, it will be necessary to set up a working group including all relevant central state administration bodies. Due to prevailing security aspects and effects of disinformation on the security environment in the Slovak republic, it is suitable to set up such working group at the Office of the Security Council of the Slovak Republic.

	The national mechanism, which will be necessary to strengthen coordination of activities of countering disinformation, will need to: ▪ Support cooperation with NGOs that are extraordinarily active in our country and effective in countering disinformation, along with systemic increase of literacy and strengthening of independent journalism, ▪ Look for financial models to support the maximum possible benefit and effectiveness of the mechanism, ▪ Clearly support more active cooperation and sharing information with independent media and NGOs.
In charge	Chairman of the Security Council of the Slovak Republic (coordinated by the Office of the Security Council of the Slovak Republic)
Deadline / duration / measure implementation /	31 December 2019 – setting up of the working group 31 December 2020 – setting up of the coordinated mechanism to counter disinformation in the sense of recommendations of the working group
Source of funding	State budget
Main expected output	Setting up of the working group Setting up of the coordinated mechanism to counter disinformation in the sense of recommendations of the working group
Reference	None. It is based on strategic document – Action Plan Against Disinformation
Dependence on other AP measures	No

Projects

1.1.5 Preparation of an analysis of the condition of digital skills in Slovakia with a proposal of particular measures

Description of the measure	Preparation of the Analysis of the condition of digital skills and competences in Slovakia with a proposal of particular measures and setting up standards of digital literacy for citizens also by means of projects such as "Buď KOMPetentný – Zamestnaj sa!/Be COMPetent – Get a job!" and "eSMART." The national standard of digital literacy for citizens will set digital competences necessary for the study, work and life for all groups of population – pupils, including pupils with special education needs, students, adult inhabitants in the productive age and seniors. The basic starting point to determine digital competences of citizens constitutes the European Digital Competence Framework for Citizens.
In charge	ODPMII, in cooperation with the Ministry of Education, Ministry of Labour and social and economic partners
Deadline / duration / measure implementation /	31 December 2020. The Implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Analysis
Reference	No
Dependence on other AP measures	No

1.1.6 Support to activities aimed at increasing the share of women in IT and digital sector

Description of the measure	Despite the fact that the share of women studying IT majors increased in Slovakia from 3 - 5 % to 10 - 12 % in the last five years, women are still not sufficiently presented with the attractiveness and the potential of their study and professional opportunities in IT and digital sector. We must remove the ongoing low demand and let women get fully involved and engaged in the digital sector by means of educative promotion of ICT study majors and job opportunities. Particular measures: ▪ Support to education and study of ICT majors, ▪ Support to projects that promote engagement of women in IT jobs and girls in IT study, ▪ Promotion, in cooperation with industrial companies, by means of stays, study visits and workshops, ▪ More intensive cooperation with private sector initiatives.
In charge	Ministry of Education in cooperation with the ODPMII and Ministry of Labour and partners dealing with this field
Deadline / duration / measure implementation /	30 June 2020 and continuously. The implementation of the measure has not started yet.
Source of funding	State budget
Main expected output	Support to projects and scholarships
Reference	No
Dependence on other AP measures	No

1.1.7 Preparation of a study of the digital transformation and recommendations at the national level in the field of employment, qualifications and labour forms – Work 4.0

Description of the measure	Preparation of a study that will result in proposals of strategic priorities and measures for employment in connection to education in the digital economy. It is part of national project Sectorally managed innovations towards an effective labour market in the Slovak Republic, approved as part of the Smart Industry Action Plan, measure No. 3, Chapter 3.3.
In charge	Ministry of Labour (sectoral councils) in cooperation with the Ministry of Education
Deadline / duration / measure implementation /	31 December 2019
Source of funding	EU funds
Main expected output	Study
Reference	No
Dependence on other AP measures	No

1.1.8 Support to increasing competences of young people for the digital era in the formal education

Description of the measure	The absolute priority is to create preconditions and increase mathematical, technological and digital literacy at primary and secondary schools as quickly as possible. It entails extension of approved measure No. 6 Chapter 3.3 of the Smart Industry Action Plan: ▪ Enhance teaching of mathematics and IT at primary schools and introduce innovative methods of education as the basis for mathematical and digital literacy for the needs of the digital economy,

	▪ After elaboration of the concept for teaching mathematics in order to set mathematics as a mandatory subject for the school leaving examination, open the discussion about making it mandatory for all students taking the school leaving examination in two steps: in the first step, for those interested in study at technical and science faculties, in the second step, for all other students taking the school leaving examination as it has been introduced by all neighbouring countries, ▪ Ensure development of digital skills for teachers in order to let them make full use of the digital curriculum and thus motivate pupils to use and acquire digital competences, ▪ Define and incorporate competences for the digital era and digital skills to all state and school education programmes, ▪ Create conditions for continuous flexible creation of more suitable, predictable and interdisciplinary education programmes at all levels of education with a better system of financial support, ▪ Support increasing higher and specialised skills for IoT, data science, artificial intelligence, programming, for the needs of STEM studies (science, technology, engineering and mathematics), team work and collaborative and co-creative procedures, creative designing and trading as well as other fields of economy and public administration due to their digital transformation, ▪ Identify current offer of education, courses, training programmes and sharing best practices in education, including education with the use of digital technologies, especially among providers of high quality formal and informal education, civil associations, private companies, universities and sample regional schools that acquired practice and, in the long-run, show positive results in improving competences and skills of teachers, executive employees and pupils for the digital era and, concurrently, have the capacity of qualified innovative teachers and trainers, ▪ Support pilot projects for o Spreading best practice in education, o Development and verification of digital skills and competences for the labour market in the digital era for teachers and non-pedagogical and executive employees of schools and pupils and students, o Innovations of educational programmes and curricula at regional schools and study majors at universities for the sake of improving competences for the digital era and development of the personality for the information society, o Digital transformation of education and schools at all levels of education, ▪ Support schools at all levels of education o Personal expert capacity (e.g. “digital coordinator” based on the practice of other EU Member States) and o Standard set of digital technologies with regard to the direction and vision of the schools from the viewpoint of education in: IoT, robotics, algorithmic thinking and programming, data science or virtual reality to support improvement of digital skills of teachers and competences of teachers for the digital era, o For this purpose, update the existing standards for financial contributions and technical standards for schools and school facilities, ▪ At the national level, ensure systems for objectivised and transparent measurement and monitoring of the quality of education, improvement of digital skills and competences for the digital era and support system of quality management and self-assessment in educational institutions with regard to the needs of the labour market and the digital transformation.

	Recent surveys have shown: As many as 81.7% of pupils are not aware of risks connected to the use of the Internet. Approximately 10% of pupils can be considered dependent on digital technologies, because they spend more than 5 hours per day with them. 77% of children use the Internet for "chatting" and, in communication with unknown persons, they do not know how to prevent possible misuse, they do not secure their own sensitive data and they are not sufficiently prepared to face hateful expressions, extreme radicalism, hoaxes, "fake news" etc. Reducing the quality of digital skills of pupils and students in the field of security were confirmed by results of IT fitness testing in the sample app. 30 thousand respondents in 2018. In the preparation of the Programme for Informatization of Education with the Outlook Until 2030 in strategic area VI. Security in the information space, we will: ▪ Focus on competences and digital skills of young people leading to higher level of security on the Internet and in using digital technologies, ▪ Adequately introduce and extend media literacy at primary and secondary schools, including critical thinking, learning about online well-being, mental health protection, personal data protection and skills for protecting oneself on the Internet, above all in the curriculum for civil education and ethics, ▪ Map the current situation in education in the field of cyber security at all levels of education, including professional education and preparation of specialists, ▪ Introduce innovated system in the field of cyber security and support research activity in the field of cyber security.
In charge	Ministry of Education
Deadline / duration / measure implementation /	31 December 2019, continuously. The implementation of the measure has started.
Source of funding	State budget / EU funds
Main expected output	Increase of digital competences of young people
Reference	Smart Industry Action Plan
Dependence on other AP measures	No

1.1.9 Initiating activities leading to assessment of impacts of the use of smart system and digital technologies on development, health and behaviour of people

Description of the measure	Digital technologies undoubtedly simplify and improve the quality of our lives in many aspects and, along with that, extend abilities of people in a manner that could not be even imaginable short time ago. On the other hand, there is an increasing number of voices from among experts, e.g. Royal College of Paediatrics and Child Health, American Academy of Paediatrics, neurologists or tech insiders[13], who warn of negative effects directly or indirectly resulting from inadequate or irresponsible use of digital technologies on health and development of people. Attention is also paid to analysing the impact of smart systems on behaviour of people as such with focus on cognitive, social and emotional and decision-making abilities[14]. Due to severity of the claims, it is necessary to examine and professionally review their justness and, subsequently, evaluate the need to adopt appropriate measures. Therefore, the proposal is to:

[13] See: https://www.aap.org/en-us/about-the-aap/aap-press-room/Pages/American-Academy-of-Pediatrics-Announces-New-Recommendations-for-Childrens-Media-Use.aspx, https://www.rcpch.ac.uk/resources/health-impacts-screen-time-guide-clinicians-parents, https://eduworld.sk/cd/jaroslava-konickova/4666/neurolog-stransky-technologie-rozhovor, http://www.tristanharris.com/the-need-for-a-new-design-ethics/

[14] https://ec.europa.eu/jrc/communities/en/community/humaint

	▪ Set up an expert team composed of experts with relevant qualification and experience, ▪ Analyse available knowledge from surveys and studies from abroad dealing with the impact of the use of smart systems and technologies on development, health and behaviour of people, ▪ Map the use of smart systems and digital technologies by various groups of inhabitants, in particular, not limited to, focus on children and the youth, ▪ Cooperate with foreign and international institutions and personalities involved in the aforementioned research and removal or mitigation of negative effects of the use of smart system and technologies on development and behaviour of people, ▪ Prepare, verify and deploy humanocentric principles in planning, designing, deploying and operation of smart systems and a digital technology, ▪ If necessary, confirm negative effects of negative impacts of smart systems and digital technologies on development, health or behaviour of people and provide suitable recommendations for their mitigation or removal, including building awareness of adequate and correct use of digital technologies and smart systems, e.g. in the form of guidelines for appropriate use of digital technologies.
In charge	Ministry of Health in cooperation with ODPMII
Deadline / duration / measure implementation /	31 December 2019, continuously. The implementation of the measure has not started yet.
Source of funding	State budget / EU funds
Main expected output	Analysis
Reference	No
Dependence on other AP measures	No

1.2 Modernization and opening of the labour market

Ambition
The ambition is to adjust rules of the labour market to the digital era and, if necessary, analyse the possibility of reviewing social insurance of employees in the platform economy if it is determined that the legislation of the Slovak republic is insufficient in this field. We will significantly simplify the possibility to acquire best experts from abroad for needs of innovative companies and research institutions.

Regulation

1.2.1 Making employment of IT specialists in state and public administration more attractive

Description of the measure	Human capacities in state administration must be extended with talented experts in digital, information and communication technologies. In a broader sense, it is important to open state administration in Slovakia also for graduates and experts in various aspects of economy and young professionals, which was also subject-matter of the *Strategy for human resources management in state administration for 2015 -2020,* in which the Office of Government (OG) undertook to perform comprehensive change of the system of remuneration of state employees. Therefore, the OG is preparing the Concept of remuneration dealing with the new system of remuneration from the viewpoint of financial and non-financial benefits in state administration.

	In order to attract selected groups of experts to state administration, it is necessary to make the conditions of employment more attractive, in particular the financial reward. Increasing compensations of selected highly qualified positions can be achieved not only by the aforementioned change of the remuneration system but also by supporting existing institutes, such as personal salaries[15]. Besides financial remuneration, there are also other, non-financial features relevant for motivation, such as flexible working hours, working from home/home office, etc. those are benefits that are currently regulated in the Act on state service as well as in the Labour Code, however, their higher level of awareness and implementation in practice are required. This aspect must be enhanced especially at informal level, by means of education and methodological guidance. The OG is currently preparing an analysis of financial and non-financial benefits that will form part of the Concept of remuneration which will also include is such strengthening of non-financial institutes and benefits in state service.
In charge	Office of the Government in cooperation with the MF SR
Deadline / duration / measure implementation /	31 December 2021. Implementation of the measure has started.
Source of funding	State budget / EU funds
Main expected output	Concept of remuneration in state administration
Reference	Strategy for human resources management in state administration for 2015 - 2020
Dependence on other AP measures	No

1.2.2 Support to acquiring talents for study and employment of experts from abroad, including universities and industry

Description of the measure	When preferring employment of our top experts, we will also support acquiring talents and highly qualified labour force from other countries, as part of adopted strategic documents in the field of migration, integration and labour mobility of foreign nationals. For this purpose, we need to set conditions for study and employment of citizens of EU Member States as well as citizens from countries outside of the EU (e.g. by means of implementing the system of blue cards). We will support joint study majors of Slovak universities with selected countries outside the EU as well as bilaterally beneficial controlled mobility for Slovakia and the other country. The procedure for arranging study at Slovak secondary schools and universities for potentially promising young students and job permits for highly qualified experts from abroad must be fast and no demanding on effort and means of the applicant. The current legislation makes it possible to hire foreign experts to state service and public service. There is also high demand for simplifying and streamlining the process of hiring foreign researchers at Slovak universities or initiating cross-border cooperation.
In charge	Ministry of Labour in cooperation with the Ministry of Education, Ministry of Interior, Ministry of Economy and the ODPMII
Deadline / duration / measure implementation /	30 June 2020. Implementation of the measure has already started.

[15] Personal salaries are defined in §129 of Act No. 55/2017 Coll. and §7a of Act No. 553/2003.

Source of funding	State budget
Main expected output	Change of policies for employing experts from third countries, in particular in ICT
Reference	Digital Transformation Strategy for Slovakia 2030, Smart Industry Action Plan
Dependence on other AP measures	No

2. We will set up the basis for modern digital and data economy and for the digital transformation of economy in general

Strategic objective *"We will set up the basis for modern digital and data economy and for the digital transformation of economy in general"* consists of four themes:

2.1 Data economy

2.2 Innovation ecosystem

2.3 Smart mobility

2.4 Financial innovations (FinTech)

Slovakia will become a dynamic data economy in the EU. The legislation setting will enable application of new business models built on digital platforms and artificial intelligence in practice. Slovak companies will thus employ an increasing number of data analysts. It is possible to expect that newly established innovations will be further exported inside the digital single market. We will adopt and introduce systemic assessment of the impact of regulations on innovations and digital economy. We will modernise and simplify the legislative framework in the field of data in a way to make Slovakia a sample country for further regulation in the EU. We will ensure sufficient quantity of high-quality data in priority sectors for the needs of artificial intelligence and we will set the rules in a wat that will make the data economy trustworthy for the public.

We will support innovation capacity and introduction of solutions built on artificial intelligence, in particular, at the level of SMEs. Therefore, we will set up a network of digital innovation centres and improve possibilities of cooperation with the academic sector in applied research in the field of artificial intelligence, which is significantly based on source data. At the same time, we will support new business models in the digital economy, in order to make conditions in Slovakia for the rise of platforms transforming standard sectors, such as transport, finance, health care and education. It means setting up "regulatory sandboxes", introducing "future-proof regulations" and redesigning permits for the needs of the digital era.

We will prepare preconditions for testing autonomous vehicles: Slovakia must not lag behind in testing autonomous vehicles and other new features in the V4 region. It means that we ned sufficient infrastructure, in particular a comprehensive system to support testing and functioning ecosystem of public, private and academic institutions. We want to be a country where it will be possible to test new business models in transport. The goal is to make Slovakia a place suitable for establishing services based on processing of data from transport, for testing new platforms. We will design transport policies and handle transport problems based on data processing. It will be necessary to create an ecosystem of partners that will be able to perform different tasks in testing and introducing autonomous transport. They are important in regulation that will make it possible for innovative companies to bring new solutions in the field of transport platforms. Those platforms need high quality data, in particular, precise map records. Testing of autonomous vehicles and building infrastructure must be a part of the national research and development.

Innovations in the financial sector will be tested in Slovakia: The Centre for financial innovation has already launched an innovation laboratory and we will significantly enhance its capacities. We will take steps to have the possibilities for experimental verification of regulations in the field of financial innovations tested in the near future and to get the possibility of regulation of collective financing analysed. It is also possible to expect benefits from setting of the system for so called tokenization of assets.

2.1 Data economy

Data is precious source for creating value in data economy and it is considered to be a catalyst of economic growth and innovations in all sectors of economy. Smart devices and sensors collect increasingly more intimate information about location and lifestyle, devices in the Internet of Things record your voice when you control them and send it for analysis to remote data centres. Quantifiable value of applications using personal data in Europe is estimated at 1 000 billion euros per year until 2020. For Slovak citizens, it means around 5.5 billion euros per year, which is currently around 7% of

the GDP. A more precise definition of data economy is provided in a study for the Commission titled European Data Market SMART 2013/006, prepared by IDC (data is applicable as of October 2016).

Data will become the basis for new smart services adjusted to needs of their users. Fostering demand of the public sector, favourable regulatory environment and investing funds into supporting research and innovations upon proposal of new algorithms and services stimulates development of data economy and artificial intelligence solutions.

Slovakia subscribes to the opinion that, primarily, it is necessary to design **functional mechanism for enforcing rules.** We support setting up functional pan-European regulatory mechanism of the data economy: ranging from suitable method of market monitoring and filing proposals (for example, by making use of collective financing instruments) up to improvement of enforcement thanks to extension of powers if existing regulatory bodies and introduction of coordination among involved players.

Ambition

Slovakia will become a dynamic data economy in the European single market, it will have effective regulation of the telecommunications market and comprehensive gigabit fibre connection. Legislation will enable application of new business models based on platforms and artificial intelligence. The economy will also generate sufficient demand for innovative solutions in order to be able to maintain sufficient market and generate innovations. Slovak companies will thus be hiring a growing number of data analysts. It is possible to expect that the new innovations will be exported in the digital single market and beyond.

Regulation

2.1.1 Increasing effectiveness of the regulation of electronic communications market for the benefit of growing coverage of the territory with ultra-fast connection

Description of the measure	An inevitable precondition of the digital transformation and building of the information society is existence of sufficiently robust, secure and functioning high-speed communication infrastructure (fibre networks as the basis for new generation mobile and fixed networks), which will enable permanent connection of all systems, their mutual communication and, of course, their effective management and supervision. Building up electronic communication networks is the policy of the state, EU and it is in the public benefit; the authority in charge of it is the Ministry of Transport. Therefore, Slovakia should make effective use of all regulatory tools it has at its disposal. Among the measure that help in the short-term are: legislative amendments and increased pressure of the regulator in order to support sharing existing infrastructure and, subsequently, for the benefit of faster, more effective and seamless building of fibre networks, for the viewpoint of both, electronic communication legislation and the legislation for territorial planning and construction. Equally, it will be important to establish conditions for effective cooperation of telecommunications companies in the build-up of the infrastructure in order to prevent double parallel coverage. It will be necessary to create an Atlas of passive infrastructure and ensure effective operation of the Unified information point, in particular adherence to rules by all stakeholders. Shortcomings of the current situation: ▪ Insufficient support from public administration authorities to electronic communication companies for building infrastructure (e.g. fibre networks). ▪ Insufficient effective cooperation of electronic communication companies in building infrastructure (e.g. fibre networks). ▪ Insufficient coverage by high-speed infrastructure in areas with lower density of households (where providers of fibre coverage face financial limitations). ▪ Double coverage of territory with electronic communication infrastructure by several companies.

	▪ Need for effective cooperation and use of saved resources for the benefit of uncovered areas, ▪ Construction legislation that will enable ambiguous interpretation of conditions for construction of new fibre infrastructure or modernisation of existing infrastructure, ▪ Insufficient coordination and definition of competences among state administration authorities and local government in application of the legislation and national strategies for building digital infrastructure. Building gigabit fibre infrastructure is an important precondition for development of national economy. To achieve it, it is necessary to support construction and sharing of infrastructure also by means of adequate primary and secondary legislation. Moreover, Slovakia is facing the task of setting the regulatory environment to enable deployment of 5G mobile networks. Wireless 5G networks, together with fibre networks, will crucial in order to continue providing new electronic communications services, effective development of the Internet of Things, autonomous transport, smart transport systems and thus they will continue to solution of many problems that cities, citizens and businesses are facing.
In charge	Ministry of Transport in cooperation with the Ministry of Environment
Deadline / duration / measure implementation /	31 December 2020, annually
Source of funding	No additional expenditures are expected
Main expected output	Legislation amendment
Reference	Directive (EU) 2018/1972 of the European Parliament and the Council of 11 December 2018 establishing the European Electronic Communications Code
Dependence on other AP measures	No

2.1.2 Support to completion of the build-up of gigabit fibre connection accessible in the sense of the EU strategy for European Gigabit Society

Description of the measure	Slovakia should continue in investments to ultra-fast connection by means of investment plans of commercial entities everywhere which connection is missing. However, it is possible to expect that in geographically difficult areas, where the costs per covered household exceed profitability limit, the commercial market will not build the coverage. In such areas, it will be necessary to intervene and use EU funds for development of the infrastructure of electronic communications in order to support the market and provide access to ultra-fast broadband services to all Slovak citizens. Such funds can support the development of the market of optic fibre providers and ensure access to funds they need in order to extend the ultra-fast broadband connection to areas with low commercial potential. Shortcomings of the existing condition: ▪ Unmapped coverage of Slovak households with ultra-fast broadband services to the level of addresses. ▪ No public consultation about commercial plans of operators concerning further build-up of the coverage with ultra-fast broadband connection in the following years. ▪ No national plan for the broadband access in Slovakia. Build-up of the gigabit fibre infrastructure is an important precondition of development of the national economy exactly in line with goals of the EU strategy for gigabit society. In order to achieve the above goals, it is necessary to prepare the national plan of broadband access in Slovakia; the authority in charge of it is the Ministry of Transport. The national plan will specify strategic milestones in Slovakia that will be met in the time horizon until 2027 and

	propose the optimum way hot to harmonise commercial plans of telco operators and government interventions everywhere it is necessary to support the market in order to achieve goals of the EU gigabit society. It is subject to collection of relevant data about current coverage of Slovakia and commercial plans of operators that is currently being prepared by the ODPMII.
In charge	ODPMII in cooperation with the Ministry of Transport
Deadline / duration / measure implementation /	31 December 2020, annually
Source of funding	EU funds
Main expected output	National plan for the broadband access in Slovakia
Reference	EU Strategy for Gigabit Society.
Dependence on other AP measures	2.1.1 and 2.1.3

2.1.3 Support to measures from the 5G for Europe Action Plan and 5G Roadmap from z Tallinn to have one big city covered with 5G until 2020

Description of the measure	5G is the main tool for all future digital services and, therefore, it is one of the priorities of the digital single market. Besides growing demand on the connection on the part of media applications, a trouble-free, shared fixed and wireless infrastructure with an offer of various levels of adjustable reliability and quality of services, depending on specific operational needs, will also be required for professional communication in industries and services such as automobile industry, transport, manufacturing, health care as well as next generation security and rescue services. 5G networks will form the backbone for a broad range of services necessary for functioning of the Eu internal market and they will also be inevitable for operation of vitally important social and economic functions such as energy, transport, banking and health care and industrial controlling system. In order to introduce 5G, the Commission adopted the 5G for Europe Action Plan. At the same time, it set a clear goal in its vision – to have at least one city covered with 5G technologies in each Member State until 2020. The 5G technology also belongs to central elements of the Commission Strategy for Gigabit Society. Building pilot 5G networks for commercial use is, similarly to building networks of lower generations, fully in hands of mobile telecommunications operators. It is possible to expect that, equally to the build-up of 4G networks, some operators building the first commercial 5G networks will decide to take over their competitors and demonstrate their technological leadership and launch testing operation of the 5G network earlier. However, primarily, it is relevant to those mobile operators that have received licences for the available frequency spectrum. Currently, there is no 5G in Slovakia. The government is aware that a vital prerequisite for development of this technology is coordinated and timely release of the 700 MHz bandwidth along with recently assigned frequency range of 3.6 GHz (3.4 – 3.8 GHz). Another difficulty is discussion and open issues concerning building up safe 5G networks not only in national but also in European context. Operation of such networks will require building safe infrastructure based on credible components confirmed in the certification process.
In charge	ODPMII in cooperation with the Ministry of Transport, Regulatory Authority for Electronic Communications and Postal Services and the National Security Authority will support activities of operators in order to reach that goal
Deadline / duration / measure implementation /	31 December 2020, annually

Source of funding	No additional expenditure is expected
Main expected output	Providing availability of harmonised frequency spectrum for 5G, coverage of at least one place with the 5G technology
Reference	5G for Europe Action Plan, 5G Road Map form Tallinn.
Dependence on other AP measures	2.1.1 and 2.1.2

Organisation

2.1.4 Setting up the institute for providing access to trustworthy data

Description of the measure	The Institute for providing access to trustworthy data is, at the time of this Action Plan, a new, non-separate structural unit of existing Data Office Department. The role of this unit is to set processes for such publication of public administration data that can subsequently be used by third parties to create applications and, at the same time, if necessary and in the case of disputes, it will be possible to demonstrate what data was published at what time. The activities will also include active communication for disclosing priority datasets whose priority results from: ▪ Regular surveys of the public demand carried out by the Office of Plenipotentiary of the Government of the Slovak Republic for Development of the Civil Society (resulting from resolution of the Government of the Slovak Republic No. 104/2017 on the Action Plan of the Initiative for open governance for 2017-2019), ▪ New directive of the Commission on open data that defines so called High Value Datasets, ▪ Practice and focus of the government towards data economy and functioning of the so called "data driven" state by means of: territorial datasets ▪ And Land Register, datasets on transport, transport flows and precise maps, datasets on providing health care and effectiveness of medical treatment, datasets on educational procedures, datasets on performance of public administration institutions. The current policy in the field of data economy includes publication of open data of the public administration (see also Strategy and Action Plan for providing access and using open public administration data). A disadvantage of data is that its further use is possible especially for information purposes and data values are not guaranteed for the legal use. Therefore, there will be a mechanism proposed and implemented that will make it possible, for selected datasets, to verify its validity, constancy and thus credibility. Credible open data will thus make it possible to set up automated processes for public sector data.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Public data trust
Reference	No
Dependence on other AP measures	No

Projects

2.1.5 Deployment of a pilot solution for personal data administration

Description of the measure	A pilot solution of the Personal Information Management System *(PIMS)* will be deployed in the eGovernment environment. The system will let citizens and

	businesses check any data recorded about them in different public administration systems from one spot. The principal intention of the project will be to select suitable technological solutions and standards that can get connected to data integration in the government cloud and confirm their applicability and scalability. Its extension to the whole database is planned, as well as adding the information about who accessed the data and on what grounds.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	
Reference	National concept of public administration informatization.
Dependence on other AP measures	No

2.2 Innovation ecosystem

Innovation ecosystem in Slovakia is still significantly lagging behind other EU countries. Inadequate ecosystem for supporting innovations has negative impact on the success and competitiveness of Slovak companies in the international market. The support should focus on all businesses. We must also support new business models so that Slovakia could serve as place of origin of platforms for new sectors supporting strengthening of the Slovak digital economy. Another big problem is also non-existence of digital innovation hub in Slovakia unlike absolute majority of other EU Member States.

Digital economy requires modernisation of the legislative framework. Therefore, it is necessary to adopt, as soon as possible, new concepts on data (adopt Act on data) and review suitable possibilities and problems for regulation of artificial intelligence as well as enabling distributed solutions of trust built on the blockchain technology. One of the most important goals is establishing centres of digital innovations in Slovakia.

Ambition
The government will use suitable means to support development of digital economy based on data. We need to make important innovations occur directly in Slovakia, especially in the fie of artificial intelligence or other innovative technologies. We will regularly monitor and improve the effect of regulations on the digital economy in order to support innovative and business projects.

Regulation

2.2.1 Introduction of systemic evaluation of effects of regulations on innovations and digital economy

Description of the measure	Processes of evaluation of effects of regulations will be supported by information system that will enable modelling effect of regulations and, at the same time, monitor their actual effects after introducing the change into practice (IT platform for better regulation). It is important to engage the expert public and stakeholders in the process of preparation and reviews of policies and regulations by means of modern digital tools. The activity will also include prioritisation of key documents of legislative and non-legislative nature that will have to be thoroughly analysed for impact assessment and updated in order to reflect needs of development of the digital economy and remove bureaucratic burden of companies that is unjustified in the modern era. Re-evaluation of the methodology of impact assessment on informatization of the society based on a unified methodology for assessing selected impacts on digitalization – Digital Impact Assessment (DIA) and extension of the methodology for assessing impacts on the business environment based on the unified methodology with the Innovation Impact Assessment (IIA) constitute

	parts of implementation of the RIA 2020 – Strategy for better regulation and its action plan.
In charge	Ministry of Economy in cooperation with the ODPMII
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Modified methodologies for assessing impacts on informatization of the society and the business environment
Reference	RIA 2020
Dependence on other AP measures	No

2.2.2 Introduction of the system of goal oriented dynamic regulation

Description of the measure	Slovakia will support and apply the best European practices in the field of digital platform regulation and intermediaries in order to not threaten jobs and safety of consumers and to foster economy growth and positive innovations in the labour market that will to strengthening if the middle class. The concept of dynamic regulation (regulation resistant to future changes in the environment) makes it possible for affected entities to experiment and innovate procedures in order to achieve the expected goal of the regulation. Dynamic regulation thus does not prescribe any exact procedure of how to keep it and thus provides the business environment with more freedom. It is suitable especially for sectors that are developing very fast (e.g. platform economy, etc.). The proposed concept will be first tested as a pilot on objectively measurable target in a specified area. The proposed regulation will be tested using the concept of its experimental verification prior to its general deployment. As part of it, the government will propose a controlled experiment, where companies can operate in a new way legally, while employees of the state administration will evaluate results, consult consumers and market participants and thus acquire knowledge for broader initiatives[16] The activity is part of implementation of the RIA 2020 – Strategy for better regulation and its action plan.
In charge	Ministry of Economy in cooperation with the ODPMII
Deadline / duration / measure implementation /	31 January 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Preparation of principles of legislation resistant to future changes in the environment
Reference	RIA 2020
Dependence on other AP measures	No

Organisation

2.2.3 Support to new business models in the digital economy, identifying of segments for the platform economy and extension of the portfolio of activities of the Slovak Investment Holding

Description of the measure	New business models can be used to put developed technologies into practice and push through their broad use. If the technology exists, a frequent reason of failure is disharmony between the regulatory framework and possibilities of such technology or the technology is limited by too small market. In order to push through such solutions better, it is necessary to offer them in the whole digital single market. Therefore, we will make systemic effort to enable experimental functioning of new business models, especially in transport, logistics, health care, education and financial services. At the same time, we

[16] Scale-up Europe: A Manifesto for Change and Empowerment in the Digital Age http://scaleupeuropemanifesto.eu/

	will study their possible disruptive nature. Slovakia can serve as an incubator of new possibilities with the vision of expansion to the whole EU. In this task, we will also analyse the role of online platforms in the Slovak market. In a comprehensive evaluation of the role of online platforms, we will look for answers to: ▪ Transparency of search results (including paid links and ads), ▪ The way how platforms use collected information, ▪ Relations between platforms and suppliers, ▪ Limitations of possibilities of individuals and businesses to change the platform, ▪ How to best deal with illegal content on the Internet, ▪ What is the influence of platforms on economic competition thanks to network effects and use of data and personal data to huge extent – digital platforms have much higher propensity to it compared to traditional businesses, ▪ How platforms in collaborative economy transform the labour market and social insurance, ▪ How platforms in collaborative economy change use of resources and responsibility, ▪ How platforms support transition to circular economy. Subsequently, we will identify those segments of economy where platforms have biggest influence in Slovakia and where Slovak platforms have the biggest chance for success. Those segments will be paid increase attention in further tasks. We will use financial instruments in the Slovak Investment Holding for funding new business models in order to support a portfolio of projects in digital and data economy.
In charge	ODPMII in cooperation with the MF SR and the Ministry of Economy
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	State budget / EU funds
Main expected output	Setting the state aid to support growth of the data economy.
Reference	No
Dependence on other AP measures	No

2.3 Smart mobility

It is well known that Slovakia is one of global leaders in automobile production. However, Slovakia needs to be leader in both, manufacturing as well as in innovations in transport. Introducing smart transport policies constitutes an opportunity for Slovakia to support building R&D functions in existing companies and setting up new companies dealing with innovations and value-added activities. Therefore, it is desirable to have testing of autonomous and connected vehicles done directly in the territory of Slovakia.

Even despite the fact that there are testing tracks in neighbouring countries and elsewhere, the testing map is still relatively sparse. Moreover, testing of self-driving vehicles in Europe, including countries like Germany and Great Britain, is still running very slowly. The main reason of a slower pace and a higher number of regulations is a higher stress on safety in order to avoid possible failures or accidents of self-driving cars, which has already happened in the USA. That fact improves the current unfavourable starting position of Slovakia in the field of self-driving testing.

Slovakia has a unique geographical location and borders on all other countries of Visegrad Four as well as with Austria. The capital city is also favourably positioned, with close distance to Vienna, Budapest and Prague. No other V4 country has the same potential. It is the autonomous connection of capitals in Central Europe that is a huge investment attraction in the near future. So, thanks to its unique position,

Slovakia can host a testing track connecting Bratislava with the Czech Republic, Austria and Hungary. Besides its unique location, Slovakia offers a broad range of geomorphological and climatic areas in a relatively small territory, which enables more effective testing and their higher variability.

Slovakia hosts of four big car makers – Kia, Peugeot/Citroen, Jaguar/LandRover and Volkswagen with top level distribution network and secondary market – with possible arrival of others in the future. Therefore, there is huge concentration of technological know-how in Slovakia. Slovakia possesses unique technological infrastructure as it is currently the global leader in car manufacturing per capita as well as in the total number of manufactured vehicles per year and it is place of operation of several innovative technological companies and start-ups.

Besides supporting new innovative projects and entities, the final objective of these activities is to get prepares for deployment of such innovations as the final effect of every innovation is supposed to be its implementation and use in everyday life.

National project titled Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility has bene adopted and it is being implemented in partnership of the Ministry of Transport and the ODPMII.

Ambition
Slovakia wants to reach the level of other countries in the field of testing of self-driving cars and related infrastructure in V4 region in the horizon of the forthcoming years, while aspiring for a respected position in the EU. It means that we need sufficient infrastructure as well as comprehensive system (structure, legislation, procedures, knowledge) to support innovations in transport and functional cooperation of public, private and academic institutions.

Regulation

2.3.1 Adoption of the national Strategy for Smart Mobility

Description of the measure	The strategy defines the priorities and content of the public policy for smart mobility. The method of building ITS in Slovakia will be determined with the emphasis on strategic understanding of self-driving cars testing and sophisticated transport services. The document also defines how to create functional partnership with private sector – it means how to support business entities to innovate in cooperation with the public sector also in more risk-exposed areas.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	30 June 2020. The implementation of the measure has started.
Source of funding	EU funds
Main expected output	Strategy for smart mobility
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility.
Dependence on other AP measures	No

2.3.2 Preparing draft concept of innovation public-private partnership for smart mobility solutions

Description of the measure	Methodology and procedures of the innovation partnership will be prepared and, based on them it will be possible to support building the testing environment and testing scenarios.
In charge	ODPMII
Deadline / duration / measure implementation /	30 June 2020. The implementation of the measure has not started yet.
Source of funding	EU funds

Main expected output	Methodology of innovation partnership
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility.
Dependence on other AP measures	2.3.1

2.3.3 Preparing draft Action plan for deployment of smart mobility in the Slovak Republic

Description of the measure	The Action plan is supposed to outline definition of particular steps of the Strategy for smart mobility, including supporting its approval, communication and presentation. The Action plan will contain a standardized list of tasks using SMART methodology, i.e. all tasks will be clearly described, including their owner, target date, method of controlling and verification of the result, etc. The Action plan and definition of priorities will simplify and increase effectiveness of assignment of necessary activities with depending on top priorities and, subsequently, it will provide the basic framework for financial allocation for those activities. The Action plan and the list of tasks will reflect international commitments of the Slovak Republic and strategic documents at the level of the Commission and the Slovak Republic, including specification of responsibilities and necessary cooperation.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Action plan for deployment of smart mobility in the Slovak Republic
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility
Dependence on other AP measures	2.3.1

2.3.4 Preparation of the legislation for testing and operation of self-driving vehicles

Description of the measure	Frameworks for necessary legislation changes will be proposed in order to adopt legislation in affected and relevant fields and the precise schedule of the legislation changes will be set. Legislation will be prepared for connected and self-driving vehicles, smart transport systems and associated topics, especially related to traffic safety and cyber security of vehicles and their components separately.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Legislation draft
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility
Dependence on other AP measures	2.3.1 and 2.3.3.

2.3.5 Preparing environment for experimental verification of the regulation for smart mobility

Description of the measure	Experimental verification of the regulation prior to its general deployment will make it possible to test procedural and structural definition of innovative management of changes. Thus, it is a mechanism to generate effective regulations that will also keep the fast pace and continuously developed innovations.

	In this process, there will be rules, tools and processes for verification of the regulation for smart mobility developed that will bring about better regulation in transport and experimenting with new setting of rules. Verifying proposed regulation will serve institutions and public administration entities in setting rules, processes and tools of regulations.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Establishing experimental verification of the regulation prior to its deployment
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility
Dependence on other AP measures	2.3.4

Organisation

2.3.6 Performance of activities of the platform for smart mobility as the "Smart mobility lab"

Description of the measure	Smart mobility lab will serve as the model platform for coordination, implementation and demonstration of innovative solutions for smart transport that will provide scientists with the possibility to perform experiments and test innovations for autonomous transport before they will be implemented into actual vehicles and actual traffic. In the Smart mobility lab, scientists will be developing and testing smart transport solutions in simulated transport situations with autonomous model vehicles, wireless communication network and positioning system based on infrared cameras. Depending on the demand on the part of scientists, there will be high precision maps prepared for selected locations for the purposes of autonomous mobility testing. Thus, the Smart mobility lab is the room for testing (near) future transport solutions. The platform will propose innovations in the field of transport, coordinate deployment of innovations and set principles and rules of operation of the ecosystem to support and scale innovations. Equally, it will create conditions and enable innovation partnerships between public, private and academic sectors in order to support innovations in transport.
In charge	Ministry of Transport in cooperation with the ODPMII
Deadline / duration / measure implementation /	30 June 2021. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Establishment of the platform for smart mobility
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility
Dependence on other AP measures	2.3.1, 2.3.3 and 2.3.4

2.3.7 Reviewing possibilities of institutional support to self-driving cars testing

Description of the measure	We will introduce so called "One stop shop" to provide solutions for testing of autonomous vehicles and smart mobility. It is the place that will concentrate information for active support to target groups. It means that the innovative entity will receive information about standards, methodologies, legislation, forms of testing as well as the form of available financial aid in one spot. We will set the process of licencing for connected and self-driving cars that can be either in the stage of pre-commercial marketing or as fully licenced vehicles

	for ordinary traffic) in line with the high level of cyber security. Reviewing possibilities of setting up the national operator for self-driving cars testing that will guarantee and coordinate tests at the one-stop-shop.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	30 June 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Setting up the contact point
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility
Dependence on other AP measures	2.3.1, 2.3.4 a 2.3.5

Projects

2.3.8 Introduction of selected innovation pilot concepts in transport, so called Proof of Concept

Description of the measure	In the first step, the measure will consist of pilot testing – so called Proof of Concept – selected innovations in the field of smart mobility in order to acquire knowledge necessary for the future setting of supporting financial mechanisms for implementation of projects in the field of smart mobility. In the second step, selected innovation concepts in transport will be deployed. Such pilot testing and deployment of innovations concepts will be limited in time and space, such as testing of certain aspects of connected and self-driving vehicles, the concept of smart crossing and the use of innovative tools for collection of traffic information. One of possible areas for testing the Proof of Concepts is the use of more precise maps or several types of maps in the territory of the test and evaluation of their suitability for application in the territory of the Slovak Republic, testing of cross-border automated exchange of traffic information, for example, for cars driving from the Czech Republic to the Slovak Republic, processing of data from cars with higher level of autonomy in steering and their use for smart transport systems, e.g. in the Smart City concept or for continuous improvement of maps, etc.
In charge	Ministry of Transport
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Deployment of selected innovation concepts in transport
Reference	OP EPA project - Improvement of public policies in transport, innovation capacity in transport and support to partnerships in deploying smart mobility y
Dependence on other AP measures	2.3.1, 2.3.4, 2.3.5

2.4 Financial innovations (FinTech)

Innovations are increasingly expressed also in the field of financial services. We can conclude that utilisation of technologically advanced procedures and systems fundamentally changes the manner of providing of financial services by financial institutions as well as utilisation of the services by end users.

Speed and intensity of the technological development in the field of FinTech leads to occurrence of innovative business models that do not always fall under the existing legal framework. The valid legislative framework for doing business in the financial market is, to large extent, harmonised by Eu regulations, which are continuously creating room for also innovative business (e.g. PSD2). Slovak institutions dealing with regulation and supervision over the financial market are involved in discussions

as well as in practical steps at the level of the European Commission, European Central Bank and European supervision authorities leading to updating the regulation, licencing and supervision processes. Our goal is to analyse opportunities to update processes and regulatory environment at the national level in line with applicable European legal framework in order to ensure financial stability and consumer protection and, at the same time, to use the high potential of the added value of new technologies on the real economy.

Even now, there are newly established companies as well existing companies operating in the financial market trying to use that potential by means of their innovative business models. Regions and entire countries are trying to set up the best possible conditions for occurrence and arrival of innovative companies. An incentive for such support in our country should be the effort to accelerate transition to digitalised economy and, at the same time, increasing the competitiveness of the Slovak Republic in global economy.

FinTech, as an integral industry, is still in the process of formation and, therefore, it is important for our economy to deal with the support to innovation in this field in a comprehensive manner already at its origin. In the long run, Slovakia has provided the room for foreign companies to test innovative financial technologies. If we add good availability of internet connection, high share of population using financial services and willingness to try innovations, Slovakia is a country with high potential to absorb as well as produce new innovative products and services and attract innovative companies from abroad.

In this connection, it will be desirable to focus capacities of the MF SR (and the National Bank of Slovakia) to support development of innovations in Slovak economy and thus set up the Centre for financial innovations. Since March 2018, the Centre for financial innovations has served as the platform for discussions between the MF SR, National Bank of Slovakia and other central state administration bodies and market participants about needs in introducing financial innovations. The Centre for financial innovations has set its goal to discuss the general progress in the field of financial innovations. At the European level, the Centre is operating by means of the Financial unit of the Permanent Representation of the Slovak Republic at the EU.

Ambition

Slovakia has the potential to become a regional leader in the field of financial innovations. It is our ambition to create environment that will support Slovak as well as foreign innovative companies in the financial market. This goal can be achieved by setting suitable regulatory environment where market participants meet regulators in an open discussion and try to set up procedures and platforms for providing services in the financial sector meeting all preconditions for ensuring high quality, effectiveness and financial stability. That will also support sharing experience and information among all relevant entities in deploying innovative solutions, services and products in the financial market. By means of the Centre for financial innovations, the MF SR should play the key role in setting cooperation and communication in the field of financial innovations with the goal of establishing competitive entrepreneurial environment.

Support to financial innovations will also require extension of education in the field of financial innovations, which is the basic prerequisite for development of the field in Slovakia. At the same time, it is possible to use specialised platforms, such as the Centre for financial innovations or events dedicated to innovations in order to increase awareness of the latest trends.

Even at present, we can observe the trend of increasing openness to financial innovations and their use on everyday basis. Clients themselves look for new technologies and request them from their banks or insurance companies. Thus, the purpose of the Centre for financial innovations is to enable financial institutions to focus on progressive procedures, remove undesirable obstacles in their deployment and maintain high level of protection of Slovak financial market with its simultaneous transition to the digitalized future.

Organisation

We must provide more detailed and comprehensible information to parties looking for information about doing business and about deployment of innovative products and services in the Slovak financial market.

2.4.1 Evaluation of activities of the NBS Innovation Hub

Description of the measure	The MF SR, by means of the Centre for financial innovations, initiated establishment of the innovation hub in the Slovak Republic. The National Bank of Slovakia (NBS) set up, in April 2019, an innovation hub that serves as the contact point with sufficient information about financial innovations and regulatory requirements for their deployment for relevant entities of the financial market. The establishment and functionalities of the innovation hub were inspired by approaches of other European countries. The NBS Innovation Hub consists of the website with basic information about financial innovations and online questionnaire for application for use of the Innovation hub. The objective is to get as much information from a company as possible about its intended innovation products and services. Afterwards, the NBS, in cooperation with the MF SR, will organise a meeting with the company that contacted the NBS using the questionnaire. The number of meetings is not limited to one, there can be more of them depending on needs of a particular company, the NBS or the Ministry. Meetings will result in information about regulatory requirements for the selected type of business activity. Approximately one year after setting up the Innovation Hub, it will be necessary to perform an analysis of its functioning and possibilities for its improvement and connection to the Centre for financial innovations.
In charge	NBS in cooperation with the MF SR
Deadline / duration / measure implementation /	30 April 2020. The implementation of the measure has already started.
Source of funding	No additional expenditure is expected
Main expected output	Evaluation of activities of the NBS Innovation Hub
Reference	No
Dependence on other AP measures	No

2.4.2 Enhancement of the activity and position of the Centre for financial innovations

Description of the measure	In order to enhance activity and position of the Centre for financial innovations, it is desirable to allocated sufficient capacities of the MF SR to ensure and increase effectiveness of operative, expert, promotional and educational activities of the Centre for financial innovations. The Centre for financial innovations, as a platform for discussions of public administration authorities and the private sector, carried a lot of activities in 2018 and their number will even increase in 2019 and in the following years. The goal is to coordinate the support of financial innovations among participants of the process, i.e. government, existing financial institutions and newly set up companies and connect such entities with each other and the academic sector. In the future, the key important factor will be the academia, together with promotion of financial innovations and their awareness. At the same time, the centre identifies topics and areas for work of dedicated working groups. The work of working groups will continue also in the following period – with connection to goals contained in this Action Plan. Enhancement of activities and position of the Centre for financial innovations is an important precondition in order to cover the aforementioned activities and enable its work to cover both, current financial innovations as well as those that will result from the future progress.
In charge	MF SR
Deadline / duration / measure implementation /	30 June 2020, continuously. The implementation of the measure has already started.
Source of funding	No additional expenditure is expected

Main expected output	Establishment of a structural unit at the MF SR – Centre for financial innovations
Reference	No
Dependence on other AP measures	No

Projects

2.4.3 Analysing benefits and possible utilisation of the regulatory sandbox concept

Description of the measure	We will analyse benefits and possible utilisation of the concept of the regulatory sandbox or all preconditions for its establishment, including amendments to existing legislation. Sandbox is, by its concept, a follow-up of the project of innovation hub in the stage before or after granting the licence to a financial institution but prior to the full deployment of the product or service. The principal prerequisite for the regulatory sandbox is defining clear conditions for participation in testing of the innovative solution in practice on a small sample of users or in a limited set of data. In this mode, the entity is able to test proposed solution and, in close cooperation with the supervisory body, finetune its future use in line with existing regulation. The concept also provides the supervisory body and the regulator with additional information on implications and effects of the technological solution on the financial market and enables proactive identification and elimination of possible risks. The analysis will result in the decision about suitability or unsuitability of the regulatory sandbox concept, or other types of sandboxes, in the Slovak financial market.
In charge	MF SR in cooperation with the NBS
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has already started.
Source of funding	No additional expenditure is expected
Main expected output	Analysis
Reference	No
Dependence on other AP measures	No

2.4.4 Analysing needs for crowdfunding regulation

Description of the measure	We will analyse the needs for regulation of the investment and lending crowdfunding in the Slovak Republic. Crowdfunding can be considered a part of the so-called alternative financing. The reason for that is the development of the market in preceding years in Slovakia, in both, its investment part (crowdinvesting) as well as in lending (crowdlending/peer-to-peer lending). Unregulated environment can be risky for investors that invest into crowdfunding platforms as well as for their clients who acquire money using them for projects or ordinary expenses. Proportional regulation could be suitable also in order to prevent undesired situations from the past in non-banking lending, when the absence of the regulatory framework threatened end users and enabled unfair practices on the part of providers of money. The result of the analysis should serve as the basis for decision-making on possible regulation of crowdfunding or measures to make existing applicable legal framework transparent and ensure more certainty and protection of users as well as investors in this field.
In charge	MF SR in cooperation with the NBS
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has already started.
Source of funding	No additional expenditure is expected

Main expected output	Analysis
Reference	No
Dependence on other AP measures	No

2.4.5 Analysing possible utilisation of tokenization of assets

Description of the measure	We will analyse possible utilisation of tokenization of assets that is understood as a recent trend in the financial and non-financial market. In the past years, tokenization has made it possible, worldwide, to build a new and growing channel for inflow of funds to real economy. Tokenization of assets represents new possibilities of investing savings to industries that had been inaccessible to ordinary investors until then. One example is tokenization of works of art with virtual division of the work of art int smaller parts (i.e. tokens), which can be acquired by the general public. Tokenization can be used in all fields of economy, not only in the financial sector. Regulation of this sector already exists in Switzerland, Estonia and Malta. The role of the analysis will be to make a detailed examination of possible benefits and risks of tokenization as an alternative funding of real economy. The analysis should result in information basis for responsible decision making about possible regulation of tokenization in Slovak legislation.
In charge	MF SR
Deadline / duration / measure implementation /	30 June 2020. The implementation of the measure has already started.
Source of funding	No additional expenditure is expected
Main expected output	Analysis
Reference	No
Dependence on other AP measures	No

3. We will improve abilities of the public administration to innovate and use data for the benefit of citizens

Strategic objective *"We will improve abilities of the public administration to innovate and use data for the benefit of citizens"* consists of two topics:

3.1 Data in the public administration,

3.2 Innovation in the public administration.

We will launch implementation of the "data-driven state" concept: The intention requires a significant improvement of the use and processing of data for analytical purposes by public administration institutions so that the public administration could provide high quality services and the government could adopt decisions on the basis of best knowledge that is available. Our institutions must know how to use data in real life and enable decision making on the basis of the data. Such change in operation of the public administration will require steps at all levels of the public administration; such assumed change will require political backing and substantial technical capacities. The initiative will be centrally coordinated by the public administration data office that has been set up at the ODPMII. Frameworks will be designed at the central level; however, actual changes of institutions can be carried out at the local level. Therefore, the OPII will provide room for implementation of transformation projects supported by technologies such as artificial intelligence or blockchain. Pursuing this effort, it will be possible to implement projects in the new programme Digital Europe.

Public administration will learn to innovate: We will significantly reduce the time for deploying innovations. Testing pilot solutions will become a common practice in the public administration. The innovation cycle of IT solutions must be rationalised by 2022. Experimenting, organizing competitions and engaging companies will become a standard feature of operation of public administration institutions. Therefore, we will reform and simplify principles of partnership with the academic and private sector. We expect a significant support to experimenting with technologies in the public administration and an overall change of the culture towards start-up like mindset and putting the "eGovernment as the platform" principle into practice, which means that innovation of public services can be also prepared by third parties, i.e. private sector or NGOs.

3.1 Data in the public administration

The first area where new innovations resulting from data economy could have actual impact is the public administration. The public administration is composed of a structure of institutions that try to perform their mission and assigned functions within the scope of clear competences. However, the progress in the 21st century wipes away once clear borders thanks to new layers of circumstances that originate in the digital era. Most public administration institutions can be significantly modernised using digital technologies and by a better use of data in every function. There is room for increasing the effectiveness while saving resources, especially thanks to better abilities to predict and plan. It means that institutions will get better adjusted to the current situation when there is huge quantity of data available on different economy sector and human activities but processes in institutions are still set as at the time when it was difficult to get access to the information. It means that it is possible to plan transition from bureaucratic organisation based on procedures and permits to a system that will be more flexible, agile and goal oriented. A substantial change can result in automation of public administration with proactive approach to citizens, which will lead to an improvement of the reputation of the public administration among citizens, savings of human and financial resources. Based on data available in information system of the public administration, citizens can be actively contacted or their requests can be verified and even completely handled automatically.

There are three basic reasons why to be optimistic that results can be achieved in a short-term horizon:

- Public administration institutions are not working at optimum level now. After the attempt to optimise processes, the current effort to improve analytical and decision-making abilities of institutions thanks to a better use of data is considered to be the best way how to achieve improvement and there are a low of reform initiatives that are being prepared as part of the OP EPA that are focused on improving the use of data in designing policies.
- New technologies built on the use of data have brought significant accomplishment in the private sector. The main question is how to achieve similar success in the public administration too. There

is a lot of successful experience from abroad that can be transferred. Also, thanks to the drop of public investments to IT in the past 3 years, we can observe a significant effort of IT sector to come with valuable solutions.

- It is the competence of the public administration to initiate and mange assumed transformation, which can strongly help other sectors of the economy that can be inspired by proposed innovations and solutions.

On the other hand, the government is facing several challenges in this field that will have to be handled effectively in order to make this transformation happen. In particular, it concerns:

- Maintaining continuity of measures and activities, evaluation of the success of current EPA projects that must have actual impact.
- The need to build human resources that understand new technologies and their possible applications.
- Allocation of sufficient funds, either form the state budget or operational programmes to meet priorities in digital themes.
- Insufficient stress on the setting and the design of eGovernment and online services to user friendly.

Ambition

Our ambition is to launch implementation of the "data-driven state" concept (state working on the basis of data use) into practice in the public administration in Slovakia. The intention requires a significant improvement of the use and processing of data for analytical purposes by public administration institutions. The public administration will adopt decisions based on its best available knowledge. Such transformation will require, along with the data lifecycle management (see preceding chapters), also a change of the method of decision-making in processes themselves, including processes that constitute the performance of the public administration. It is necessary to make sure that institutions know how to use real data and to make data based decision-making possible (and automated, where it is possible). It means creating conditions for the maximum use of the potential that can be exhausted from data. It also includes transformation of the functioning of organisations and processes in the public administration so that such analyses could be effectively used and, at the same time, published in suitable visual format for the public. We propose continuous deployment of fully automated public administration services. In this process, the system will handle filings automatically based on selected criteria. Applications will be verified on the basis of data maintained by the public administration, in ideal case, we will have fully proactive and chained services.

Regulation

3.1.1 Modernising and simplification of the legislation framework for data – preparation of the new act on data

Description of the measure	Slovakia has the ambition to introduce a modern legal framework for the use of data in lien with the general data protection regulation. Entrepreneurs and the public sector must learn how to use data they have available efficiently in order to provide consumers and citizens with increased added value of services. At the same time, we will examine possibilities of applying the Smart Disclosure principles that enable consumers take better decisions based on access to information and use innovative services and products based on data. We will result from precisely defined categorisation and classification of data based on their information value and required level of protection. It means that there will be a precise definition of rules and processes for reference data, open data and the manner how it will be possible to analytically process data (including rules for anonymising and pseudonymising data). At the European level, Slovakia finds it material to handle urgent matters concerning ownership, European interoperability, utilisation and access to data in various situations such as relations with the public administration, business

	to business relations, business to consumer relations, machine generated data and M2M (machine-to-machine) data. The new European legislation will remove barriers to free movement of data in the EU. Citizens will gradually acquire the right to control the flow of data they own and grant approval to process the data. In accordance with Act No. 400/2015 Coll., we will prepare the legislation intent of the act in the broadest possible extent and, sufficiently in advance of submitting it to the government session, we will consult public administration authorities that perform supervision over data or process data registers, their findings, themes and issues from application practice concerning creation and dissemination of data.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Act on data
Reference	No
Dependence on other AP measures	No

Projects

3.1.2 Build-up of a consolidated analytical layer and providing access to important analytical tools for the needs of public administration institutions to form public policies based on data

Description of the measure	We will provide uniform room for the needs of all public administration institutions that will make it possible to perform analytical tasks. Many analytical units need, for drafting policies or assessing impacts, high quality anonymised or pseudonymised data and tools for production and sharing of outputs. Ensuring the process of data collection and processing is usually complicated. In many cases, data is necessary in various heterogeneous information systems in the public administration. The intention of this project is to relieve end users form technical aspects of data collection, as much as possible, to let them focus on experimenting and analyses. A shared analytical layer will ensure fast dissemination and sharing of best practices and experience. **Analytical layer** will enable storing, handling and management of data and large data bases in various types of databases: Relation databases (SQL), NoSQL databases (document-oriented, storages with "key-value", inspired by large tables or graph oriented) as well as New SQL. The solution will enable reading data directly from source systems. The analytical layer will provide various levels of data storage that can be provided depending on domain classification, where domain-specific analyses of data will be carried out. Data can be searched thanks to catalogues of metadata and search engines. It is very important to fix security and protection of data privacy (thanks to anonymisation and pseudonymisation, cryptography and levels of access with different granularity). **Analytical tools** will be available to users from the public administration and enable making analyses over batch data and data flows for operative analyses. In this field, we will support cooperation with research and university teams. We expect that the following tools will be available: ▪ Traditional BI tools that support analytical functions over classic structured data sources (facts),

	▪ Machine learning – toolkit supporting data processing using methods of artificial intelligence, ▪ Statistical tools that enable creation of statistic data models, testing of hypotheses, factor analyses, correlations, regressions, etc., ▪ Tools for simulations that make it possible to simulate historical and future course of modelled events over selected set of historical and current data, ▪ Tools for visualising data and publication of results of analytical research. Analytical units that have been set up at different ministries help form policies on the basis of data. We propose further systemisation of policy making in cooperation with the data office of the ODPMII and continuously extend the list of policies that will be defined on the basis of data, in particular in priority areas such as transport (issues concerning transport safety and intensity), health care (optimising the network of health care providers, introducing new medications, coordination of health care policies) as well as social affairs, labour market, environment protection and financial policies. For each policy, there will be data model, its interpretation and reference to data sources.
In charge	ODPMII
Deadline / duration / measure implementation /	30 June 2022. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Providing data to analytical units in public administration authorities
Reference	No
Dependence on other AP measures	No

3.1.3 Setting up the system for sharing spatial information

Description of the measure	Spatial data have a specific position. They are bound to a certain location and its correct use can significantly help monitor the effectiveness of selected policies, e.g. in environment protection, public health policy, etc. Therefore, it is necessary to increase the scope of available spatial data and related services that can be searched more easily and work with them. It means a significant increase of public administration institutions that work with spatial data correctly. The key aspect will be increasing the level of providing access, harmonisation and quality of spatial data and services, as well as engagement of the private sector, science and research and, last but not least, population. Spatial information could be used also in application of augmented reality using a broad spectrum of devices (such as phones, tablets or headsets) and their innovative solutions. Currently, building up such system in required in the EU by the INSPIRE Directive. Unfortunately, Slovakia is currently lagging behind and, for majority of topics, necessary data and services are not available. Therefore, we will create a single platform for sharing harmonised spatial data that will ensure credible access and support new possibilities of utilisation of related services.
In charge	Ministry of Environment
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Single platform for sharing harmonised spatial data and services
Reference	Directive 2007/2/EC
Dependence on other AP measures	No

3.1.4 Testing utilisation of the blockchain technology in public administration on pilot projects

Description of the measure	▪ Technical solutions that can occur thanks to the technology of decentralized general ledger (blockchain) have the potential to restructure institutions as we know them thanks to guaranteeing credible transactions among participants. A credible third party is necessary in order to ensure credibility of transactions. Besides institutional innovation, a decentralised architecture can contribute to building a better internet that is more in line with European values than the current model. Experimenting in the field of blockchain is therefore important for Slovakia, too. Using blockchain makes sense if: ▪ The situation includes a large number of independent entities without explicit trust, ▪ The proposed solution changes functioning of institutions and makes it possible to leave out intermediaries (often a public administration institution, bank, exchange), ▪ A value cycle occurs in the ecosystem that cannot be captured at present. ▪ It is necessary to take into consideration that the technology is not ready for large production deployment yet, due to high energy demands, slow processing or low level of security. Many difficulties can be fixed gradually. Some countries, such as South Korea and the Dubai Emirate want to build the whole public documents processing on this technology. In Slovakia, we propose starting with managed experiments in various cases of use. Suitable pilot projects will be designed and implemented in the Laboratory for better services and digital innovations with other units of ODPMII.
In charge	ODPMII in cooperation with institutions that will deploy innovations
Deadline / duration / measure implementation /	31 December 2021. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Testing the blockchain technology in the form of pilot projects
Reference	No
Dependence on other AP measures	No

3.2 Innovations in the public administration

The first wave of informatization and innovations in the public administration by means of digital technologies occurred between 2010 and 2015 as part of the Operational Programme Informatization of the Society. Information systems and digital services that resulted from this effort failed to meet expectations to large extent because we did not manage to transform corporate processes that became obsolete in the meantime and costs were apparently too high.

Many initiatives presented in the Strategy have been in the process of preparation for several years and the process of public procurement has not even started. On the other hand, the first wave of informatization led to formation of a layer of official records and information systems that can serve as the basis for superstructure services with added value.

The current situation and slow deployment of innovations is incompatible with technological progress and it is necessary to significantly reduce the process of preparation as well as investment costs of future projects. One possible solution is experimenting in the public administration and changing the culture in order to make innovations actually possible. If we want to modernise the operation of the public administration and succeed, primarily, it is necessary to change the way how the public administration is able to innovate.

Ambition

We will significantly reduce the time necessary for deployment of innovations into practice. In the public administration, testing pilot solutions will become a standard feature. Innovation cycle of IT solutions must be reduced under one year by 2021. Experimenting, organising competition and engaging companies will become a standard for functioning of public administration institutions.

Regulation

3.2.1 Drafting the concept of innovation public-private partnership

Description of the measure	The concept and methodology of innovation partnership will be developed and, based on them, it will be possible to support implementation of innovative solutions. Private partners can offer interesting services with higher quality and lower costs and often possess knowledge necessary for successful innovation. Today's relation in providing public services is often classic supplier-customer relationship that is not suitable for most calls. In order to make partnerships work, we need "future-proof" framework that defines open conditions for setting up partnerships, forms of cooperation, financial models, intellectual property protection, personal data protection, sharing costs and revenues among partners and other important issues. The concept of partnership will occur in practice especially in newly established labs and it will focus on supporting innovations such as artificial intelligence. The above concept will be reviewed also from the viewpoint of possible new forms of agile governance with regard to ongoing unprecedented dynamic changes, growing flow of data, increasing online participation of inhabitants and strengthening influence of multinational corporations on management and running of the society.[17]
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Innovation partnership concept and methodology
Reference	No
Dependence on other AP measures	No

Organisation

3.2.2 Setting up a laboratory for better services and digital innovations

Description of the measure	The Action Plan assumes the necessity to support targeted experimenting and testing of various innovative models even before their possible deployment in the public, private or NGO sector. Therefore, the ODPMII is currently working on setting up a new organisational unit – Digital Innovations Laboratory – for testing agile approaches to governance and formation of public policies. Such government "start-up" will be in charge of setting and managing better and more conceptual digital policy of the state, make more effective calculations of possible effects of future legislative and strategic measures, increase innovation capacity of the state and strengthen cooperation between the public sector, private sector, academia and civil society in the process of digitalization. The Laboratory will also come up with innovative solutions for administration of data as well as credible public data and private data, e.g. in the form of voice activated use interface and personal assistants.

[17] https://ec.europa.eu/digital-single-market/en/news/future-government-2030-citizen-centric-perspective-new-government-models

	Similar laboratories also operate abroad. There are successful examples of identical projects in Europe in Denmark and directly at the Commission – Joint research centre of the EU.
In charge	ODPMII
Deadline / duration / measure implementation /	31. 12. 2019. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Setting up a laboratory for better services and digital innovations
Reference	No
Dependence on other AP measures	No

3.2.3 Implementation of activities of the behavioural innovations laboratory (BRISK)

Description of the measure	Behavioural Research and Innovations Slovakia (BRISK) or the digital nudge unit, is a new innovative and dynamic unit at the ODPMII, which brings latest knowledge of behavioural sciences to Slovakia. That unit started its full operation in February 2019. It brings behavioural interventions into the environment of electronic services of the public administration, supervises communication of government services from the viewpoint of citizens and entrepreneurs, tries to understand them, their feelings and decisions in order to make digital government services user friendly, make citizens know about services and use them. Inter alia, it also includes administration of tools to achieve uniform user perception of services of the state (as a uniform design of electronic services) to make the visualisation of services user friendly, make handbooks and transfer of domestic and foreign experts.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has already started.
Source of funding	EU funds
Main expected output	Performance of activities of the organisational unit
Reference	OP EPA project - Improvement of digital services in public administration by means of behavioural innovations.
Dependence on other AP measures	No

3.2.4 Setting up of methodological and evaluation unit and expert platform to support development of smart cities and regions

Description of the measure	At present, the local government is facing significant changes connected to the effort to ensure sustainable growth. Smart technologies provide the local government with huge opportunities for its development and offer solutions of environmental, economic and social changes. Smart cities can become the driving force of a new European policy that will be able to influence development of specific manufacturing sectors and expand benefits of the digital economy. The ODPMII finds it necessary to help the local government and create conditions for effective deployment and use of smart solutions, in the form of expert platform for supporting development of mart cities and regions. The principal objective of the measure is to create methodological and evaluation unit for smart cities and regions and create an expert platform to support development of smart cities and regions. An inspiration for this platform is the URBIS platform set up by the European Commission (DG REGIO) and the EIB.

	Methodological and evaluation unit, after being set up, will focus on the following activities: ▪ Preparation of the National strategy for development of smart regions (including a benchmark for smart cities and regions in Slovakia), ▪ Preparation of recommended methodology and procedures for making strategies and concepts of smart regions, ▪ Analysis and assessment of impacts of deploying smart region projects. The Expert platform will provide the local government with support in preparation and implementation of projects and acquiring investments into smart development. Its goal is not to substitute activities of the local government but to complement activities of cities and regions and provide expert support in specific fields. The Expert platform and the Methodological and evaluation unit will provide support to those municipalities that do not qualify for the support from European initiatives.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Setting up of methodological and evaluation unit and expert platform
Reference	No
Dependence on other AP measures	No

3.2.5 Setting up an office for digital innovations in local government

Description of the measure	Large number of public administration agenda is carried out at the level of local government, which has its specific features. It applies to larger as well as smaller towns and villages with different needs and priorities as well as self-governing regions facing different challenges. A central tool for innovations in the 21st century is, above all, digital technologies, thanks to which towns, villages and regions can improve lives of their inhabitants, improve providing public services and increasing the effectiveness of decision making and performance of the self-government. Globally, this approach is referred to as smart city, but it also applies to smart regions, smart towns and smart villages or communities. In Slovakia, this approach has been gaining ground relatively slowly, because Slovakia is even now still fighting a certain digital abyss between the level of informatization and the utilisation of technologies in small and big municipalities. There have also been cases when expectations of citizens and entrepreneurs regarding the quality, speed and access to services were not sufficiently reflected, even in bigger cities. We have few pilot solutions, experiments with better performance of the local government powers and utilisation of possibilities that are provided by digital technologies. There are several state documents being prepared in order to support such approach at the level of the local government. Due to the above, it makes sense to set up a unit that will handle specific issues of the local government concerning smart solutions and digital innovations and deployment of new digital technologies. The unit will focus on identification of needs of the population and local government authorities for the purposes of proper functioning in the digital era, participation in drafting relevant policies, testing pilot smart solutions, innovative public services and digital innovations in different local government authorities and evaluation of the most effective means of their implementation also from the viewpoint of the "value for

	money" principle and their scalability and their possible application in other local government authorities. The Office for digital innovations in the local government should evaluate conditions for significant innovations of public policies, services and the functioning of the local government as such. Its role will be to support synergies, sharing best experience and practice. We can see big potential in better us of data and, therefore, the proposed tools should include support to the use of analytical solutions. For the purpose of the setup, we recommend using the ESIF funds (OP EPA 2014-2020) alternatively, 2021-2027 ESIF funds.
In charge	DEUS in cooperation with associations of municipalities and regions
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has not started yet.
Main expected output	Setting up an office for digital innovations in local government.
Source of funding	state budget / EU funds
Reference	No
Dependence on other AP measures	No

Projects

3.2.6 Setting up the platform for finding innovative solutions

Description of the measure	The public administration is facing many difficulties that require creative and bold solutions. In developed countries, it has become a common practice to turn the process of problem solution into a contest for best ides where the best ones will be rewarded. An example for it is the US platform challenge.gov. The purpose of this activity will be to create a similar platform for engaging students, scientific teams, NGOs, businesses – simply anyone, who has the capacity to get involved and who can come with solutions. The challenge will be to get sufficiently big audience interested in it. The platform can be connected to other initiatives, such as organising hackathons that are gaining popularity in the private and public sector. Digital innovations laboratory notifies calls in the form of public contest and the public can submit their solution proposals.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Platform to bring creative solutions of problems in the public administration
Reference	No
Dependence on other AP measures	3.2.3

3.2.7 Providing new opportunities for doing business and innovations of public services by means of open API

Description of the measure	The purpose of the open API platform is to provide the expert public with technical interface to let them further develop technical means using electronic services of the government. Such approach to electronic services will lead to diversity of services for citizens, which will further increase the demand of citizens for government services and their satisfaction. Examples of such creative development of services using open data are Finnish "tax tree „and British "where does my money go", which show, in a user-friendly

	manner, how and where the government uses collected taxes. It means that open data makes it possible to implement a whole range of other services while it is a non-controlled process of free market – open data and the respective platform, which provides access to data, are inevitable prerequisites of it. The purpose of the activity is to develop a detailed methodology – manual explaining how to proceed while using the platform. The platform will make it possible to open application interfaces of public administration information systems in order to make it possible for application services to also use trustworthy information systems of third parties. That will build creative competition between commercial solutions that will lead to development of innovative solutions without participation of the government and thus without further costs for the state budget but also with direct positive impact for citizens and businesses. An example of such solution is developing applications to simplify the paperwork for entrepreneurs as they will have the possibility to use provided APIs to simplify processes of communication with the government, e.g. software for accounting will not have to access to the Financial administration portal in order to submit the tax return statement. Those activities will be done by the application itself that will use published services of the government, in that case, the financial administration at the API platform. Concerning API solutions for digital services, emphasis will be placed on compliance with GDPR (personal data protection) and use of tools for personal data management (My data service). The National Agency for Network and Electronic Service (NASES) is building pilot project API GW based on the module of official communication of the public administration. On the top of that basis, the ODPMII will build full-fledged API GW from the finds of the Operational Programme Integrated Infrastructure, which deals with the access to digital services for registration and modification of data in state registers. The portfolio of third-party applications is thus much broader and innovative applications can substitute the whole interaction between users and the government.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2022. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Open API GW, new API accesses
Reference	No
Dependence on other AP measures	3.2.3

4. We will support development of artificial intelligence

Priority *We will support development of artificial intelligence* consists of two themes:

4.1 Research and education in the field of artificial intelligence,

4.2 Increase of the economic growth in Slovakia with the use of artificial intelligence.

In December 2018, the Coordinated plan on artificial intelligence was adopted at the European level and it obliges Member States to principal obligations in developing their national capacities and international cooperation in the field of artificial intelligence. Inter alia, the adopted document implies that Member States are to adopt their own national strategies concerning the use of artificial intelligence. In order to meet the above obligation, the Government of the Slovak Republic adopted the Strategy and, at the same time, by means of this Action Plan, it has proposed a group of particular measures aimed at supporting research, education, testing and deployment of systems based on the use of artificial intelligence. Implementation of the above measures will be reviewed on continuous basis in regular intervals, with the presence of all affected parties due to dynamics of the research, development and deployment of this technology.

Use of artificial intelligence must be based on demonstrably secure deployment of this technology and respecting international principles and recommendations, such as Principles of OECD for artificial intelligence[18], approved in May 2019 or recommendations of the European Commission for trustworthy artificial intelligence[19]. That will require meeting the following requirements: 1. Increase, adequately depending on the pace of development of artificial intelligence applications, sufficient understanding of artificial intelligence by the general public, 2. Recognise and correctly address social risks resulting from artificial intelligence, 3. Adjust education and vocational training to the digital era, 4. Regulate and improve data processing, 5. Adjust protection of rights and freedoms to the needs of the digital era.

Global demand for experts in the field of artificial intelligence in the global market economy with both, academic or commercial focus, is highly above the global supply and its consequence is that experts associate in organisations where they are rewarded and socially recognised and the country or continent where the organisation is located is less relevant.

With the strategic setting of education and research in Slovakia with specialisation in artificial intelligence, it is important to not only focus efforts to set up a system that will effectively produce such experts as well as develop environment for full utilisation of their ambitions and overall satisfaction. This effort to educate and keep experts in artificial intelligence in our territory should help us in building the technological autonomy.

The whole list of recommendations on artificial intelligence will be successful if we simultaneously increase awareness of artificial intelligence among the general public whose lives will be affected by it. It is necessary to identify, at the national level, opportunities for artificial intelligence in Slovakia (in what way we will be developing, what sectors will be priority for us, what we are good at).on the part of the government and for the needs of the state, it is necessary to support pilot projects in the private sector by supporting projects of application experimenting with artificial intelligence in the public sector and increasing accessibility of public services using artificial intelligence.

4.1 research and education in the field of artificial intelligence

Ambition

Provide access to basic principles and mechanism of functioning of artificial intelligence to the general public by means of public education. Positive promotion of subjects that form the basis of artificial intelligence among pupils and primary and secondary schools. Establish shared education of experts of selected aspects of artificial intelligence at universities. Take part in building globally competitive conditions that will actually make it possible for domestic and selected foreign experts in artificial intelligence to operate in our country. Support setting up expert groups for moving the research and application of artificial intelligence forward as well as

[18]http://www.oecd.org/going-digital/ai/principles/?utm_source=Adestra&utm_medium=email&utm_content=ai&utm_campaign=Going%20Digital%20AI%20principles&utm_term=demo

[19] https://ec.europa.eu/digital-single-market/en/news/ethics-guidelines-trustworthy-ai

coordination of educational activities in this field. An important part will rest in cooperation with research institutions, their involvement in particular projects and providing access to data necessary for the research.

Organisation

4.1.1 Involvement of the Slovak Republic in the EU initiative for building European centres of excellence for artificial intelligence

Description of the measure	For Slovakia it is necessary to get involved in European initiatives in the field of artificial intelligence, where it can increase its research capacity and attractiveness of the research in the field of artificial intelligence. Unless we take measures aimed at building centres of excellence, the existing small capacity in the research will continue diminishing. Due to small research capacity in the field of artificial intelligence as well as in the academic sector, there is not a big chance that the private sector in Slovakia could make Slovakia apply for such centre separately. However, in connection with V4 countries, a unique grouping can occur that will make it possible to acquire one of the planned centres of excellence for artificial intelligence in our region. In 2020, the European Commission intends to provide 50 million euros to a network of European centres of excellence by means of Horizon 2020 programme and Slovakia intends to get involved in the network. By engaging Slovakia in European structures of excellence, the research positions will become more attractive, we will be in the centre of events and our chances of acquiring additional sources and involvement in European activities will increase. It is important for such centre to serve for the benefit of all involved parties and to ensure distributed nature of experts who will not have to be concentrated in one field.
In charge	ODPMII will support affected entities in order to get Slovakia involved in European structures of responsibility
Deadline / duration / measure implementation /	30 June 2020, continuously. The implementation of the measure has not started yet.
Source of funding	State budget / EU funds
Main expected output	Involvement of Slovakia in European excellence structures
Reference	Coordinated plan of the EU for artificial intelligence
Dependence on other AP measures	No

4.1.2 Setting up an expert group for coordination of educational activities in artificial intelligence

Description of the measure	Without educating experts at various levels of knowledge and skills, it will not be possible to ensure competitiveness of the labour force in Slovakia. The goal is to build a coordinating group that will act as a part of the national platform for artificial intelligence, for example, and that will: ▪ Map and analyse relevant educational programmes (regarding the content, form, success rate) abroad and in Slovakia, ▪ Monitor global trends in the field of research and application but also safe and suitable use of artificial intelligence, ▪ Prepare recommendations for education in the field of artificial intelligence in Slovakia for various target groups, ▪ Provide consultancy services concerning education on artificial intelligence for schools, public sector entities as well as the business sector. The role of the expert group can be delegated alternatively to the platform for research and use of artificial intelligence.
In charge	Ministry of Education in cooperation with the ODPMII and other stakeholders

Deadline / duration / measure implementation /	30 June 2020. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Setup of the expert group
Reference	No
Dependence on other AP measures	No

Projects

4.1.3 Development of a tool for natural language processing

Description of the measure	By means of targeted efforts, it will be necessary to prepare and finance projects on the part of the demand as well as of the supply and support diffusion of tools for natural language processing (NLP) in practice. It will be necessary to remove barriers in the use and development of text and voice corpus of the Slovak language with specific regard to safe and practical application of such technologies in the field of public services. It will be possible to use the methods of natural language processing for monitoring of priority holistic goal, i.e. increasing transparency of the Slovak regulatory framework. Subsequently, it will be possible to use features of semantic text and voice analysis for automation and electronization of subset of services in the contact with authorities, medical facilities and schools, which will make opportunities for developing innovative packages of services and products also for commercial sector, e.g. in IT sector, in the field of data transfer security, in automobile industry as well as in other fields of the commercial sector. Mechanism: Setting up a centralised and coordinated approach to tools for natural language processing for Slovak will accelerate the development of corpuses and support their use. It is necessary to provide access to corpuses under preparation, research results, methods and algorithms. Effective cooperation of research teams in academic and commercial sector will support development of tools for Slovak that can be used in various applications. Such mechanism, applied to increasing transparency of priority regulatory environment using tools for natural language processing can be later used in other EU countries as well as by the EU itself.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2020 and continuously. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Development of the centralised mechanism and approach to tools for natural language processing
Reference	No
Dependence on other AP measures	No

4.1.4 Defining themes with the social need and preparation of pilot projects with a broad support of experts in artificial intelligence

Description of the measure	We will identify and define themes with social impact whose solutions requires methods and models of artificial intelligence. Based on such themes, we will prepare and notify pilot projects based on the open-source principle. ▪ Particular projects will be defined either directly (e.g. analysis of tax data and uncovering tax evasions, detection of disinformation in media (in Slovak language), effective communication of machines and people in services in Slovak language , selected medical issue, prediction of security

	threats, use of artificial intelligence for safer Internet for children up to the use of digital technologies using artificial intelligence in order to slow down or avert climate changes or introduction of circular and low-carbon economy) or indirectly by means of hackathons. ▪ We will select companies and universities, whose tole will be to engage a broader community of experts. ▪ We will assist in implementation of projects. In order to increase the quality of research in artificial intelligence as well as to accelerate deployment of artificial intelligence, it is necessary to put together sufficient number of experts, high quality data and computation capacity. One suitable method is making model solutions of pilot projects that will enable defining suitable processes for making high quality data, ensure computation infrastructure and attract experts from academic, public and private sector thanks to their nature. That will only be possible if: ▪ The selected theme reflects the social need, ▪ Initial results of the project are delivered within one year, ▪ The project will last adequately long time period (ideally 5 years).
In charge	ODPMII in cooperation with relevant ministries, with the presence of universities, Slovak Academy of Sciences and the business sector
Deadline / duration / measure implementation /	31 December 2020, continuously. The implementation of the measure has not started yet.
Source of funding	EU funds
Main expected output	Identifying themes
Reference	No
Dependence on other AP measures	No

4.1.5 Defining and notification of calls for grant schemes for basic and applied research focused on artificial intelligence

Description of the measure	Define and notify calls for grant schemes for basic and applied research focused on artificial intelligence with the focus on: ▪ Basic research, ▪ Applied research in connection to academic and private sectors, ▪ Multidisciplinary research in artificial intelligence, ▪ Research in the field of safe use of artificial intelligence and techniques for securing artificial intelligence-based applications. We will define and notify calls in order to make them consistent with activities of the Commission, complement them in a suitable manner and support the quality resulting from the quality of existing research HR infrastructure, which has to be extended as well as in academic and private sector. A direct financial support to the research will make it possible to enhance capacities of stakeholders and contribute to increasing the competitiveness of Slovakia in artificial intelligence. Recommended activity: prepare and notify calls by means of existing entities and schemes (Slovak Research and Development Agency, state programmes, ESIF). Specific emphasis will be put on supporting research and development of trustworthy artificial intelligence in the sense of recommendations of the European Commission as well as of the OECD.
In charge	ODPMII in cooperation with the ODPMII, universities and the business sector
Deadline / duration / measure implementation /	31 December 2021, continuously. The implementation of the measure has not started yet.

Source of funding	EU funds (public private partnership)
Main expected output	Notified grant calls
Reference	No
Dependence on other AP measures	No

4.1.6 Introduction of joint education of experts about selected aspects of artificial intelligence

Description of the measure	The purpose of the measure is to increase the number of students in study majors that are connected to artificial intelligence. Its goal is to: ▪ Set up a platform for shared education of selected AI aspects in English language in the form of "blended learning", ▪ Get foreign students for the study of graduate study majors or different courses, ▪ Set up a database of research activities and projects in the field of artificial intelligence in Slovakia, ▪ Notifying grant calls for drafting and developing joint education in English language, ▪ Improvement of end-point communication and information infrastructure for the needs of mixed education, ▪ Preparation of courses in English language and their remote teaching for foreign students. It will be financed from existing budgets of universities and Slovak grant schemes. We expect that developing high quality study majors will reduce the churn of potential university students abroad. The system of shred teaching can serve as the basis of joint study majors and sharing of courses can help expand existing study majors with artificial intelligence. Providing individual courses on-line in English language will contribute to popularising Slovak education abroad. A measurable criterion of success of the recommendation is an increase of graduates of study majors that refer to artificial intelligence in their graduate profiles.
In charge	Ministry of Education in cooperation with the ODPMII and universities
Deadline / duration / measure implementation /	31 December 2020, continuously. The implementation of the measure has not started yet.
Source of funding	State budget / EU funds (public private partnership)
Main expected output	Increase of the number of students of study majors related to artificial intelligence
Reference	No
Dependence on other AP measures	No

4.2 Increase of the economic growth of Slovakia using artificial intelligence

Unprecedented increase of human productivity efficiency by deploying technologies with features of artificial intelligence is already transforming global economy and society. Therefore, the Slovak Republic must also respond quickly and effectively as it is one of the developed countries most threatened by substitution of jobs by artificial intelligence in the next decade due to its structure of industry. However, we can see huge potential in the use of artificial intelligence that can result in increasing competitiveness of Slovak economy. Based on estimates of consultancy company PwC, it is possible to assume that artificial intelligence will generate more than USD 16 trillion by 2030 and increase global GDP by 26 per cent. Therefore, we find it important to support investments of the business sector in this field.

We also find it important to support technological sector in Slovakia and companies dealing with the development and applications based on AI. Development and application of such solutions is accompanied with high added value. In order to strengthen this sector of economy, it is in our interest to be one of countries that will have strong representation in this field.

Ambition
Slovakia will make use of the human potential of experts prepared by academic facilities in the field of artificial intelligence in order to support development of the sector with high added value that will attract further investments. Launching the demand for technologies with features of artificial intelligence will enhance not only competitiveness of the economy in sectors where such technologies will be deployed but also development of IT sector in this field with high added value with the potential to expand to global markets.

Regulation

4.2.1 Analysis of the regulatory environment for artificial intelligence

Description of the measure	The intention is to set up an advisory group at the Digital Agenda Section of the ODPMII composed of experts from private, academic and public administration sectors that will make recommendations concerning the need for amending existing regulatory environment. The role of the advisory group can also be delegated to the platform for research and utilisation of artificial intelligence. Its activities should focus, primarily, on legislative and technical obstacles of effective use of AI tools, availability of data sets in a suitable form, quality and structure, "dual" education (basic knowledge concerning functioning of AI algorithms and professional knowledge in fields where AI utilisation is expected), transparency and comprehensiveness of data sets, access to data – mainly from public institutions, support to research and development, making opportunities for entrepreneurs and, subsequently, framework assessment of impacts of proposed measures. From the viewpoint of regulation, the relevant activity will not only cover the data collection but also the ways of data use and purposes for which data is used. The analysis should also review suitability of the framework for intellectual property in the field of AI, model for open data management that will result from the current regulatory status in the Slovak Republic and the EU and also reflect requirements of cyber security. High quality analysis is the basic precondition for setting an effective regulatory environment. Moreover, knowledge of opinions of the general public is important for a correct model of AI management. Effective regulatory environment combining legislative and non-legislative instruments (e.g. codes of conduct, standards, industry best practices, reporting) is of key importance for competitiveness of the Slovak Republic not only in the field of AI, reducing the lag, increase of foreign direct investments, identification of strategies for the use of AI as a tools of transformation and long-term increase of competitiveness of Slovak companies also in the field of research and development. Ineffective regulatory environment is also slowing down AI activities.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2019. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Analysis of the regulatory environment
Reference	No
Dependence on other AP measures	No

4.2.2 Designing and supporting implementation of principles of transparent and ethical use of AI

Description of the measure	Digital transformation must be carried out under supervision on the state sector in order to make sure that artificial intelligence as well as other benefits of the digital are used for the purposes of supporting our social values and legal principles. Specifically, the government must focus, in the process of correct setting of the use of smart systems, mainly on the following steps: ▪ Modify and enhance legislation for protection of rights and freedoms of individuals as well as on collective rights in the use of smart AI-based systems, ▪ Regularly enhance legislation for the purposes of better data protection and its regulation at the national and international level, ▪ Regulate legal liability as well as related insurance frameworks for technological and innovative companies for their innovations so that, in the event of possible errors and risks, they worked on their removal in order to ensure trustworthy use of AI and its responsible deployment, ▪ Set the legislation that will not inadequately threaten development of AI, ▪ Enhance communication and cooperation between state authorities and technological companies in order to better address social and other risks of digital transformation for citizens, ▪ Support implementation of measures about the use of AI that will be adopted at the European level by means of *High-Level Expert Group on Artificial Intelligence* (AI HLEG). **Promotion of best ethical procedures:** Implementation of a survey among companies with experience in implementing artificial intelligence and among expert public about benefits of the technology and their concerns. Setting up of a mechanism for continuous collection of best ethical procedures from companies and the public with the focus on practical and theoretical experience (catalogue of case studies). Foster involvement of Slovak companies in the pilot project *Ethics Guidelines for Trustworthy AI Assessment*.
In charge	ODPMII in cooperation with the Ministry of Economy
Deadline / duration / measure implementation /	31 December 2020, continuously. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Definition and implementation of ethical principles
Reference	Coordinated plan of the EU for artificial intelligence
Dependence on other AP measures	No

Organisation

4.2.3 Supporting the development of artificial intelligence ecosystem

Description of the measure	We will carry out a public survey in an innovative format by means of chatbots about the public perception of AI, with a clear assessment of the starting point (ground zero – either as positive or negative). The survey will summarise biggest concerns and expectations of the public. The purpose of the survey will be to set policies aimed at supporting trustworthiness of artificial intelligence. Other tasks will be: ▪ Setting clear and comprehensive ethical principles for trustworthy AI and their presentation to the public, ▪ Harmonisation of the discussion on AI ethics and regulations in Slovakia with the status of the discussion in the Eu and elsewhere in the world, in particular with *Ethics Guidelines for Trustworthy AI*, as well as based on other existing international documents and standards,

	▪ Setting principles of responsibility for AI, above all, for operation of autonomous and collaborative systems and for the stage of experimental and real operation, with the emphasis on self-learning systems, ▪ Engage companies implementing AI and the expert public in activities running in the EU, ▪ On particular examples, illustrate approaches that are successfully developing ethical design of AI in the context of sustainability and have actual successful results, ▪ Support ethical use, deployment and development of AI in Slovakia, ▪ Receive feedback from companies with experience in AI and the expert public, ▪ Apply the SAM method (*scientific advisory mechanism*) in making concepts, policies and regulations on ethical use of artificial intelligence, ▪ Identify possible applications of AI that are in contradiction with these principles and deployment of the remedy mechanism. The task can be delegated to the platform for research and utilisation of artificial intelligence.
In charge	ODPMII
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Opinion survey
Reference	No
Dependence on other AP measures	No

4.2.4 Setting up the permanent committee for ethics and regulation of artificial intelligence

Description of the measure	We will set up an authority for cumulation of best practices in developing, deploying and use of artificial intelligence and determining the discussion on ethical aspects of artificial intelligence. We will set up an independent committee that will be able to assess ethical aspects of running AI projects and possibly comment on provided services. AI regulation and ethics has a broader scope than the policy for data providing. Themes that should be paid attention are, not limited to: ▪ Ethical principles (supported by legislation) in the use of AI: o Fair access to technologies for all groups of population (justice, non-discrimination), o Transparency and controllability of system using AI, comprehensibility of basic principles of functioning for the general public (application of the informed consent principle), o Principle of not causing harm – to assets, health, social status, etc., o Liability for the future – today's decisions have impact on the future development of humankind. ▪ The question is if there are decisions that AI must not take and if yes, which ones they are (e.g. kill a human, lie, take decision about medical intervention, etc.), ▪ Building trustworthy AI – not only data but also methods must be trustworthy. It is necessary to make sure that selected methods are reliable, they are primarily not intended for activities aimed at damaging humans, their rights and freedoms,

	▪ Positive perception of the public and trust of the public in AI. Better understanding of real risks as well as positive aspects brought about by the deployment and use of AI. It is necessary to conform that we want to develop AI in a way that will not only improve the quality of life but that will also support desirable social and human values. Furthermore, it will be necessary to set up a committee that will have the authority to comment actions of entities in development, deployment and use of AI tools. A similar committee has been working for long in biomedical research. The committee operates at the Ministry of Health of the Slovak Republic[20]. The committee should be composed of not only experts in AI and regulations but also by experts in ethics or other experts with education in humanities (sociology, psychology) and economics.
In charge	ODPMII in cooperation with the Ministry of Economy
Deadline / duration / measure implementation /	31 March 2020. The implementation of the measure has not started yet.
Source of funding	No additional expenditure is expected
Main expected output	Setup of a permanent committee
Reference	No
Dependence on other AP measures	No

Projects

4.2.5 Preparation of a manual for companies for deployment of artificial intelligence

Description of the measure	We will prepare a universal map and a control list of tasks for companies that want to modernise their business using artificial intelligence but that do not know how to do it. We will prepare answers to frequently asked questions, such as how can artificial intelligence help different types of companies. An easy to read manual will contain answers for FAQs, provide preconditions for a successful deployment of the technology, define necessary stages of implementation of modern technologies and warn of dangers. That will simplify access of companies and institutions to the latest and most progressive forms of available innovations. It will help companies correctly understand the whole modernisation process.
In charge	ODPMII in cooperation with the Ministry of Economy
Deadline / duration / measure implementation /	31 December 2020. The implementation of the measure has not started yet.
Source of funding	State budget (public private partnership)
Main expected output	Manual
Reference	No
Dependence on other AP measures	No

[20] http://www.health.gov.sk/Clanok?statut-etickej-komisie-mzsr

4.2.6 Supporting an increase of investments of foreign and Slovak companies into research activities

Description of the measure	It is necessary to improve conditions for setting up research centres of Slovak and foreign companies in Slovakia. That will support building industry with higher added value. Implementation mechanisms will be: ▪ Research of the biggest obstacles for corporate investments into research activities in Slovakia, ▪ Building strong start-up ecosystem, ▪ Enhancement of mechanisms for protection of intellectual property and law enforcement, ▪ Accessibility of public data for experimenting. Many companies support education of their employees, however, there is shortage of trainings in the field of machine learning and artificial intelligence. We propose that the centre of excellence actively search for global experts and hold practical trainings with them. We propose reimbursement of participation for students, university and secondary school teachers and provide access to such workshops also to employees in private and public sector.
In charge	ODPMII in cooperation with the Ministry of Education and the Ministry of Economy
Deadline / duration / measure implementation /	30 June 2020. The implementation of the measure has not started yet.
Source of funding	State budget (public private partnership)
Main expected output	Increased investments into research activities in the field of AI
Reference	No
Dependence on other AP measures	No

Overview of proposed measures

Institutional background in order to increase innovative performance of Slovakia, including enhancing abilities to use new digital EU funds

Measure designation	Name of the measure	Entities in charge	Deadline
A	Ensuring direct political support to priority areas of the Action Plan	Relevant ministries	31 December 2019, continuously
B	Support to activities of the Digital Coalition	ODPMII, MF SR, Ministry of Education, Ministry of Labour, ITAS and members of the Digital Coalition	30 September 2019, continuously
C	Initiating, support to setting up and connecting DIHs in Slovakia (DIH / CDI)	ODPMII, Ministry of Economy, ITAS	31 December 2020, continuously
D	Support to setting up and activities of a platform for research and utilisation of artificial intelligence	ODPMII and other relevant ministries	31 December 2019, continuously
E	Support to setting up and activities of the platform for research and utilisation of the blockchain technology	ODPMII and other relevant ministries	30 June 2020, continuously
F	Support to setting up and activities of national high-performance computing competence centre	ODPMII, Slovak Academy of Sciences and other stakeholders	31 December 2019, continuously
G	Support to setting up and activities of the national competence and coordination centre for cyber security	National Security Authority, ODPMII	31 December 2020, continuously

1. We will support digital transformation of schools and education in order to improve the quality and preconditions for employments and acquisition of digital skills and competences necessary for the digital era

Measure designation	Name of the measure	Entities in charge	Deadline
1.1.1	Preparation of the programme for informatization of education until 2030	Ministry of Education	31 December 2019
1.1.2	Systemic change of the system of education preparing employees for the needs of economy	Ministry of Education, Ministry of Labour	31 December 2020
1.1.3	Life-long education – comprehensive systemic change, strategy and implementation of legislative measures	Ministry of Education, Ministry of Labour	31 December 2019

1.1.4	Setting up a working group in order to build a coordinated mechanism to counter disinformation	Chairman of the Security Council of the Slovak Republic	31 December 2019
1.1.5	Preparation of an analysis of the condition of digital skills in Slovakia with a proposal of particular measures	ODPMII, Ministry of Education, Office of the Government, Ministry of Labour	31 December 2020
1.1.6	Support to activities aimed at increasing the share of women in IT and digital sector	Ministry of Education, ODPMII, Ministry of Labour and partners active in this field	30 June 2020, continuously
1.1.7	Preparation of a study of the digital transformation and recommendations at the national level in the field of employment, qualifications and labour forms – Work 4.0	Ministry of Labour, Ministry of Education	31 December 2019
1.1.8	Support to increasing competences of young people for the digital era in the formal education	Ministry of Education	31 December 2019, continuously
1.1.9	Initiating activities leading to assessment of impacts of the use of smart system and digital technologies on development, health and behaviour of people	Ministry of Health, ODPMII	31 December 2019, continuously
1.2.1	Making employment of IT specialists in state and public administration more attractive	Office of the Government, MF SR	31 December 2021
1.2.2	Support to acquiring talents for study and employment of experts from abroad, including universities and industry	Ministry of Labour, Ministry of Education, Ministry of Interior, Ministry of Economy, Office of the Government, ODPMII	30 June 2020

2. We will set up the basis for modern digital and data economy and for the digital transformation of economy in general

Measure designation	Name of the measure	Entities in charge	Deadline
2.1.1	Increasing effectiveness of the regulation of electronic communications market for the benefit of growing coverage of the territory with ultra-fast connection	Ministry of Transport	31 December 2020, every year
2.1.2	Support to completion of the build-up of gigabit fibre connection accessible in the sense of the EU strategy for European Gigabit Society	ODPMII, Ministry of Transport	31 December 2020, every year

2.1.3	Support to measures from the 5G for Europe Action Plan and 5G Roadmap from z Tallinn to have one big city covered with 5G until 2020	ODPMII, Ministry of Transport, Regulatory Authority for Electronic Communications and Postal Services, National Security Authority	31 December 2020, every year
2.1.4	Setting up the institute for providing access to trustworthy data	ODPMII	31 December 2020
2.1.5	Deployment of a pilot solution for personal data administration	ODPMII	31 December 2021
2.2.1	Introduction of systemic evaluation of effects of regulations on innovations and digital economy	Ministry of Economy, ODPMII	31 December 2021
2.2.2	Introduction of the system of goal oriented dynamic regulation	Ministry of Economy, ODPMII	31 January 2021
2.2.3	Support to new business models in the digital economy, identifying of segments for the platform economy and extension of the portfolio of activities of the Slovak Investment Holding	ODPMII, MF SR, Ministry of Economy	31 December 2021
2.3.1	Adoption of the national Strategy for Smart Mobility	Ministry of Transport	30 June 2020
2.3.2	Preparing draft concept of innovation public-private partnership for smart mobility solutions	ODPMII	30 June 2020
2.3.3	Preparing draft Action plan for deployment of smart mobility in the Slovak Republic	Ministry of Transport	31 December 2020
2.3.4	Preparation of the legislation for testing and operation of self-driving vehicles	Ministry of Transport	31 December 2021
2.3.5	Preparing environment for experimental verification of the regulation for smart mobility	Ministry of Transport	31 December 2021
2.3.6	Performance of activities of the platform for smart mobility as the “Smart mobility lab”	Ministry of Transport, ODPMII	30 June 2021
2.3.7	Reviewing possibilities of institutional support to self-driving cars testing	Ministry of Transport	30 June 2021
2.3.8	Introduction of selected innovation pilot concepts in transport, so called Proof of Concept	Ministry of Transport	31 December 2021
2.4.1	Evaluation of activities of the NBS Innovation Hub	NBS, MF SR	30 April 2020
2.4.2	Enhancement of the activity and position of the Centre for financial innovations	MF SR	30 June 2020, continuously
2.4.3	Analysing benefits and possible utilisation of the regulatory sandbox concept	MF SR, NBS	31 December 2020
2.4.4	Analysing needs for crowdfunding regulation	MF SR, NBS	31 December 2020

2.4.5	Analysing possible utilisation of tokenization of assets	MF SR	30 June 2020

3. We will improve abilities of the public administration to innovate and use data for the benefit of citizens

Measure designation	Name of the measure	Entities in charge	Deadline
3.1.1	Modernising and simplification of the legislation framework for data – preparation of the new act on data	ODPMII	31 December 2022
3.1.2	Build-up of a consolidated analytical layer and providing access to important analytical tools for the needs of public administration institutions to form public policies based on data	ODPMII	30 June 2022
3.1.3	Setting up the system for sharing spatial information	Ministry of Environment	31 December 2022
3.1.4	Testing utilisation of the blockchain technology in public administration on pilot projects	ODPMII	31 December 2021
3.2.1	Drafting the concept of innovation public-private partnership	ODPMII	31 December 2020
3.2.2	Setting up a laboratory for better services and digital innovations	ODPMII	31 December 2019
3.2.3	Implementation of activities of the behavioural innovations laboratory (BRISK)	ODPMII	31 December 2022
3.2.4	Setting up of methodological and evaluation unit and expert platform to support development of smart cities and regions	ODPMII	31 December 2020
3.2.5	Setting up an office for digital innovations in local government	DEUS	31 December 2022
3.2.6	Setting up the platform for finding innovative solutions	ODPMII	31 December 2022
3.2.7	Providing new opportunities for doing business and innovations of public services by means of open API	ODPMII	31 December 2022

4. We will support development of artificial intelligence

Measure designation	Name of the measure	Entities in charge	Deadline
4.1.1	Involvement of the Slovak Republic in the EU initiative for building European centres of excellence for artificial intelligence	ODPMII	30 June 2020, continuously

4.1.2	Setting up an expert group for coordination of educational activities in artificial intelligence	Ministry of Education, ODPMII	30 June 2020
4.1.3	Development of a tool for natural language processing	ODPMII	31 December 2020, continuously
4.1.4	Defining themes with the social need and preparation of pilot projects with a broad support of experts in artificial intelligence	ODPMII	31 December 2020, continuously
4.1.5	Defining and notification of calls for grant schemes for basic and applied research focused on artificial intelligence	Ministry of Education, ODPMII	31 December 2021, continuously
4.1.6	Introduction of joint education of experts about selected aspects of artificial intelligence	Ministry of Education, ODPMII	31 December 2020, continuously
4.2.1	Analysis of the regulatory environment for artificial intelligence	ODPMII	31 December 2019
4.2.2	Designing and supporting implementation of principles of transparent and ethical use of AI	ODPMII, Ministry of Economy	31 December 2020, continuously
4.2.3	Supporting the development of artificial intelligence ecosystem	ODPMII	31 December 2020
4.2.4	Setting up the permanent committee for ethics and regulation of artificial intelligence	ODPMII, Ministry of Economy	31. 3. 2020
4.2.5	Preparation of a manual for companies for deployment of artificial intelligence	ODPMII, Ministry of Economy	31 December 2020
4.2.6	Supporting an increase of investments of foreign and Slovak companies into research activities	ODPMII, Ministry of Education, Ministry of Economy	30 June 2020

Annex 1 – Ranking of Slovakia in the DESI index in 2019

ID			Indicator	Current state: 2019				
				Ranking of Slovakia	Slovak score	EU average	Best score	Best country
1			**Connectivity**	**23**	**52,6**	**59,3**	**73,6**	**Denmark**
1	a	1	Fixed Broadband coverage	25	88,0%	97,0%	100,0%	Cyprus
1	a	2	Fixed Broadband take-up	20	70,0%	77,0%	97,3%	Netherlands
1	b	1	4G Coverage	25	87,0%	94,0%	99,6%	Netherlands
1	b	2	Mobile Broadband take-up	18	88	96	162,6	Poland
1	b	3	5G Readiness	28	0,0%	14,0%	66,7%	Finland
1	c	1	NGA Coverage	17	86,0%	83,0%	100,0%	Malta
1	c	2	Fast broadband take-up	20	34,0%	41,0%	76,1%	Netherlands
1	d	1	Ultrafast Broadband coverage	11	80,0%	60,0%	99,9%	Malta
1	d	2	Ultrafast Broadband take-up	21	13,0%	20,0%	53,9%	Sweden
1	e	1	Broadband price index	8	90	87	94,1	Finland
2			**Human Capital**	**18**	**44,2%**	**48,0%**	**77,5%**	**Finland**
2	a	1	At least basic digital skills	12	59,0%	57,2%	85,2%	Luxembourg
2	a	2	Above basic digital skills	12	33,1%	31,2%	55,3%	Luxembourg
2	a	3	At least basic software skills	10	62,9%	60,0%	87,1%	Luxembourg
2	b	1	ICT Specialist	19	2,8%	3,7%	6,8%	Finland
2	b	2	Female ICT Specialist	23	0,8%	1,4%	3,1%	Finland
2	b	3	ICT Graduates	18	3,2%	3,5%	7,1%	Finland
3			**Use of Internet Services**	**20**	**47,9%**	**53,4%**	**74,1%**	**Denmark**
3	a	1	People who never used the Internet	15	13,3%	11,3%	1,7%	Denmark
3	a	2	Internet Users	19	78,5%	83,1%	95,2%	Denmark
3	b	1	News	18	77,3%	72,5%	93,0%	Lithuania
3	b	2	Music, Videos and Games	26	66,4%	80,6%	93,6%	Finland
3	b	3	Video on Demand	17	16,5%	31,3%	60,7%	Sweden
3	b	4	Video Calls	14	51,2%	49,2%	83,2%	Bulgaria
3	b	5	Social Networks	10	74,4%	65,4%	86,0%	Romania
3	b	6	Professional social networks	27	4,8%	15,4%	35,6%	Netherlands
3	b	7	Doing an online course	25	4,4%	8,8%	18,4%	Sweden
3	b	8	Online consultations and voting	25	4,3%	10,3%	32,9%	Luxembourg
3	c	1	Banking	17	61,9%	63,7%	94,0%	Finland
3	c	2	Shopping	9	70,9%	68,7%	87,2%	UK
3	c	3	Selling online	6	29,5%	22,7%	37,1%	Netherlands
4			**Integration of digital technology**	**21**	34,5	41,1	68,7	**Ireland**
4	a	1	Electronic Information Sharing	16	30,6%	33,8%	54,0%	Belgium
4	a	2	Social media	17	16,6%	21,4%	42,4%	UK
4	a	3	Big data	20	9,4%	12,3%	24,4%	Malta
4	a	4	Cloud	20	13,9%	17,8%	50,2%	Finland
4	b	1	SMEs selling online	19	12,5%	16,6%	30,8%	Denmark
4	b	2	e-Commerce turnover	14	11,0%	10,1%	26,0%	Ireland
4	b	3	Selling online cross-border	18	7,6%	8,4%	16,8%	Ireland
5			**Digital public services**	**21**	53,6	62,9	79,9	**Finland**
5	a	1	e-Government Users	19	54,0%	64,3%	93,1%	Sweden
5	a	2	Pre-filled Forms	22	35,1	57,9	100	Malta
5	a	3	Online Service Completion	24	79,4	87,4	100	Malta
5	a	4	Digital public services for businesses	21	79,9	85,1	100	Denmark
5	a	5	Open Data	8	73,6%	64,0%	87,8%	Ireland
5	b	1	e-Health services	15	16,0%	18,0%	49,0%	Estonia
5	b	2	Medical data exchange	28	10,0%	43,0%	98,0%	Denmark
5	b	3	e-Prescription	N/A	N/A	50,0%	100,0%	Sweden

OECD Going Digital Toolkit - ranking of Slovakia (data from 2016/2017/2018)

Toolkit indicators:

1. Access (to communication infrastructure, services and data)
2. Use (of digital technologies and data)
3. Innovations
4. Labour
5. Society
6. Trust (in digital environment)
7. Openness of the market

Indicator 1a: Access - Fixed broadband per 100 inhabitants				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
33rd (out of 37)	25.8	30.2	47	Switzerland

Indicator 1b: Access - M2M SIM cards per 100 inhabitants				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
19th (out of 34)	11.9	16.6	113.8	Sweden

Indicator 1c: Access - Mobile broadband per 100 inhabitants				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
26th (out of 37)	82.8	102.4	163.1	Japan

Indicator 1d: Access - Average monthly mobile data use, Gb				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
36th (out of 36)	0.74 Gb	3 Gb	15.9 Gb	Finland

Indicator 1e: Access - Share of households with broadband connection				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
26th (out of 36)	79%	85.50%	99.50%	South Korea

Indicator 1f: Access - Share of companies with broadband speed of 30 Mbps or more				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
23rd (out of 28)	33.40%	47.70%	74.90%	Denmark

Indicator 2a: Usage - Internet users				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
25th (out of 36)	80.50%	86%	99%	Iceland

Indicator 2b: Usage - users using internet connection for interactions with public authorities				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
28th (out of 37)	51.30%	56.80%	91.50%	Denmark

Indicator 2c: Usage - Internet users who purchased online in the past 12 months				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
13th (out of 39)	70.90%	64.20%	87.20%	UK

Indicator 2d: Usage - Share of small companies that made e-commerce sale in the past 12 months				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
26th (out of 34)	13.70%	20.60%	49.70%	New Zealand

Indicator 2e: Usage - Share of adults who reached level 2 or higher in solving problems in technological environment				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
17th (out of 24)	25.60%	30.60%	44.20%	New Zealand

Indicator 3a: Innovations - Investments in ICT as the percentage share in the GDP				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
26th (out of 26)	1.01%	2.37%	4.21%	Netherlands

Indicator 3b: Innovations - Expenditure on research and development in information sectors as the percentage share of the GDP				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*

34th (out of 39)	0.06%	0.57%	2.12%	Israel

Indicator 3c: Innovations - Venture capital investments in ICT sector as the percentage share of the GDP				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
22nd (out of 30)	0.000016	0.0184	0.1668	USA

Indicator 3d: Innovations - Share of start-ups (up to 2 years) in the total number of businesses				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
25th (out of 30)	14.70%	15.50%	Greece	25.30%

Indicator 3e: Innovations - Top 10% most quoted documents in computer science as the percentage share out of top 10% assessed documents				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
31st (out of 36)	4.59%	13.20%	24.80%	Luxembourg

Indicator 4a: Labour - IKT jobs in the labour market				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
24th (out of 29)	6.84%	12.40%	21.70%	Luxembourg

Indicator 4b: Labour - Share of digital demanding sectors in the total employment				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
30th (out of 41)	52.40%	50.20%	56.50%	Netherlands

Indicator 4c: Labour - Employees participating in vocational training for the job, as the percentage share of the total employment				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
22nd (out of 27)	45.80%	59.20%	76.40%	Finland

Indicator 4d: Labour - New university graduates in STEM majors as the percentage share of fresh graduates				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
33rd (out of 40)	21.10%	23,30%	36,00%	Germany

Indicator 4e: Labour - Public expenditure on active labour market policies as the percentage share of the GDP				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*

24th (out of 33)	0.16%	0.36%	0.92%	Hungary

Indicator 5a: Society - Percentage share of persons aged 55-74 years using the internet connection				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
27th (out of 35)	50.50%	65.30%	97.30%	Iceland

Indicator 5b: Society - Percentage share of Internet users in low-income households				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
17th (out of 35)	66.30%	72.50%	96.60%	Iceland

Indicator 5c: Society - Women who develop programs as the share in all 16-24-olds				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
16th (out of 27)	29.70%	28.00%	37.80%	Switzerland

Indicator 5d: Society - Percentage share of individuals using digital equipment at work				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
16th (out of 23)	25.00%	26.40%	38.00%	Iceland

Indicator 5e: Society - Performance of 15-old students in science, mathematics and reading				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
31st (out of 41)	9.69%	15.30%	25.80%	Japan

Indicator 5f: Society - Generated e-waste, in kilograms per inhabitants				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
31st (out of 42)	12.30%	17.44%	28.50%	Norway

Indicator 6a: Trust - Percentage share of Internet users who have come across misuse of personal information or violation of privacy				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
20th (out of 31)	2.62%	3.20%	7.80%	Chile

Indicator 6b: Trust - Percentage share of individuals who do not shop online due to concerns about safety of payments

Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
21st (out of 27)	14.40%	28.50%	67.50%	Portugal

Indicator 6c: Trust - Percentage share of individuals who do not shop online due to concerns about returning product				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
16th (out of 27)	14.80%	18.70%	48.30%	Portugal

Indicator 6d: Trust - Percentage share of companies that use predominantly inhouse capacities for their ICT security and data protection				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
21st (out of 24)	19.10%	23.70%	40.50%	Latvia

Indicator 7a: Openness of the market - Share of companies that do cross border e-commerce				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
15th (out of 26)	47.10%	45.30%	67.40%	Austria

Indicator 7b: Openness of the market - Share of mostly digital provided services in the market with end-user commercial services				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
29th (out of 36)	17.60%	30.80%	73.10%	Luxembourg

Indicator 7c: Openness of the market - Added value of digitally demanding services contained in exports of manufacturing as the percentage share of the added value of exports of manufacturing				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
10th (out of 44)	23.70%	24.90%	43.90%	Luxembourg

Indicator 7d: Openness of the market - Restrictions of the market with digital services				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
8th (out of 44)	0.10%	0.40%	0.49%	China

Indicator 7e: Openness of the market - Restriction regulatory index for foreign direct investments				
Ranking of Slovakia	*Slovak score*	*OECD average*	*Best score*	*Best country*
21st (out of 44)	0.05%	0.07%	0.32%	China