

STRATEGY AND ACTION
PLAN TO IMPROVE
SLOVAKIA'S POSITION IN
THE DESI INDEX
BY 2025

Digital Agenda Section
Institute of Digital and Development Policies

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Summary

The importance of digitization the economy and society as a result of global trends and in particular the current pandemic is undeniable. The COVID-19 crisis has forced all states to redirect an essential part of key societal activities to the digital world. It is this situation that has revealed the true level and effectiveness of national digitization. Unfortunately, it has often pointed to fundamental shortcomings that have made it impossible to fully exploit the potential of digital technologies to overcome this crisis.

At the same time, the digital transformation is key to strengthening the social and economic resilience of the European Union (EU) and its member states, their potential for sustainable growth and job creation. In particular, the development of digital skills at all levels is a prerequisite for ensuring that all Europeans can participate in society and reap the benefits of the digital transformation through education and skills reforms to support a transformed labour market and to develop and deploy key digital technologies.

Digitization is an inevitable phenomenon of time, but it is necessary to comprehensively prepare for it and to focus on the need for cross-cutting cooperation in the preparation of not only employees but also educational institutions (especially in the field of digital literacy) in the preparation of employees for the labour market.

The strategy and action plan to improve Slovakia's position in the DESI index until 2025 is a framework strategic document of the Slovak government that responds to the long-term trend of stagnation to decline in Slovakia's assessment in the Digital Economy and Society Index (hereinafter referred to as "DESI"). The Slovak Government committed itself to improving Slovakia's position in DESI in its programme statement of March 2020. However, this ambition is not an end in itself. Its importance lies not only in the nominal improvement of the Slovak score in DESI and bridging the long-standing gap between Slovakia and the vast majority of EU countries.

The primary vision is for **Slovakia to actively develop digital trends over the next five years and, thanks to innovation, to improve the lives of its citizens, the conditions for entrepreneurship and to make the most of the full potential that digitization provides across the economy and society.**

The DESI index serves as the main measurable indicator to compare the fulfilment of the EU's digital policy objectives, which also give Slovakia commitments. Moreover, given the very clearly articulated emphasis of the current European Commission on digitization, **DESI is becoming one of the key parameters for member states assessment**, e.g. from the point of view of formulating reform recommendations, which ultimately translates into the availability, prioritisation and amount of EU funding allocated to individual initiatives.

The DESI has become more important with the publication of a new EU Digital Strategy in March 2021 entitled "*The 2030 Digital Compass: the European way for the Digital Decade*". This strategy paper sets out the objectives in the four most fundamental areas of the global digital transformation. To these objectives, it also defines measurable indicators, which in most cases draw from DESI indicators. The objectives of the Digital Compass, and therefore their measurable indicators, should be translated into a legislative act in the course of 2021, making them legally binding for all EU Member States.

Despite the yearly gradual growth of the Slovak score in DESI, **Slovakia's location is stagnating or even falling within the last third of EU countries and oscillating around 20th place.** Since the first DESI report in 2015, Slovakia **has even ranked 22nd in DESI 2020 and the** gap with the overall EU average has widened by almost one whole point.

These trends show at least two basic facts – progress in the digitalization of Slovakia is taking place, but it has **only moderate growth** in most indicators year- **on-year, and this rate is not enough to catch up**

with those more digitally advanced EU countries that are progressing and growing much faster. This is indicated in particular **by the fact that the distance between the Slovak score and the EU average often varies very slightly and fails to significantly decrease or even widen the gap.**

At the level of the index dimensions assessed, none of them achieves or is not significantly close to the EU average score. For Slovakia, the digital public services dimension is clearly the worst rated dimension, where Slovakia ranks 25th on average in the EU. However, it is important to note that this dimension accounts for at least 15 % of the overall DESI score, as well as the Internet usage dimension. From the point of view of the DESI methodology, it is clear that connectivity and human capital dimensions have the greatest weight in a country's overall score. In addition to these, the dimension of the integration of digital technologies in enterprises contributes significantly to the score. **The increase in the overall Slovak score in DESI 2020 is largely related to an improvement in Slovakia's location in the connectivity dimension by three places while reducing the gap from the EU average.** On the other hand, the **human capital dimension, which was usually the best rated, has already seen a decrease in Slovakia's location by two places and a simultaneous decrease in scores. The digitalization dimension of businesses has stagnated for a long time, and in this case we are also following a widening gap from the EU average.**

It is therefore clear that Slovakia needs a stronger approach to digitalization and consistently push for practical initiatives and measures with a visible reform impact on the economy and society. We can also say that **it is not possible to continue to rely on spontaneous and natural progress in digitalization, as this will not ensure Slovakia's rapid adoption of innovations, which will lead to a widening gap compared to the leaders or even the European average.**

Slovakia's **fundamental ambition within five years should be to move from the last third of the DESI ranking to its center and thus reach the minimum EU average.** It is therefore necessary to strategically focus on such activities that will actually help to narrow the score gap between Slovakia and the EU average, and not only those that slightly increase scores in numerical terms. It is therefore crucial to reflect our shortcomings in the approach to digital transformation, which bring other countries a higher level of digital maturity and thus a better position in DESI.

Given the large scale of the issue, the active and systematic management of Slovakia's digitalization requires setting clear priorities. Based on an analysis of Slovakia's overall performance in DESI and its individual indicators, this strategy points to areas where the proposed measures have the potential to bring about the most significant positive change.

In the connectivity dimension, the improvement of Slovakia's position relies primarily on the **consistent implementation of all conclusions and priorities under the National Broadband Plan of Slovakia (hereinafter referred to as "NBP").** Of these, the primary need is to invest effectively in building an adequate performance electronic communications infrastructure and last mile connections that meet the objectives of the Gigabit society. In terms of connectivity coverage of at least 100 Mbit/s, the ambition is to outperform the EU average by connecting all households with at least 100 Mbit/s for downloading data with the possibility to extend to 1 Gbit/s and socio-economic interactions⁴⁵ by connecting at least 1 Gbit/s. We expect an increase in the overall take-up rate of fixed broadband between 1 and 2 percentage points per year, allowing the EU average in DESI 2025 to be reached.

In the context of the **human capital** dimension for the digital era, it will be crucial to **achieve a cross-sectoral approach to the development, approval and effective implementation of the National Digital Skills Strategy and the Lifelong Learning Strategy.** There is a need to put even more **emphasis on specific groups of people most lacking digital skills.** These include, for example, **seniors,** but also **low-income groups of working age, who are most vulnerable to the automation** of their professions. For this reason, there is an acute need for a clear vision of lifelong learning, with systematic support from

the state. A wide range of digital skills must be an integral part of lifelong learning, including rules on safe use of the Internet and cybersecurity principles. Slovakia also needs to **actively act towards increasing the share of women working in the Information and Communication Technology (ICT) sector**. Initiatives to build advanced digital skills need to specifically address and include women. In order to avoid brain drain in the group of ICT specialists with a high level of digital skills, attention will be paid to **supporting STEM studies at all levels of education**. Emphasis will be placed on maintaining ICT doctoral students in STEM disciplines and creating favourable conditions for their work in Slovakia.

In terms of **the level of use of internet services** evaluated by the third dimension, the State has significantly limited possibilities to support its increase through specific activities. The dimension depends on the assumptions that create the previous two dimensions for its positive development. Without adequate skills and access to internet connectivity, a significant increase in the motivation of citizens to exploit the full potential offered by the internet cannot be expected. **However, by actively and efficiently communicating and popularizing the benefits and possibilities of the Internet, the state can contribute to increasing the number of regular internet users** in order to reduce as much as possible the number of people who have never used the internet before.

Improving scores in **the digital integration dimension** requires first and foremost support for the uptake of innovation at the level of small and medium-sized enterprises (SMEs). The use of technology will enable them to make their own operations more efficient, to improve access to customers and to expand online sales opportunities. One of the instruments to achieve this objective will be **aid schemes for SMEs aimed at reimbursing the costs associated with the deployment of technologies**. Building digital skills specifically for entrepreneurs, which can be supported **through the European Digital Innovation Hubs (ECDI)**, is also a prerequisite for the digitalization of businesses. In addition, the strategy focuses on promoting technological transfer from the research environment to examples of good practice in innovative entrepreneurship. This goal will be **helped by the establishment and development of platforms for research, development and application of innovation** in prospective areas of the Slovak digital economy.

Digital public services in Slovakia often appear on the tails of the rankings in international comparisons. Given that the fifth dimension of DESI is closely linked to the evaluation of eGovernment Benchmark, meaningfully targeted measures will contribute in parallel to improving the evaluation of Slovakia in both indices. Based on DESI, there is a need **to increase the number of users of digital public services**. Despite the expected changes in the definition of the indicator, which will only contribute to a slight increase in the number of users, it is necessary to continue to **work on the quality of the user experience of electronic services**. This parameter is becoming increasingly important in a number of international evaluations. DESI indicators and attributes should be linked to the prioritisation of the services and functionalities that are being improved. **The relevant strategic documents should reflect the indicators on the basis of which Slovakia is evaluated**. From the DESI perspective, **it is crucial to improve the use of data held by the state so that it is effective and as proactive as possible**. Complementary and coordinated activities in this area will allow for a visible shift in Slovakia in this dimension. The strategy therefore puts emphasis on **improving data quality, interconnecting central registers, improving the functionalities of the Open Data Portal, as well as making available and actively using analytical data**.

These strategic priorities are translated into specific tasks and actions under each dimension, which are clearly set out in Annex 1: *Action plan to improve Slovakia's position in DESI*. In general, we consider the full duration of this strategy to be implemented, and we expect their impact on the evaluation of Slovakia to be expressed in terms of the index methodology at the earliest in DESI 2025.

Given the complexity of the indicators evaluated by DESI, the improvement of the Slovak position in the ranking **requires a coordinated initiative aimed at almost all areas of digitalization**. Only this can

then be cumulatively reflected in the overall DESI assessment. The strategy has been primarily designed as **an extension and linkage of a number of already existing or planned national initiatives and measures** that need to be **implemented efficiently, in parallel and in a coordinated manner** in order to achieve the desired final goal. The document is therefore intended to serve as a platform integrating these activities into a coherent process and subsequently identifying missing components and proposing complementary measures.

A number of strategic actions already taken will undoubtedly improve the various DESI indicators. However, the process of their implementation will benefit from the ongoing coordination of all relevant bodies of these measures. As part of this process, it would be appropriate to continuously monitor the impact of the measures on the evaluation of Slovakia in the relevant DESI indicators and propose corrections if necessary. This process should also include a systematic reflection on the annually published DESI results, which should be reflected, if necessary, in appropriate changes in the design and implementation of measures.

The ambition to move Slovakia to higher positions in DESI must be cross-cutting across all relevant innovation agendas. Improving Slovakia's position in DESI requires that the upcoming national strategy papers in the field of digitalisation reflect the indicators measured by this ranking. At the same time, the results of the analysis of the evaluation of Slovakia in DESI and the evolution of its position in it, presented by this strategy, should become decisive for the future setting of objectives and priorities of digitalization at national level. Their meaningfulness should also be assessed in terms of how their results will contribute to improving the evaluation of Slovakia in DESI and other international indices.

In the case of coordinated and consistent implementation, we expect a positive impact on the evaluation of the specific indicators on which the measures are being followed. Consequently, this improvement will be cumulatively reflected in the Slovak score in this dimension and in the overall location of Slovakia in DESI.

1 Introduction

Since 2015, the European Commission has published an annual assessment report on the level of digitalization in the EU, entitled 'Digital Economy and Society Index (DESI)'. DESI aims to evaluate the overall level of digitization of the economy and society of each EU Member State, as well as the five dimensions of digitalization that DESI pursues. From the results of the evaluation, each state can identify underdeveloped and problematic areas of digitalization that need more attention and effective steps towards improvement. At the same time, thanks to the evaluation of all EU countries, the EC can also compare Member States with each other.

DESI's ambition is to serve as a measurable indicator of the delivery of European digital policies. In February 2020, the EC published new Digital Strategy Papers that set out the priorities and objectives for the further development of the EU's Digital Single Market. Given the growing importance of digitalization for the EU's competitiveness, the importance of assessing Member States from the DESI perspective is also increasing. The index has gradually become an important indicator, often in many policy decisions.

A new EU Strategy Paper, "*The 2030 Digital Compass: European Way for the Digital Decade*", of March 2021, targets in the four areas of the global digital transformation – digital handheld populations and highly qualified ICT professionals, digital infrastructure (including gigabit connectivity for each household and coverage of all populated 5G areas), digital transformation of businesses (with a focus on cloud, AI, large-scale data processing) and digitalisation of public services (including e-identification and eHealth tools). All these areas have been evaluated by DESI for a long time and therefore most measurable indicators draw on DESI indicators for these objectives. The objectives of the Digital Compass, and therefore their measurable indicators, should be translated into a legislative act in the course of 2021, making them legally binding for all EU Member States.

The improvement of the position in DESI is also in the interest of Slovakia, not to mention the appreciable contribution to residents and entrepreneurs that a concerted initiative can bring to this end. However, this commitment can only be achieved through a coordinated set-up of digitization projects and activities that are logically linked and complementary. Synergistically, it will be possible to achieve the overall effect of moving Slovakia to the higher ranks of the DESI ranking.

On the basis of the above mentioned starting points, the Ministry of Investment, Regional Development and Informatization (MIRRI) has developed a strategy which, based on a thorough analysis of the evaluation of Slovakia throughout the existence of DESI, identifies priority areas of lagging behind. To them, the strategy then identifies strategic priorities and instruments to meet them among existing or planned measures, but also by proposing new ones. It should be borne in mind that the strategy should also be seen as sufficiently flexible in view of the rapid technological developments that will undoubtedly occur during its implementation period. For this reason, attention should also be paid to the recommendations and conclusions of the analysis, to which the Strategy is currently not responding directly with concrete measures. These conclusions should be seen as principles that can be applied flexibly when planning and prioritizing future initiatives in the areas of digitalization addressed by DESI.

The document defines strategic priorities within each dimension:

Connectivity

- efficient electronic communications infrastructure;
- interdepartmental coordination mechanisms for necessary changes and implementation of legislation, as well as market development and investment.

Human capital

- lifelong learning with a focus on digital skills for all groups of the population;
- creating favorable conditions for maintaining ICT graduates on the Slovak labour market.

Use of Internet services

- increase the motivation and confidence of citizens in the possibilities offered by the Internet.

Integration of digital technologies

- building the digital skills of entrepreneurs and raising awareness of the possibilities of using digital technologies in different business areas;
- promoting technological transfer within industrial and innovation clusters from the research environment to concrete examples of best practice in business.

Digital public services

- efficient and active re-use of government data in the provision of digital services and for analytical purposes;
- improving and modernizing the public administration's open data publication process through the national open data portal;
- increasing the share of digitalized public services based on prioritization criteria.

Within the scope of this strategy, we mainly work with the term “digitalization” and less with the commonly used term “informatization”. We see the reason especially in the trend of more intensive extension of this term in the use of the lay but also in the professional public in the Slovak language in recent years. The meaning of this term is much broader today (in 2020) compared to its traditional connotations, which represented a rather technical process of transitioning from analogue to digital environment. Digitalization can therefore be seen as a complex process that, beyond its original semantics, reflects the areas of connectivity, skills, security, economic and social development, or public administration in a broader context.

1.1 Purpose of the strategy

The implementation of digital technologies in society is one of the central priorities of the European Union and the policies pursued by the European Commission. Member States' progress is monitored by the Digital Economy and Society Index (DESI), compiled in the form of rankings, both compositely and on a component-by-component basis. In the programme statement of the government in March 2020, the Government of the Slovak Republic committed itself to improving Slovakia's position in the digitalization of the state and society: “The Government of the Slovak Republic will prepare a strategy and action plan for the 2020-2024 parliamentary term in order to significantly improve Slovakia's position [in the DESI ranking].

This strategy will serve as a tool for a more consistent perception of the broader relationships of the observed dimensions of DESI and their impact on the digitalization of Slovakia. For competent authorities, including MIRRI, it is, inter alia, a guide and an interesting data source for a more targeted preparation of future strategy papers and action plans.

1.2 Context of the Strategy

Progress in digitalization is not only one of the top priorities of the last two terms of the European Commission¹, but also a topic of global importance. Digitalization has the potential to improve and simplify the lives of the citizens of the country and significantly shift its economy. It is therefore clear that it is in Slovakia's best interest to move forward in the degree of digitalization of the economy and society.

Although Slovakia's overall score in DESI is growing annually, this growth is not sufficient to move the country to the top of the index and, in many cases, to the EU average. Overall, Slovakia ranked 22nd (2020), 21st (2019), 20th (2018), 20th (2017), 21st (2016) and 20th (2015) in recent years. Thus, 2020 was the weakest year ever for Slovakia

European Commission¹ Strategy Papers 2020-2024: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age_en

in DESI.

The start of the new programming period 2021-2027, the priorities of the new EU Multiannual Financial Framework 2021-2027, as well as the additional funding available under the EU Recovery Instrument (Next Generation EU) in the context of the COVID-19 pandemic and the subsequent preparation and submission of the National Recovery Plan, as well as the preparation of the new National Concept for Informatization of Public Administration (NKIVS) are ideal moments for a fundamental assessment of Slovakia's digital policies. It is these circumstances that enable and require the active, targeted and more precise targeting of specific measures to improve the preconditions for further digitalization of Slovakia. Analysis of Slovakia's evaluation so far in DESI and its identified shortcomings should be one of the basic sources for an informed identification of priorities in the field of digitalization.

The current global COVID-19 pandemic has highlighted the necessity of digital solutions as a fundamental backbone for enabling the economy and society to function even in conditions of physical isolation. These experiences and lessons have significantly strengthened global trends in the digitalization of society. For this reason, substantial changes can also be expected in the position of States in the DESI evaluation. In particular, the digital skills of the population are at the forefront in the digitalization process, which are essential for any electronic communications infrastructure and the availability of digital technologies to deliver the expected effects on the economy and society.

1.3 Users of the strategy

The primary implementers of the Strategy and Action Plan to improve Slovakia's position in the DESI by 2025 are MIRRI and the departments responsible for implementing the measures defined in Chapter 4. However, the extensive information analysis underlying this strategy is also a useful resource for other public administrations as well as for the wider professional public interested in the current direction of the digital society in Slovakia compared to developments in the EU. Transforming the data provided in DESI into useful information to shape recommendations may not always be straightforward, so we recommend that the accompanying information contained in the annexes of this material also be taken into account for further study of the issue.

1.4 Current relevant strategy papers

The Government of the Slovak Republic and the relevant ministries have adopted a number of strategic documents focused on the areas measured and evaluated by DESI. The mapping of the currently set targets and measures was important in the development of this strategy, especially in order to avoid duplication of the same or similar measures. At the same time, the preparation of the strategy was a good opportunity to rethink and improve some of the already existing measures and objectives.

The position of Slovakia in DESI is and will be influenced by the quality of the achievement of the objectives in the following strategic documents:

- Digital Transformation Strategy for Slovakia 2030
- Action Plan for the Digital Transformation of Slovakia 2019-2022²
- Draft national priorities for the implementation of the 2030 Agenda³
- Vision and strategy for the development of Slovakia up to 2030 – long-term strategy for sustainable development of the Slovak Republic – Slovakia 2030 – new text⁴
- National Concept of Informatization of Public Administration of the Slovak Republic⁵

2 Available at: https://www.vicpremier.gov.sk/wp-content/uploads/2019/07/Akcny-plan-DTS_2019-2022.pdf

3 Available at: <https://rokovania.gov.sk/download.dat?id=BAE2DA078C09473CB6D5858B521AD27F-7DC9664FBC4DBF45B991ED9C9B9117FA>

4 Available at: <https://rokovania.gov.sk/RVL/Material/25655/1>

5 Available at: <https://www.mirri.gov.sk/sekcie/narodna-koncepcia-informatizacie-verejnej-spravy-nikvs/index.html>

- Revision of IT expenditure 2.06
- Operational Programme Integrated Infrastructure⁷
- Smart Industry Action Plan of the Slovak Republic⁸
- Economic Policy Strategy of the Slovak Republic up to 2030⁹
- Strategy and action plan for accessing and using open government data¹⁰
- National Broadband Plan of Slovakia
- Supporting the development of 5G networks in Slovakia for 2020-2025

This strategy also mentions documents that are in working versions and have not been approved by the government. Annex 1 of this strategy provides a clear list of the various strategy documents currently in force, which relate to the areas of digitalization evaluated by the DESI. It also provides an assessment of the achievement of objectives and established measurable indicators linked to dimensions and DESI indicators.

2 Analysis of the DESI index and the position of Slovakia

2.1 DESI and its methodology

Every year, the European Commission monitors the progress and level of development of the EU's digital competitiveness in individual Member States through the Digital Economy and Society Index (DESI). The EC developed DESI based on OECD recommendations¹¹ and published for the first time in 2015. Thanks to DESI, it is possible to monitor the progress of a country in different dimensions, to compare the performance of different countries and to identify areas where the country is lagging behind and where there is room for improvement.

2.1.1 Structure of DESI

DESI is a composite index composed of three levels – *dimensions* broken down into *subdivisions* containing individual *indicators*. The five main dimensions of DESI are essential policy areas for the digital transformation of the economy and society. DESI evaluates the level of digitization of the state in the following dimensions: 1. connectivity, (2) human capital, (3) the use of internet services, (4) the integration of digital technologies (in enterprises) and (5) digital public services.

Dimensions are interrelated, and interventions in one of them usually necessitate the creation of assumptions in another or cause consequences that need to be taken into account in the future progression in the other dimensions.

While the list of the five dimensions of the DESI has remained unchanged since the introduction of the index, the selection and number of indicators are subject to slight changes each year to reflect technological progress, the strategic priorities of EU digital policies, as well as the availability of reliable data to evaluate them¹². In general, however, the EC declares its efforts to interfere with the structure of the index as little as possible in order to maintain the time series of data collected and their comparability. In 2020, the index consisted of 37 indicators in five main dimensions.

Table 1: Overview of index structure in 2020

6 Available at: https://www.mfsr.sk/files/archiv/39/Informatizacia2.0_reviziavydavkov_20200320.pdf

7 Available at: <https://www.opii.gov.sk/>

8 Available at: <https://www.mhsr.sk/uploads/files/8U6RKSS5.pdf>

9 Available at: <https://rokovania.gov.sk/RVL/Material/23019/1>

10 Available at: https://www.slovensko.sk/img/CMS4/strategia_otvorene_udaje.pdf

Dimension	Weight of dimension	Subdimensia	Weight of subdimension	Indicator	Indicator weight
1 Connectivity	25 %	1a Fixed broadband usage	25 %	1a1 Overall fixed broadband take-up rate	50 %
				1a2 Fixed broadband take-up rate of at least 100 Mbps	50 %
		1b Fixed broadband connection	25 %	1b1 Fast broadband coverage (NGA)	50 %
				1b2 Very High Capacity Fixed Network (VHCN) coverage	50 %
		1c Mobile Broadband	35 %	1c1 4G coverage	25 %
				1c2 Mobile broadband take-up rate	25 %
				1c3 Ready to deploy 5G networks	50 %

^{OECD} Handbook on constructing composite indicators: methodology and user guide: <https://www.oecd.org/els/soc/handbookonconstructingcompositeindicatorsmethodologyanduserguide.htm>

¹² Overview of DESI indicators and their definitions: <https://digital-agenda-data.eu/datasets/desi/indicators>

		1d Broadband Price Index	15 %	1d1 Broadband price index	100 %
2 Human capital	25 %	2a Skills of Internet users	50 %	2a1 At least basic digital skills	33 %
				2a2 More than basic digital skills	33 %
				2a3 At least basic software skills	33 %
		2b Advanced skills and development	50 %	2b1 ICT specialists	33 %
				2b2 ICT specialists	33 %
				2b3 ICT graduates	33 %
3 Use of Internet services	15 %	3a Use of the Internet	25 %	3a1. People Who Never Used the Internet	50 %
				3a2. Internet users	50 %
		3b Online Activities	50 %	3b1. News	16.6 %
				3b2. Music, Videos & Games	16.6 %
				3b3. Video on Demand	16.6 %
				3b4. Video calls	16.6 %
				3b5. Social networks	16.6 %
		3c Transactions	25 %	3b6. Participation in online courses	16.6 %
				3c1. Banking	33 %
				3c2. Shopping	33 %
4 Integration of digital technologies	20 %	4a Digitalization of businesses	60 %	3c3. Selling online	33 %
				4a1 Electronic sharing of information	16.7 %
				4a2 Social media	16.7 %
				4a3 Big data	33.3 %
		4b e-commerce	40 %	4a4 Cloud	33.3 %
				4b1 Online sale of SMEs	33.3 %
				4b2 Turnover of e-commerce	33.3 %
5 Digital public services	15 %	5a eGovernment	100 %	4b3 Cross-border online sales	33.3 %
				5a1 eGovernment users	20 %
				5a2 Pre-filled forms	20 %
				5a3 Online service provision	20 %
				5a4 Digital public services for businesses	20 %
				5a5 Open data	20 %

A detailed analysis of all DESI indicators across all five dimensions is available in Annex 2, which contains detailed information on the evolution of Slovakia's scores in each of the indicators, as well as details of the data collection for their evaluation.

- ④ The five dimensions of DESI – *connectivity, human capital, use of internet services, integration of digital technologies and digital public services* – are core areas of digital policies that are interdependent and interlinked in the digital transformation process.
- ④ Each of the dimensions consists of sub-indicators that reflect the strategic objectives and priorities of European policies in a given area, as well as the state-of-the-art ways to achieve them. These are measurable indicators indicating the level of a given dimension.
- ④ The highest emphasis and therefore weight in the overall score in DESI is the quality and availability of a stable internet connection and the level of digital skills in the general population, as well as the creation

of sufficient human resources for the ICT sector.

Dimension 1 Connectivity

The availability of internet connectivity for all its members is a prerequisite for the development of a digital society. High-speed internet connectivity, which today belongs to the modern infrastructure of the digital economy and society, is essential to fully benefit from the comprehensive capabilities of today's digital services.

The first dimension of DESI monitors the rate and development of internet connectivity in EU member states. By its very nature, the dimension focuses primarily on fixed and mobile broadband. The dimension is divided into four subdivisions, each focusing on the relevant aspect of Internet connectivity.

Dimension 2 Human Capital

In addition to sufficient electronic communications infrastructure, the efficient functioning of a truly digital society requires members of society who are able to exploit all the possibilities offered and the full potential of digital technologies. This requires investing in human capital and building digital skills across all groups of the population. Digital education is becoming a precondition for social justice, equal participation of all citizens in democracy and equal opportunities to participate in social processes in the digital age. Education in the digital age is also a prerequisite for the future global competitiveness of the EU and each of its Member States. Only such training will lead to sufficient skilled workers who are prepared for future employment and the labour market equally changing due to the integration of digital technologies.

The second dimension of DESI assesses the general level of digital skills in the population, as well as the development of the available skilled workforce for the digital age, in the form of a number of ICT graduates and a number of specialists working in the ICT sector. The level of digital skills ranges from basic skills that enable individuals to participate in the digital society and consume digital goods and services, to advanced skills that strengthen the workforce in the development of new digital goods and services.

The current COVID-19 pandemic has shown very well how important digital assets are for the economy, as well as the ability to fully cater for their private needs in conditions where digital tools are the only way to participate in society. Thus, basic and advanced digital skills are fundamentally impacting and shaping society as a whole. Connecting to the Internet or owning the necessary hardware is simply not enough. They must be paired with appropriate abilities.

Dimension 3 Use of Internet services

The third dimension of DESI evaluates the level of internet use and selected online activities of the population. This dimension is closely linked to the first dimension (connectivity) and the second dimension of DESI (human capital), as accessibility and thus covering the country with the necessary electronic communications infrastructure is crucial for the very use of the internet. At the same time, a certain level of digital skills is essential for online activities and transactions.

Dimension 4 Integration of digital technologies

The fourth dimension of DESI monitors the integration of digital technologies into society and the business environment. Performance in this dimension describes how technologies built within previous dimensions become an integral part of society and find applications in the daily lives of citizens and entrepreneurs.

Dimension 5 Digital Public Services

The fifth dimension of the DESI index evaluates digital public services provided by the state to citizens and entrepreneurs. The aim of the dimension is to map supply and demand for digital public services across the EU. Their evaluation is intended to serve as an incentive to harness the full potential of modern technologies in public administration. The expected result is greater efficiency, cost and time savings on the part of the state and users, while promoting transparency and openness in the exercise of public authority.

The digital public services dimension weighs (share) 15 % of the state's overall score in the DESI index, making it one of the least important dimensions together with the third dimension (use of internet services). This is because, from an index point of view, these two dimensions are more or less the result of fulfilled assumptions, which are assessed mainly in the first two dimensions.

2.1.2 Weight of dimensions and indicators on total DESI score

For the calculation of the aggregate score for the entire DESI for each country, the weight of individual indicators and dimensions is significant. An overview of the allocated weights for each dimension and indicator is provided by the table in the previous chapter. Dimensions and indicators have different weights given their importance for increasing the level of digitalization of the economy and society. They also reflect the EU's priorities in digital policies and therefore attach greater importance to the trends and technologies that the EU wants to promote the most. In this way, Member States are encouraged to pay more attention to improving these indicators. Last but not least, more advanced technologies are given more weight than indicators evaluating the relatively basic assumptions of digitalization.

The varying share of individual dimensions and indicators in the country's final score in DESI allows governments to tactically focus on selected key areas of digitalization in order to improve their ranking as significantly as possible.

2.1.3 Data sources used in DESI

DESI indicators are evaluated on the basis of empirically measurable data collected by the EC through multiple sources. Most often, data for the DESI evaluation are collected through Eurostat questionnaires. In addition, however, some data are collected by the EC Communications Committee (COCOM). Data that the EC cannot collect or evaluate on its own comes from externally contracted studies such as *Broadband in Europe*, *Broadband prices in Europe*, *eGovernment Benchmark* and *studies of the European Data Portal*.

An overview of the sources from which DESI draws data for the evaluation of individual indicators is illustrated by the following table. A more detailed description of their methodology is given individually for each source in the text below the table.

Table 2: Overview of DESI resources

Source	Dimension	Indicator
Eurostat: Use of ICT in households and individuals	1 Connectivity	1a1 Overall fixed broadband take-up rate
		1a2 Rate exploitation fixed broadband connections speed of at least 100 Mbit/s
	2 Human capital	2a1 At least basic digital skills
		2a2 More than basic digital skills
		2a3 At least basic software skills
	3 Use of Internet services	3a1. People Who Never Used the Internet
		3a2. Internet users
		3b1. News
		3b2. Music, Videos & Games
		3b3. Video on Demand
		3b4. Video calls
		3b5. Social networks
		3b6. Participation in online courses
		3c1. Banking
3c2. Shopping		
3c3. Selling online		
5 Digital public services	5a1 eGovernment users	
Eurostat: Use of ICT and e-commerce in enterprises	4 Integration of digital technologies	4a1 Electronic sharing of information
		4a2 Social media
		4a3 Big data
		4a4 Cloud
		4b1 Online sale of SMEs
		4b2 Turnover of e-commerce
		4b3 Cross-border online sales
Eurostat: Labour Force Survey	2 Human capital	2b1 ICT specialists
		2b2 ICT specialists
Eurostat: Administrative data on education	2 Human capital	2b3 ICT graduates
EC Communications Committee (COCOM)	1 Connectivity	1a2 Fixed broadband take-up rate of at least 100 Mbps
		1c2 Mobile broadband take-up rate
		1c3 Ready to deploy 5G networks
	1 Connectivity	1b1 Fast broadband coverage (NGA)
		1b2 Very High Capacity Fixed Network (VHCN) coverage

Broadband coverage in Europe ¹¹		1c1 4G coverage
Broadband prices in Europe ¹²	1 Connectivity	1d1 Broadband price index
eGovernment Benchmark ¹³	5 Digital public services	5a2 Pre-filled forms
		5a3 Online service provision
		5a4 Digital public services for businesses
European Data Portal ¹⁴	5 Digital public services	5a5 Open data

For the evaluation of individual DESI indicators, it is crucial that data collection is carried out on a regular basis and in a uniform standardised form for all Member States. The reliability and accuracy of the data is also important. Nevertheless, it happens that some indicators work with outdated data or had to be discarded at the last minute due to the unavailability of the necessary data in time. Member States have repeatedly called for national institutions to be a priority source of data and that these hard data are subsequently processed and evaluated in a transparent manner on the basis of previously known methodologies and formulae.

Eurostat questionnaires

The Commission evaluates the absolute majority of DESI indicators on the basis of data collected by Eurostat. Eurostat collects data from national statistical institutes. In doing so, most DESI indicators rely primarily on two annual questionnaire surveys – *ICT use in households and individuals* and *ICT and e-commerce use in enterprises*. Respondents to the first questionnaire are a representative sample of households with at least one member aged 16-74. In the case of enterprises, questionnaires are delivered to a representative sample of companies with 10 or more employees registered in the Slovak Republic. In Slovakia, the Statistical Office of the Slovak Republic (hereinafter referred to as the Statistical Office of the Slovak Republic) covers the implementation of these regular surveys. Each year, Eurostat receives a uniform questionnaire for all countries. It will then provide its translation and preparation for use in the survey in Slovakia.

Both questionnaires are divided into several thematic modules with several questions. Depending on the frequency of the indicator survey, some modules in the questionnaire appear only in even or odd years (especially in the case of the questionnaire for enterprises) or at a different frequency. Questions are formulated in the questionnaires by the working groups within Eurostat, where the content is discussed by representatives of the national statistical institutes¹⁵.

However, according to the Commission’s assessment, this process is quite separate from expert discussions on EU digital policies, which leads to the fact that the content of the questionnaire is not sufficiently updated in light of technological and societal trends and the strategic objectives pursued by EU digital policies. The EC itself therefore repeatedly appeals to Member States to ensure this expert coordination at national level and to provide expert input to representatives of their statistical institutes. The timing of their preparation also causes problems with the relevance of the content of the questionnaires. The composition of modules and

¹¹ Annual study for the EC carried out by a consortium of suppliers IHS Markit, Omdia and Point Topic.

<https://op.europa.eu/en/publication-detail/-/publication/077cc151-f0b3-11ea-991b-01aa75ed71a1>

¹² Annual study for EC implemented by Empirica. <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2019>

¹³ Annual study for EC realised by Capgemini <https://ec.europa.eu/digital-single-market/en/news/egovernment-benchmark-2020-egovernment-works-people>

¹⁴ Study “Maturity of Open Data” <https://www.europeandataportal.eu/en/impact-studies/open-data-maturity>

¹⁵ More information on the details of the Eurostat methodology, as well as a link to all existing and upcoming versions of the questionnaires, is available at <https://ec.europa.eu/eurostat/web/digital-economy-and-society/methodology>

question formulations is being discussed in Eurostat approximately two years before the questionnaire is used for the survey. This preparatory phase lasts about a year and therefore the content of the questionnaire is finalised one year before it is used. Last but not least, the complicated formulation of questions in the questionnaire itself may contribute to the inaccuracy of the collected data, which ultimately does not reflect reality. It can start with the original questionnaire itself and its English template, but also with an inaccurate translation of questions into national languages, as pointed out by a number of Member States. Given the subject matter of the questionnaires and their professional terminology, this process also requires expert input from a digital policy perspective.

Broadband coverage in Europe

The Broadband Coverage study in Europe is designed to monitor the progress of EU Member States in meeting the specific broadband targets set out in the *Digital Agenda for Europe*, with a focus on “universal broadband coverage of at least 30 Mbps by 2020” and “covering 50 % of households with broadband connections of at least 100 Mbps by 2020”. The current methodology of the study has been used for the seventh consecutive year.

The study monitors household coverage across nine types of technology¹⁶, four speeds¹⁷ and three combinations of coverage:

- Total broadband coverage: combination of DSL, VDSL, FTTP, DOCSIS 3.0 standard cable modem (including DOCSIS 3.1) and FWA
- Next Generation Connection (NGA) coverage¹⁸: combination of VDSL, FTTP and DOCSIS 3.0 standard cable modem (including DOCSIS 3.1)
- Very High Capacity Network (VHCN) coverage¹⁹: combination of DOCSIS 3.1 and FTTP

The study was originally intended only as an evaluation of fixed broadband connections and therefore, e.g. mobile LTE networks were not included in the assessment of coverage at available speeds, although they have achieved the same quality and speed as fixed connections in recent years. However, in the 2018 study, the research team also added parameters for assessing the average LTE coverage²⁰. The study assesses the coverage of households and/or users by LTEs provided by all electronic communications network operators (hereinafter referred to as network operators) on a given national market. The average coverage is then calculated as the arithmetic average per network operator in a country. This methodology puts countries with more network operators at a disadvantage on the market, although such a competitive environment incentivises price and quality competition that is beneficial to the consumer. Smaller network operators that do not play a significant role in a given coverage reduce the country’s scores. Therefore, for example, it would be preferable to use a weighted average depending on the network operator’s national market share, or to take into account only the few largest network operators that achieve a certain pre-defined market share.

The study collects coverage data at national,²¹ regional²² and rural level²³. The preparation of the study has three phases:

1. Collection of data on coverage of all nine technologies at all three levels through questionnaires for

¹⁶DSL, VDSL, VDSL with vectoring, DOCSIS 3.0, DOCSIS 3.1, FTTP, FWA, LTE, and satellite
¹⁷ 17 Mbit/s, 30 Mbit/s, 100 Mbit/s and 1 Gbit/s (download)

¹⁸Corresponds to indicator 1b1 in the first dimension of DESI for connections of at least 30 Mbit/s when downloading.

¹⁹Corresponds to indicator 1b2 in the first dimension of DESI

²⁰Corresponds to indicator 1c1 in the first dimension of DESI

²¹total of 31 countries – in addition to the EU, Switzerland, Iceland and Norway

²²Defined as NUTS3. A total of 1,362 regions are the subject of the study in all 31 countries.

²³A rural household is defined as located in an area with a population of less than 100 inhabitants/km².

network operators and national regulatory authorities and from alternative sources (network operators' websites, annual reports, white papers, available studies by consulting companies, press releases, etc.)

2. Estimation of coverage of combinations of technologies and speeds
3. Preparation of a report on average coverage in the EU and at national level and creation of a regional data base

The data collected in the questionnaire are verified through the above-mentioned additional sources, which also complement the potentially missing information. Both the questionnaire and the range of respondents are only slightly updated year by year in September. Data collection takes place in parallel between October and December. National regulators have the possibility to validate their country's collected data. Between January and March, data are then evaluated, integrated, estimated for combinations of technologies and speeds, finalising the database. The final step is the formulation of conclusions, the publication of the study and the final datasets.

The standard data integration formula shall be based on the average of the minimum possible coverage (coverage of the most widespread technology or network operator in the area) and the maximum possible coverage (sum of coverage of all technologies or network operators considered, or equal to 100 %, whichever is higher). The modified formula is applied where the coverage of some technology is more complementary than overlapping other technologies.

Data shall be evaluated and integrated on a case-by-case basis for each of the nine technologies under review at regional level, taking into account possible overlaps in the coverage of multiple technologies in one territory. Consequently, combinations of technologies are also calculated at regional level. Data on speeds shall be integrated at national level.

Broadband prices in Europe

Initially, two studies were carried out separately for fixed broadband²⁴ and mobile broadband²⁵. The mobile connection study evaluated and compared the prices of seven consumer baskets defined using the OECD methodology²⁶ with different speeds and products. It should be noted that these baskets are not fully representative for all countries²⁷ within the scope of the study, as in some countries network operators sell much larger packages with more downloads. Moreover, the most advanced markets do not offer services with a small amount of downloads.

According to the methodology of the study, the three largest MNOs in each country were ranked by market share. The combined market share shall be at least 70 %. Prices of the two largest network operators (Orange and Slovak Telekom) are compared in Slovakia. In other countries, price baskets are mostly compared for 3 network operators. In addition, the study also assesses the offers of five internet service providers, which together hold at least 90 % of the market share. The selection of the network operators and providers assessed is validated by the national regulator of the Office for the Regulation of Electronic Communications and Postal Services (hereinafter referred to as 'RA').

The Fixed Connection Study included the five largest Internet Service Providers (ISPs) in each country. In Slovakia it is Slovak Telekom, Antik, Orange, SWAN and UPC. The data was collected from the IPS website between 8 and 22 October 2018. Four packages of internet services were analyzed: standalone Internet,

24 Available at: <https://ec.europa.eu/digital-single-market/en/news/fixed-broadband-prices-europe-2018>

25 Available at: <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2019>

26 Consumer baskets are defined by the OECD methodology of 2017: [http://www.oecd.org/sti/broadband/DSTI-CDEP-CISP\(2017\)4FINAL.pdf](http://www.oecd.org/sti/broadband/DSTI-CDEP-CISP(2017)4FINAL.pdf)

27EU+Iceland, Norway, South Korea, Japan, USA

Double Play with fixed telephony, Double Play with TV services and Triple Play. Bids were awarded for each of the five baskets according to download speeds ranging from 0.256 Mbit/s to more than 1 Gbit/s.

Data connectivity offers must meet three criteria in accordance with the OECD and BEREC guidelines:

- Information about them must be available online
- It must be possible to purchase them online.
- Their use cannot be limited in any way (e.g. for a specific time during the day)

Moreover, from a time point of view, the study only gives a picture of a very short moment in a very fast-growing market. Data collection takes place for three weeks each year in October. The data will then be validated by the research team in cooperation with national regulators.

Empirica has been monitoring retail prices for both mobile and fixed broadband for the fifth year. For the first time, this data collection on both types of broadband was carried out in parallel in October 2019, transforming the study into its new form, entitled '*Retail prices for broadband in Europe 2019-2021*'.

The study looked at offers from the largest mobile network operators and internet service providers in each country. The methodology uses the implementation of a household approach that is fully in line with the 2018 BEREC Guidelines.

A set of 17 representative households as well as 'individual' consumer price baskets with different usage patterns were considered. Household baskets include mainly convergent packages that include both fixed and mobile broadband services (data and voice). The supply of such packages is an increasing trend in the supply of fixed broadband lines supplied with mobile services, which in some cases have the most competitive prices.

As a follow-up, a number of methodological adjustments were made in 2019 reflecting changing market conditions and ensuring a reliable and realistic representation of broadband market prices according to current and future consumption patterns. All results have been presented and discussed with the EC and the national regulatory authorities concerned by the study.

eGovernment Benchmark

eGovernment Benchmark is an annual study carried out for the EC by the consulting company Capgemini. While the study evaluates 36 European countries²⁸, it also specifically recalculates data to map the level of digital public services only in the EU.

The benchmark evaluates the 4 main dimensions ('top-level' indicators): user-centred, transparency, cross-border services (for citizens and businesses) and key tools (technical infrastructure). In each of the dimensions, scores 3-5 indicators. Their level is measured on models of eight life situations that consist of a set of services that the user must use to solve a given life situation. Every year, only four life situations are evaluated²⁹. In addition to the services, the functionalities of web portals related to them are also evaluated.

In addition to a few indicators that are evaluated by automated tools, the absolute majority of indicators are evaluated on the basis of the³⁰so-called *mystery shopping* method. This is done in such a way that the members of the research team, in terms of the user's prescribed profile, go through individual services

²⁸EU+UK, Iceland, Norway, Montenegro, Serbia, Switzerland, Türkiye, Albania and North Macedonia

²⁹In even years, it is the start of business, employment, study and family. In odd years, these include regular business operations, launching small claims, moving and owning and using a car.

³⁰For example, cyber security or mobile compatibility of portals.

related to the particular life situation they evaluate. For each service, they note the evaluated indicators, which they evaluate with their answers to a pre-prepared questionnaire. In it, each indicator is assigned a set of questions that asks about the different aspects and functionalities of the evaluated service.

Mystery shopping is preceded by a mapping of services in each of the monitored countries. The research team shall verify this mapping with the authorities of the country concerned. Following the collection and evaluation of mystery shopper responses, States also have the possibility to re-validate and possibly correct inaccurate evaluations of mystery shoppers with adequate explanation.

The mapping and evaluation of services is carried out annually in the autumn. The collected and processed results are prepared in the first quarter of the following year. DESI then uses data from those indicators or life situations that are also included in the structure of the fifth dimension of DESI.

European Data Portal

In the period 2015-2017, open data measurements were built on two key indicators – readiness and maturity. These indicators include the implementation of policies and strategies at country level and the level of sophistication of national open data portals. In order to better reflect the status of open data, the methodology was updated in 2018. The evaluation has become more comprehensive and the study has therefore focused more on the quality of open data as well as on re-use and the impact of open data on society and the economy. The scope of the evaluation has therefore been extended to include new indicators to cover four areas: national policies, open data portal, impact and quality of data.

The 2019 evaluation also added new layers to the questionnaire reflecting progress in European countries, developments at EU level, as well as national and EU priorities. Examples include focusing on access to dynamic data in real time and enabling smarter cities and states.

The main points of the 2019 evaluation were the stronger prioritisation of high-quality open data publication, the active promotion of data re-use, the mechanisms for monitoring open data re-use and the development of the advanced functionalities of the portal.

- ⌚ Regularly available, uniformly collected and reliable data is one of the criteria for including indicators in the DESI. Nevertheless, from time to time there is a gap in the availability of data for some indicators, which happens to be that DESI works with outdated data.
- ⌚ The possibility to thoroughly examine and understand how data is sourced in DESI is an inseparable precondition for a more targeted setting of measures to improve the evaluation of indicators. For some indicators, a certain degree of improvement in the evaluation could only be achieved by improving and streamlining the process of data collection and provision of data by state authorities to EC bodies or consultancies.
- ⌚ The data comes to a greater extent from the national authorities of the Member States, but the methodology for their collection or subsequent processing often creates scope for distortion and simplification, which may put some Member States at a disadvantage over others. Exactly this challenge is presented by the studies supplied by the EC by consulting companies or their consortia, on which indicators in the connectivity dimension are currently based, but it can be expected that they will also be used for possible future indicators, in particular in the fourth dimension of the digitalisation of businesses.
- ⌚ 70 % of DESI indicators are evaluated through data collection and statistical measurement coordinated by Eurostat. This process also needs to be closely monitored and coordinated at national

level from the design phase and discussion of the text of the questions in the questionnaires, through the translation of the questionnaire into the national language, to its use for data collection from respondents. The formulation of questionnaires in Eurostat working groups needs more expert input on current developments in digital policies. At the same time, inaccurate and incomprehensible formulations complicate obtaining the correct answers of respondents and a precise description of the current status in the given indicator.

2.2 Digital competitiveness of the EU and the evolution of Slovakia's position in DESI

The Nordic countries – Denmark, Finland and Sweden – have been ranked best in the rankings since 2015, which only change their ranking among the top-rated trio of EU Member States from year to year.

In terms of individual dimensions, Finland has been a stable leader in the second dimension of human resources since 2015, thanks to which it has also gradually seen a significant shift in the use of internet services (according to DESI 2020 it also ranked 1st). The fourth dimension of business digitalisation since DESI 2016 is led by Ireland. Estonia is a constant leader in the fifth dimension of digital public services.

Slovakia's position is fundamentally far from the leading rankings since the index was established. Moreover, in most indicators it does not reach, and possibly is not close to, the EU average. Across all dimensions, Slovakia is experiencing constant but moderate upward growth in most indicators, but the pace of growth is not sufficient to keep pace with other Member States, leading to a gradual decline in the ranking despite the country's growing overall score in DESI.

Overall, Slovakia ranked 22nd (2020), 21st (2019), 20th (2018), 20th (2017), 21st (2016) and 20th (2015) in recent years. I mean, 2020 was our worst year ever in the DESI Index.

The year-on-year weakening of Slovakia's position has been observed since 2018. This is evidenced by the steep year-on-year increase in 2017 score (10.64 %), which was the highest among all countries. However, this is followed by only 2.39 % year-on-year growth in 2019, which is the second lowest growth rate.

The Visegrad Group (V4) also consistently ranks below the EU average in the overall order of countries, with a significant distance from the ranking leaders. The Czech Republic is closest to the EU average.

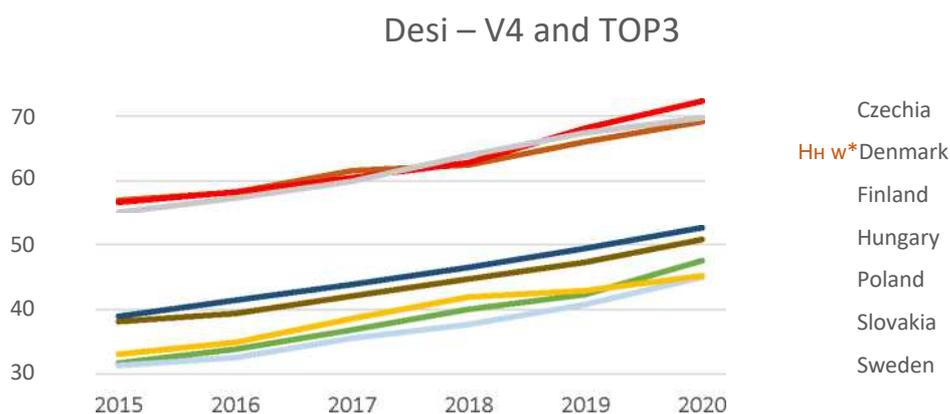


Figure 1: Evolution of the ranking of V4 leaders and countries in 2015-2020 (dark blue line represents average EU)

Source: <https://digital-agenda-data.eu>

2.2.1 Historical development of Slovakia's position in the dimensions of DESI

2.2.1.1 Connectivity

Slovakia's connectivity dimension score over the last five years oscillates between 18th and 24th place, with

scores from 28.9 to 47.5. Slovakia's overall score in this dimension is gradually growing, but Slovakia is still in the last third of the 28 EU countries.

Slovakia's goal in the connectivity dimension is to improve the country's position compared to the EU average and V4 countries. At the same time, we compare Slovakia with Austria, which we perceive geographically and morphologically as a similar country. We also selected countries with the best and worst scores in the connectivity dimension to compare.

Successful countries should serve as inspiration for Slovakia. We recommend focusing on using those tools that have been successful and helping countries ensure their high scores and position in DESI indicators and connectivity dimension.

Table 3: Historical development of dimension score Connectivity

Connectivity		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	20	20	18 ↑	21 -	24 -	21 ↑
	score	28,9	31,8	36,1	37,9	39,6	47,5
EU	score	31,1	34,1	37,1	39,9	44,7	50,1
The Best MS EU	order	1 LAT	1 LAT	1 LUX	1 LUX	1 SW	1 DAN
	score	45,5	49,9	53,1	55,3	60,1	65,8
The Worst MS EU	order	28 CY	28 DG				
	score	17,4	21,1	23,5	26	29,5	33,4
Austria	order	21	21	22	22	18	22
	score	28,3	31,8	34,3	37,5	43,5	47,2
Czechia	order	15	16	19	19	19	24
	score	32,4	34,7	36,0	39,4	43,5	44,9
Hungary	order	19	18	17	14	16	7
	score	29,4	34,1	37,4	41,1	45,9	59,8
Poland	order	22	22	21	18	20	15
	score	27,8	30,6	35,2	39,4	42,8	51,3

2.2.1.2 Human capital

Despite the current education system, Slovakia remains relatively firmly behind the European average in the human capital dimension. It oscillates around the 18th to 20th place, just before the last third of the Member States.

Human capital is absolutely crucial for the future of Slovakia. According to the OECD, we are among the countries most at risk of automation, which will also have a significant impact on the strong automotive industry in the near future. Already today, labour supply mismatches have a negative impact on the Slovak labour market and most sectors are struggling to employ people with the necessary skills.

Of the V4 countries, the Czech Republic is better (it moves between 13rd and 14th place), Hungary is usually one position in front of Slovakia, and Poland holds just before the end of the ranking.

Given the achievements so far and the current situation, a fundamental change in the education system, with a clear focus on digital skills and soft skills, should also be a policy objective. During the COVID-19 pandemic, it was precisely the lack of skills that affected the country's functioning in the most significant way. In schools

where teachers or directors did not have the necessary skills, distance teaching was significantly limited. Moving to the online environment has enabled not only education but also business and services.

In the case of human capital, the most successful countries (Finland, Estonia or the Netherlands) should serve as a model for Slovakia, which have been able to change the education system and adjust it adequately to current but mainly future market needs. We recommend systemic changes that will affect all levels of education (possibly complementing almost non-existent ones, such as lifelong learning) and will have a major impact on the future of the country.

Table 4: Historical Development of Dimension Score Human Capital

Human capital		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	19	19	19	18↑	18	20-
	score	37,0	39,0	40,6	42,9	44,2	41,8
EU	score	44,0	44,5	45,4	47,6	47,9	49,3
The Best MS EU	order	1 FI					
	score	72,2	73,4	74,7	76,1	77,5	78,4
The Worst MS EU	order	28 RO	28 RO	28 BG	28 RO	28 BG	28 IT
	score	27,5	27,6	27,3	31,5	28,5	32,5
Czechia	order	13	13	16	16	16	14
	score	44,9	44,6	42,8	45,0	44,8	48,6
Hungary	order	18	18	18	19	20	19
	score	38,4	39,5	41,2	42,5	42,1	41,8
Poland	order	25	25	22	24	22	22
	score	31,7	32,0	34,5	36,2	36,8	37,3

2.2.1.3 Use of Internet services

The score of Slovakia in the area of internet use dimension over the last five years oscillates between 16th and 20th place, with scores from 42 to 53.4. Slovakia's overall score in this dimension is gradually growing, but Slovakia is still in the second half of the 28 EU countries.

Table 5: Historical development of dimension scores Use of Internet services

Use of Internet services	DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
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States	parameter						
Slovakia	order	17.	20.	16TH↑	18.	17. ↑	20:20
	score	42,7	42	47,2	48,8	51,3	53,4
EU	score	45	46,7	49,1	51,7	55,1	58
The best country	order	1. DK	1. DK	1. DK	1. SE	1. DK	1. FI
	score	65,3	66,6	71,1	73,7	75,2	76,3
The Worst Country	order	28. RO					
	score	21,74	26,06	26,29	31,5	35,01	35,97
Czechia	order	18.	18.	20.	21.	18.	17.
	score	42,6	42,9	45	47,7	51,3	54,1
Hungary	order	12.	12.	15.	16.	19.	14.
	score	46,1	47,2	48,51	49,5	51,2	56
Poland	order	24.	25.	23.	24.	23.	23.
	score	33,38	34,5	40,1	42,2	45,8	49,6

2.2.1.4 Integration of digital technologies

In the fourth dimension of DESI Slovakia fell from 18th to 21st in the last three measurements (2018 to 2020) and in the current score (32.6) it falls significantly below the EU average (41.4). Scores were improved in only one measurement indicator, namely the use of social media by businesses, where Slovakia improved by 1 % year-on-year (a value of 18 % in 2020). In the electronic information sharing indicator, the score remained at 31 % for three years, and in the other indicators Slovakia gradually declined over the last three measurements.

Tab. 6: Historical Development Dimension Score Integration of Digital Technologies

Integration of digital technologies		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	17	17 =	19	18 ↑	21 –	21 =
	score	27,9	30,9	31,2	35,8	32,6	32,6
EU	score	29,2	33,1	35,7	37,8	39,8	41,4
The best country	order	1 DK	1 IE				
	score	48,0	56,7	60,4	63,4	69,1	74,3
The Worst Country	order	28 BG					
	score	15,3	16,0	16,6	18,3	16,9	17,9
Austria	order	15	18	18	19	19	17
	score	28,0	30,2	31,4	34,9	34,8	40,6
Czechia	order	7	10	9	10	10	9
	score	37,2	37,3	42,0	41,5	42,7	49,6
Hungary	order	24	24	24	24	24	26
	score	18,0	20,1	22,9	25,7	24,9	25,3
Poland	order	25	27	27	26	26	25
	score	17,3	18,5	19,6	21,0	23,5	26,2

2.2.1.5 Digital public services

The last three DESI scores showed a downward trend in the overall ranking of Slovakia. Despite the fact that Slovakia recorded the largest year-on-year increase in the overall score for this dimension in 2020, Slovakia

fell again by one place. This brought Slovakia back to 26th place, where it was last placed in 2016. Slovakia is recording a stagnant and declining take-up of digital public services. This is due to some extent to the narrow definition of indicator 5a1 (see the analysis of the indicator in Annex 1), which will be modified in the coming years. At the same time, Slovakia advocates because of the lack of re-use of government data against the backdrop of digital public services. An important factor is also the degree of openness of the data and the offer of user-friendly options for making them available.

Tab. 7: Historical development of the Digital Public Services Dimension Score

Digital public services		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order	25	26 –	25 ↑	24 ↑	25	26 –
	score	30,6	31,1	40,5	48,0	50,7	55,6
EU average	score	50,2	54,2	57,9	61,8	67,0	72,0
The best country	order	1 EE					
	score	77,3	80,5	80,7	83,0	85	89,3
The Worst Country	order	28 EL	28 EL	28 EL	28 RO	28 RO	28 RO
	score	20,6	27,0	33,7	41,1	45,0	48,4
Czech Republic	order	23	24	22	21	21	22
	score	33,0	37,5	47,9	54,1	59,9	62,4
Poland	Order	13	17	17	20	20	20
	score	53,1	53,3	54,2	54,9	61,5	67,4
Hungary	order	26	27	27	26	26	24
	score	28,2	28,9	35,2	43,6	50,7	57,8

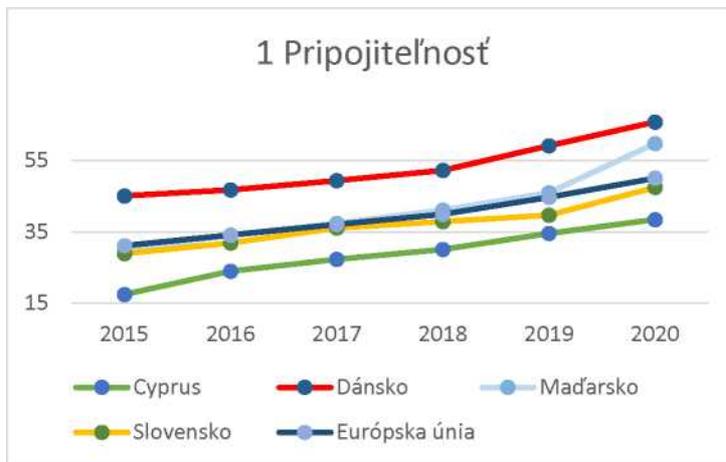
- ⌚ A fundamental feature of the development of Slovakia's scores in individual dimensions is that while their scores in absolute terms are gradually increasing, the pace of growth does not keep pace with the EU average and other Member States. This trend leads to the fact that, despite increasing scores, Slovakia often falls in the rankings year-on-year.
- ⌚ By default, Slovakia ranks in dimensions at the beginning of the last third of the ranking (usually between 18. 21st place). The sovereign worst position is in the digital public services dimension, where it ranks on average 25th in the long term.
- ⌚ In addition to the location of Slovakia and its absolute score for a given dimension, it is important to note how large the distance from the average score in the EU is and whether this distance is gradually and constantly decreasing or vice versa is increasing. An important reference is also the score of the last country in that dimension. The difference from the lowest score indicates how quickly Slovakia threatens to fall to the end of the ranking.

2.2.2 Situation in the EU according to DESI 2020

2.2.2.1 Connectivity

A 2020 study ranked Denmark first in the connectivity dimension, replacing the previous leader, Sweden. The index has seen the largest improvement in the connectivity indicators for Cyprus over the entire existence of the index, by up to 120.5 % compared to the 2015 DESI. In absolute terms, we see the biggest increase in scores in Hungary, namely by up to 30.4 points over six years. This is also due to the most significant shift in Hungary's location of up to 12 places over the same period.

Belgium improved its ranking in the index most year-on-year, moving up by up to 10 places compared to DESI 2019. This is mainly due to a significant reinforcement of the indicator 1b2 (Support by a fixed network of very high VHCN capacity), where Belgium has progressed by up to 17 places.



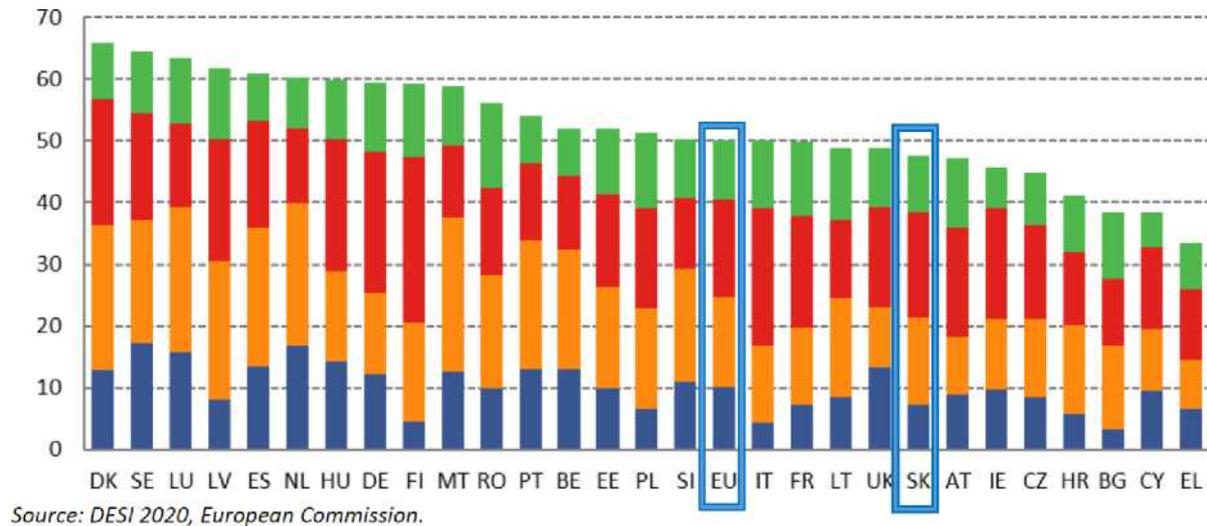
A significant shift in 4G coverage is registered in Malta, which managed to move 25 places in 1 year, making it a leader in the field in 2020, along with Denmark (same score of 25). The evolution of the position of selected countries in this dimension shows the following graph.

Source: <https://digital-agenda-data.eu/>

Connectivity within the EU has improved both in terms of demand and supply. In 2019, Next Generation Network (NGA) coverage increased to 86 % of households compared to 83 % the previous year, while fixed high capacity networks (VHCNs) are available in 44 % of households. Malta, Denmark and Luxembourg lead VHCNs with a coverage of at least 90 % of households. In 2019, 78 % of households had fixed broadband subscriptions across Europe, compared to 70 % five years ago. Over the past five years, the group of users of broadband services with speeds of at least 100 Mbps has grown, at the current level of 26 % of households, five times more than five years ago. 4G networks cover almost the entire European population, while relatively little progress has been made in the allocation of 5G spectrum. Only 17 Member States have already allocated spectrum in the pioneering 5G bands. Finland, Germany, Hungary and Italy are the most advanced in 5G preparedness. Denmark, Sweden and Luxembourg have the highest overall scores in the connectivity dimension.

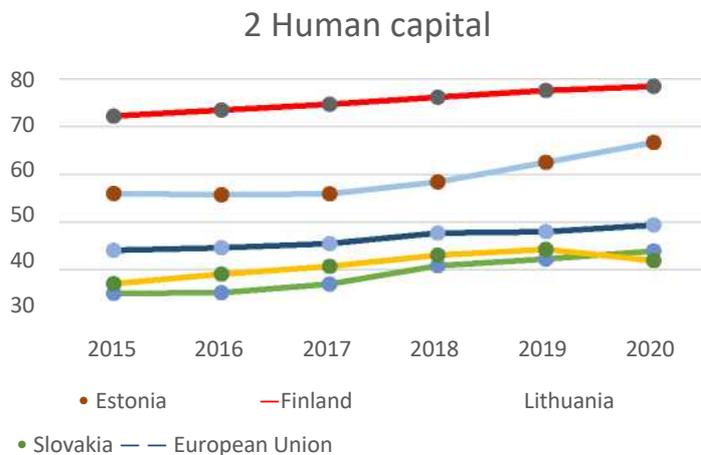
Figures 1 Digital Economy and Society Index 2020, Connectivity

La Fixed broadband take-up 1b Fixed broadband coverage 1c Mobile broadband 1d Broadband price index



2.2.2.2 Human capital

Finland has been the long-term leader of this dimension since the birth of the index. However, a constant significant improvement in the score has been observed since 2015 in Lithuania, which has improved its score by 25.4 % over the period.



In terms of absolute score, the largest the increase since DESI 2015 was recorded by Estonia, which improved its score by 10.8 points. In terms of location, we are following the biggest positive shift in Croatia, which has improved its position by 4 positions in the current 13rd position since DESI 2015.

Year-on-year we see the biggest improvement in the ranking for Malta,

Source: <https://digital-agenda-data.eu/>

We can clearly say that the development of the human capital dimension is a great disappointment. This negative fact is also reflected in the EU and has therefore been more supportive of digital skills activities in recent years. However, results and very gradual developments across Member States show that these activities are not entirely sufficient.

However, despite improvements in the skills of internet users (at least basic digital skills) as well as in advanced skills (ICT graduates and ICT specialists), it is not able to meet faster growing demand. For example, an indicator of at least basic digital skills, which reached 58 % in 2019 (compared to 55 % in 2015). However, a large part of the EU population still lacks basic digital skills, despite the fact that most jobs require these skills. In 2018, around 9.1 million people worked as an ICT specialist in the EU, 1.6 million more than four years ago. However, there is still a shortage of ICT specialists in the labour market: 64 % of large enterprises and 56 % of small and medium-sized enterprises talk about problems with filling ICT specialists. The problem is even more pronounced in Romania and

the Czech Republic, where at least 80 % of businesses consider filling these positions to be problematic.

Equally, the gender imbalance in the ICT sector remains a crucial issue, as only one in six ICT professionals is a woman. The potential of women remains untapped in this area, despite the fact that the labour market across the EU, not only Slovakia, suffers from a shortage of skilled ICT workforce. Studies³³ show that women of working age are interested in working in the ICT sector. However, the problem is that at the age critical to determine the specialisation of their studies and later practice (14-19 years), up to 79 % of girls are not interested in studying ICT disciplines and therefore do not acquire advanced digital skills.

The Commission is taking a strategic approach to the issue of women in the digital field, as evidenced by the Declaration of Member States' Commitments of April 2019³⁴. In it, States committed to developing a long-term national strategy to increase the share of women and girls in ICT, which can be a separate document, but also integrate specific objectives, commitments and actions into various sub-digital policies. In addition, every year all Member States commemorate the Day of Women and Girls in ICT with various activities, raising public awareness of the opportunities and potential of women in the digital economy. Slovakia was also involved in this activity in 2020. This also shows the need to increase the positive image of the ICT sector and the women in it in the awareness of the general public. Therefore, Member States should focus on changing the narrative on women's careers in the ICT sector and highlight the importance of advanced digital skills for their economic independence and career development. It is also essential to make the working environment in the ICT sector more attractive for women by means of measures to promote their career development, for example through childcare allowances or the provision of nurseries and nurseries in the vicinity or at the workplace. This is closely linked to the objective of increasing the number of women in decision-making positions in the ICT sector. Last but not least, States have committed to more sophisticated monitoring and data collection on women's influence in the ICT sector. As a follow-up, the need for national policy milestones in this area to be set to meet the measured indicators³⁵.

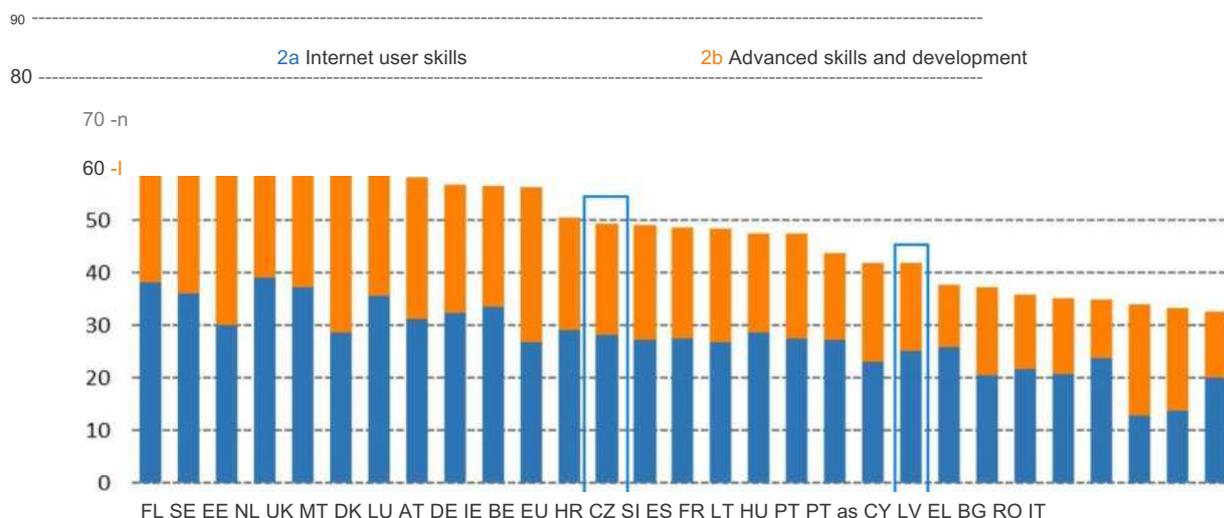
Overall, Finland, Sweden and Estonia are the most advanced in the human capital dimension. Successful countries include the Netherlands and the United Kingdom. Astonishingly, France is lagging behind, but in the past year it has declared quite massive support for digital skills, which has given rise to hopes for improvement. Countries such as Italy, Romania and Bulgaria are in turn.

³³https://www.nadacnyfondtelekom.sk/wp-content/uploads/2019/07/Zeny_vo_sвете_IT.pdf

³⁴<https://ec.europa.eu/digital-single-market/en/news/eu-countries-commit-boost-participation-women-digital>

³⁵ Women in Digital Scoreboard <https://ec.europa.eu/digital-single-market/en/women-digital-scoreboard>

Figures 1 Human Capital dimension (Score 0-100), 2019



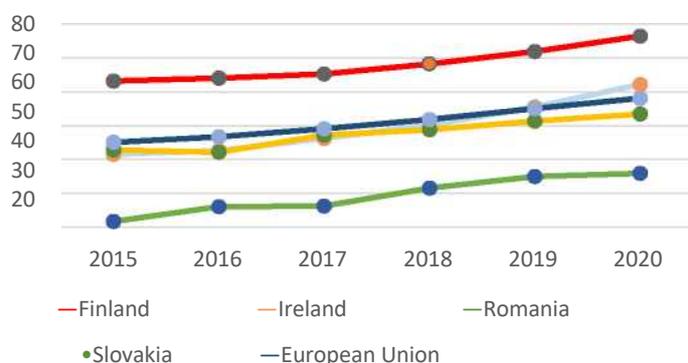
Source: Scare 2020, the European

2.2.2.3 Use of Internet services

In DESI 2020, Finland is the leader of this dimension, which has moved by three places year-on-year. Ireland has a very strong position in this dimension, which has steadily progressed in the ranking since

DESI 2015 and has risen by 12 places by 2020. Ireland also recorded the largest increase in absolute score in the third dimension, by 20.6 points since DESI 2015. The most significant improvement in scores during the existence of the index is seen in the case of Romania, whose score has increased by 67.8% since DESI 2015.

3 Users of Internet Services



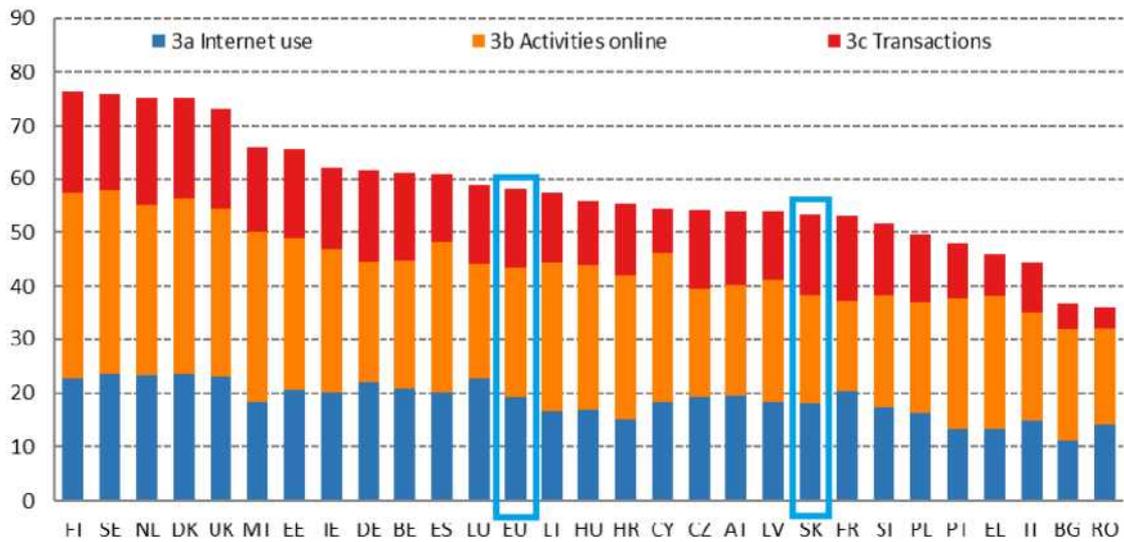
Hungary has improved its position in this dimension most year-on-year, which has climbed by 5 places to the 14th place.

Source: <https://digital-agenda-data.eu/>

Although the use of internet services in Slovakia continues to grow, the country does not keep pace with other EU Member States. Slovakia fell from 17th to 20th place, with scores in some indicators well below the EU average.

In the 2020 DESI evaluation, Finland (score 76.3), Sweden (score 75.9) and the Netherlands (score 75.3) were ranked in this dimension in the top three. At the opposite end of the ranking are countries such as Italy (scores 43.04), Bulgaria (score 36.61) and at the end of the ranking Romania (score of 35.97). Among the V4 countries, Poland ranked 23rd behind Slovakia. The Czech Republic ranked 17th and Hungary even ranked 14th.

Figure 1 Use of internet services (Score 0-100), 2020



Source: DESI 2020, European Commission.

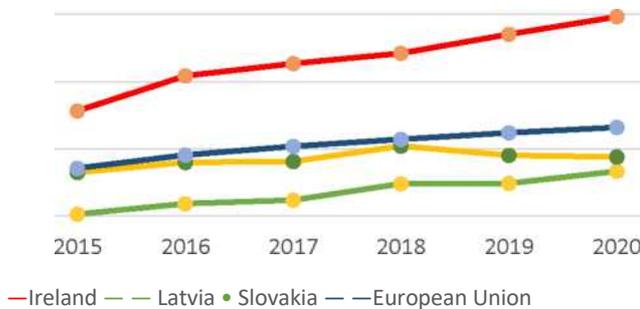
2.2.2.4 Integration of digital technologies

The long-term leader of this dimension is Ireland, which ranks first since DESI 2016. For the whole period

the existence of the index also saw the largest increase in the score in absolute terms, namely by 28

points. In relative terms, Latvia's score has risen the most since DESI 2015, by 82.3%. Compared to DESI 2015, France improved its ranking most significantly by placing it in 11st place, a procedure of 8 places.

4 Integration of digital technologies

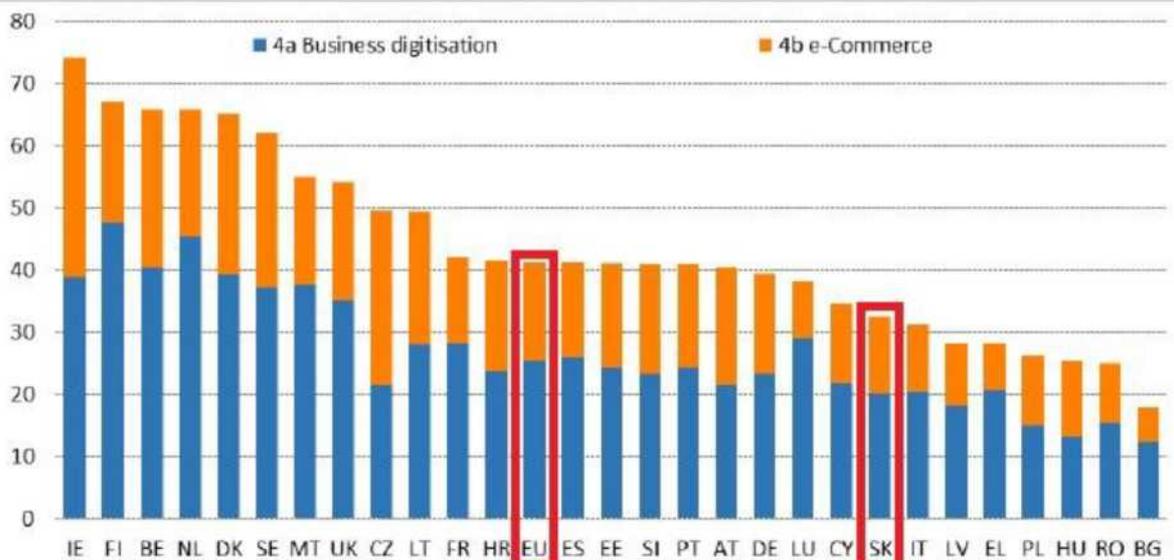


Croatia moved most year-on-year in the DESI 2020 ranking, which improved its position by 5 places in the 12nd place.

Source: <https://digital-agenda-data.eu/>

DESI 2020: Ranking of EU Member States by score in the digital integration dimension and in relation to the EU average

Figure 1 Digital Economy and Society Index (DESI) 2020, integration of digital technologies



Source: DESI 2020, European Commission.

2.2.2.5 Digital public services

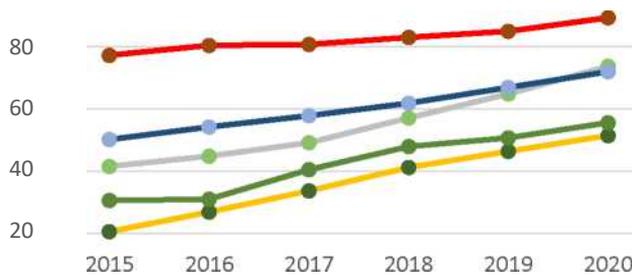
Estonia has been a stable leader in this dimension since the beginning of the DESI evaluation. Although Greece has risen the most (by less than 150 %) over the years since DESI 2015, relative to its initial score, it remains at the penultimate ranking (27th). In absolute terms, the scores improved the most, with a 32.2 point increase in scores compared to DESI 2015. In terms of ranking, Latvia has improved most significantly since DESI 2015, by 7 places, (5th in DESI 2020), France (12nd), and Luxembourg (14th).

Spain (2nd place), Austria (8th place) moved up two places year-on-year in DESI 2020.

Luxembourg (14th) and Hungary (24th).

Pronounced year-on-year the shift in digital public services for entrepreneurs (5a4) has moved Italy, which has moved by 12 places, placing it in the 6th place.

5 e-Government



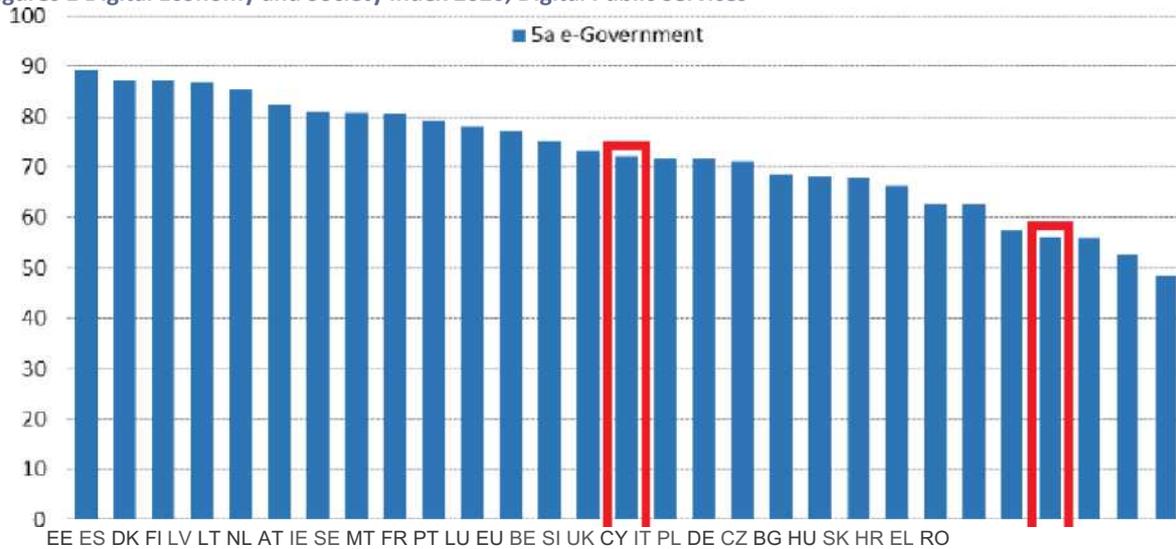
— Estonia • Greece Luxembourg Source: <https://digital-agenda-data.eu/>

by score in the digital public services dimension and in relation to the EU average

— Slovakia — European Union

DESI 2020: Ranking of EU Member States

Figures 1 Digital Economy and Society Index 2020, Digital Public Services



Source: Scare 2020, the European Commission.

- ⊕ According to the DESI 2020 evaluation, Belgium and Malta in particular can set a good example for Slovakia, which have seen a very significant improvement in their location in some connectivity dimension indicators year-on-year. Belgium has advanced 17 seats in the VHCN coverage indicator, improving its position by 10 overall in the dimension. Malta reached the first place in 4G coverage, moving from 25th place in DESI 2019 and bringing it up by 7 in the connectivity dimension.
- ⊕ In the human capital dimension, Finland defended the position of permanent leader. The countries whose example is worth following in view of the constant and significant improvement in their assessment in this dimension are Lithuania, Estonia and Croatia. However, overall results suggest that while the digital skills of the EU population are gradually increasing, the problem of skills shortages for the ICT sector remains.
- ⊕ Finland and Ireland are stable patterns in terms of Internet usage rates. However, among Slovakia comparable countries, it is possible to draw inspiration from the progress made by Romania since the establishment of DESI. Similarly, Hungary improved its ranking by up to 5 places year-on-year, reaching the 14th place.
- ⊕ Ireland has been leading the digitization of businesses for a long time, but Latvia has been improving its scores steadily and significantly over the years. Croatia has improved its position in this dimension most year-on-year, by up to 5 places in the 12nd place.
- ⊕ Estonia is expected to be a constant leader in digital public services. However, an interesting development has gone through Greece, which has improved its score by 150 % since the creation of DESI. Nevertheless, it remains at the end of the ranking in this dimension, pointing in particular to the growth rate of other countries. In DESI 2020, it is worth paying attention to the move of Italy by 12 places to 6th in the Digital Public Services Indicator for Entrepreneurs.

2.2.3 Slovakia in DESI 2020

According to the DESI 2020 report published in June 2020, Slovakia ranked 22nd (out of 28 EU countries), which represents a drop of one place. On the other hand, Slovakia's overall score increased to 45.2 (with an EU average of 52.6) from 42.9 in 2019 (for an EU average of 49.4).

The decrease by one place despite the increased score suggests that Slovakia is gradually improving its level of digitalization, but the rest of the EU is improving faster. The Slovak score gap from the EU

average widened to 7.4 points compared to 6.5 in the 2019 report. Slovakia is below the EU average in none of the five measured dimensions, with the most close to the EU average in the dimensions of internet access and use of internet services.

The increase in the overall score is mainly due to a significant improvement of three places in the connectivity dimension from 24th to 21st, while reducing the score gap from the EU average. This dimension, along with the human capital dimension, has the greatest weight in calculating the overall score. The improvement in location is mainly related to significant progress in Slovakia's readiness on the 5G network (indicator 1c3). On the contrary, the largest year-on-year decrease occurred in the fixed network coverage indicator of very high capacity (indicator 1b2), by 5 seats down. However, Slovakia has long and significantly lags behind in 4G coverage, in which it ranked 26th, just behind Romania and Bulgaria.

In the human capital dimension, usually best rated in Slovakia, it fell by two places, to 20th place in the EU, while reducing the score for this dimension from 44.2 to 41.8, which also led to an increase in the gap compared to the EU average (49.3). In particular, there has been a decline in the population's measured digital and software skills. At the same time, despite a slight improvement in the evaluation, DESI notes a shortage of available professionals in the ICT sector on the labour market (3.2 %) as well as an almost stagnant share of women working in ICT disciplines (0.9 %), which ranks Slovakia in the 23rd position.

The share of Slovaks with more than basic digital skills is 27 %, the best score in the V4 region, but still below the EU average (33 %). The share of ICT professionals out of the total number of employees rose to 3.2 %, but still below the EU average (3.9 %). Slovakia is one of the EU countries with the lowest share of female ICT professionals – only 0.9 % compared to the EU average of 1.4 %. The share of ICT graduates is growing on an ongoing basis (3.3 %), but still below the EU average (3.6 %).

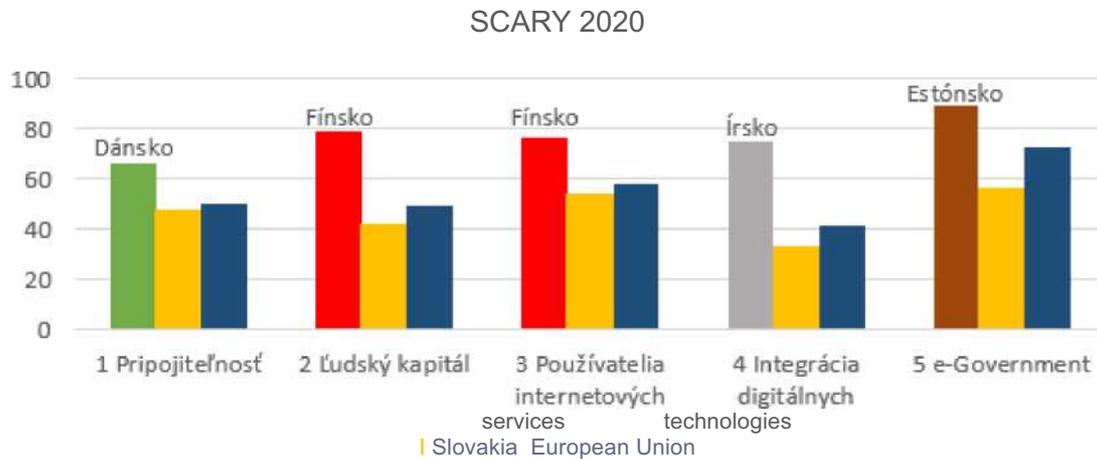
The most significant decline occurred in the dimension of the use of internet services, where Slovakia fell by three places to 20th place in the EU. While the number of people who have never worked with the Internet is steadily declining (12 %), it is clear that the lack of digital literacy combined with barriers to accessing internet connectivity and technology prevents our citizens from fully realising the potential the Internet brings. The video call usage indicator rose by 15 percentage points (66 %) and outperforms the EU average (60 %), as well as the use of social networks, which declined year-on-year (72 %). Despite a slight decrease (from 29 % to 27 %) in the indicator of the share of users selling goods or services online, Slovakia continues to outperform the EU average. In particular, in terms of individual population groups, there has been a decline in the age groups 56 to 64, where only 70 % of citizens use the internet. In the 65-74 age group, only 40 % of the population uses the internet and in the low-educated population only 52 %. Other age and educational groups, as well as the employed population, use the internet between 91 % and 98 %.

Slovakia's assessment in the dimension of business digitalization is stagnant at 21st place (32.6), with a widening gap from the EU average (41.4). Slovak companies are lagging behind in their ability to invest and implement state-of-the-art technologies such as big data analysis or cloud services. Slovak small and medium-sized enterprises (only 11 %) are very slowly catching up with their competition in the EU (18 %) in the ability to sell their goods and services online, not only on the Slovak market, but also across the EU's single market.

In the last dimension of digital public services, Slovakia recorded its worst position, dropping one place to 26th in the EU, with an overall score of 55.6 on the EU average of 72.0. DESI identifies our shortcomings in particular in three areas:

- 🕒 the reluctance of citizens to use state electronic services, which has increased slightly in DESI (only 52 % of internet users use digital public services compared to 54 % in the 2019 report), due to low

- trust in the security of these services and their lack of user attractiveness;
- insufficient work with citizens' data held by the state against the background of electronic services provided (pre-filled forms or services completely without the need to provide already known data);
- the level of openness of government data (score decreased year-on-year from 74 % to 33 % with an EU average of 66 %).



Comparison of Slovakia's assessment against the leaders of individual dimensions and the EU average in DESI 2020

- According to DESI 2020, the Slovak Republic occupies 22nd place, which represents a decrease in the position by one place. On the other hand, Slovakia's overall score increased to 45.2 (with an EU average of 52.6) from 42.9 in 2019 (for an EU average of 49.4). The Slovak score gap from the EU average widened to 7.4 points compared to 6.5 in the 2019 report. None of the five measured dimensions is below the EU average.
- The increase in the overall score is mainly due to a significant improvement of three places in the connectivity dimension from 24th to 21st, while reducing the score gap from the EU average. The improvement in location is mainly related to significant progress in Slovakia's readiness on the 5G network (indicator 1c3).
- In the human capital dimension, which has hitherto been the highest rated in Slovakia, there has been a decrease of two places, to 20th place in the EU, while the score for this dimension has been reduced. The share of Slovaks with more than basic digital skills is 27 %, the best score in the V4 region, but still below the EU average (33 %). This is where the impact of

leaving high-quality graduates of secondary and higher education is likely to begin. Slovakia does not produce enough new specialists for the ICT sector compared to other countries such as the Czech Republic, which also successfully acquires these specialists from Slovakia.

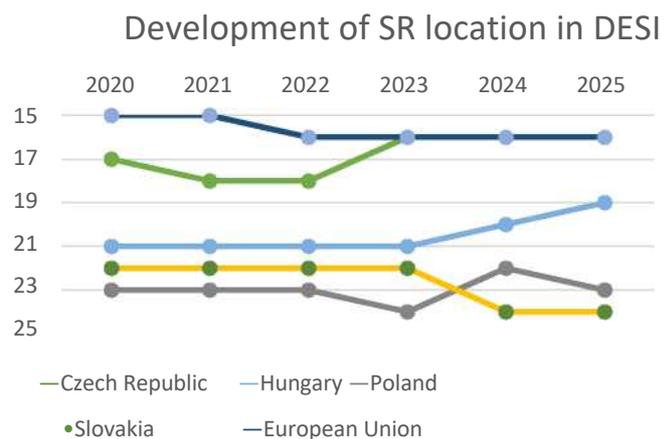
- ⊖ The most significant decline occurred in the dimension of the use of internet services, where Slovakia fell by three places to 20th place in the EU. While the number of people who have never worked with the Internet is steadily declining (12 %), it is clear that the lack of digital literacy combined with barriers to accessing internet connectivity and technology prevents our citizens from fully realising the potential the Internet brings.
- ⊖ Slovakia's assessment in the dimension of business digitalization is stagnant at 21st place (32.6), with a widening gap from the EU average (41.4).
- ⊖ In the digital public services dimension, Slovakia recorded its worst position, dropping one place to 26th in the EU, with an overall score of 55.6 with an EU average of 72.0.

2.2.4 Forecast of the future development of Slovakia's position

The following forecast was based on the assumption of how countries will change their position in DESI 2025 if countries make the same level of effort to digitize as they have been since 2015.

The position of Member States in DESI 2025 in light of trends so far is presented in the attached graph.

The graph shows a persistent weakening of Slovakia's overall position in DESI. According to the forecast, Slovakia will fall by 2 places by 2025, making Slovakia take the 24th position. According to the trend so far, Slovakia expects the biggest decline in the integration of digital services, from 21st to 25th position. On the contrary, we expect the biggest increase in the third dimension, namely the shift from the 20th to the 14th position.



Through active and targeted measures on the part of the state, it is possible to reverse the negative trend and thus ensure that Slovakia is one of Europe's successful countries in the field of digitalisation and moves to at least the middle of the ranking.

According to forecasts, we expect the V4 countries to rise, especially Hungary and the Czech Republic. We estimate the most significant shift in digitalization for Spain from 11st to 8th and Italy from 25th to 22nd. Finland will probably remain the leader, followed by Sweden and Ireland.

2.3 Examples of good practice

The selected examples of good practice presented in the following chapter illustrate possible approaches to solving similar problems identified by the analysis of Slovakia's evaluation in the DESI index. Examples can serve as an inspiration for Slovakia's own approach to improving these shortcomings. The chapter does not aim for Slovakia to fully apply these examples of good practice. In their eventual transposition into Slovakia's conditions, it will be necessary to take into account the specific needs and conditions in Slovakia.

The selection of individual countries and their examples of good practice is specific to each dimension due to the different problems identified in it by DESI for Slovakia. In some cases, this can only be an exemplary solution to specific problems linked to specific indicators of a given dimension, despite the fact that the overall location of the country in the dimension may be worse than the location of Slovakia. Other factors in assessing the appropriateness of the above examples were, depending on the DESI indicators addressed, country geography, technological and infrastructure bases, comparable demographics, economic circumstances, etc. (see PESTLE analysis in Annexes 4 and 5).

2.3.1 Connectivity

The Austrian national broadband plan “Broadband Austria 2020” aims to reach 99 % coverage of 100 Mbit/s (downstream) broadband for households in **Austria by 2020**. Since 2015, EUR 1 billion has been reallocated under the “Broadband Austria 2020” programme, with around 400 beneficiaries (countries, cities, municipalities, SMEs, self-employed) receiving funding for over 1200 projects. The areas of funding are:

- access (NGA and connectivity quality for entrepreneurs);
- Backhaul (construction and modification of passive electronic communications infrastructure for entrepreneurs);
- empty guards (broadband preparation for municipalities, their associations and businesses)
- connection (connection of school facilities, SMEs and self-employed to the fiber network).³⁶

Another project BBA2020_Backhaul aims to address the connectivity gap in Austria when deploying optical connections in the framework of the National Broadband Plan, with the aim of significantly reducing the cost of fiber connectivity. The aim is to increase the number of connected organizations of particular socio-economic importance, in particular educational institutions and small and medium-sized enterprises. In addition, there are a number of private investments aimed at introducing FTTH in the near future.

Looking at the post-2020 period, the Austrian Broadband Strategy 2030 adopted in August 2019 aims to achieve nationwide access to fixed and mobile Gigabit broadband services by the end of ³⁷2030. The Austrian government is working on developing a new financing model. The strategy expects funds to come from past and upcoming 5G spectrum auctions. Austria ranked 22nd in DESI 2020, one place behind Slovakia.

In November 2019, **Czechia** adopted an Action Plan 2.0 of non-subsidy measures to support the planning and construction of ³⁸an electronic communications network, involving the main actors in the sector, as well as representatives of local government and self-government. The ultimate goal is to remove obstacles to the construction and operation of these networks. These are two priority actions:

- the use of newly established or significantly refurbished line structures for the deployment of an electronic communications network;

³⁶ Die Österreichische Forschungsförderungsgesellschaft, 2020, <https://www.ffg.at/content/breitband-austria-2020-0>

³⁷For connecting devices within the Internet of Things (IoT), M2M (Machine to Machine) communication and the deployment of Smart Home solutions.

³⁸ Available at: <https://www.mpo.cz/cz/e-komunikace-a-posta/elektronicke-komunikace/koncepce-a-loss/national-plan-development-siti-nga/akcni-plan-k-provedeni-nenotacnich-opatreni-pro-support-planovani-a-construction-siti-electronic-communication-by-l-svalen-228387/>

- a significant reduction in remuneration for the installation of electronic communications infrastructure on land owned by the State or municipalities.

The Czech Republic from the point of view of the Business Doing 2020 study ranks last in the process of construction proceedings from OECD countries (Slovakia is penultimate!)³⁹.

In the field of 5G, in the framework of the “5G for 5 cities” competition organised by the Czech Government, 5 places were selected for the first testing of 5G networks in the country. Czechia is interested – together with Germany – to build a 5G corridor of the Prague-Munich network, which it plans to finance through CEF2 for the period 2021-2027.

The Czech Republic has been placed in front of Slovakia for the entire period of DESI’s existence. It was only in the DESI 2020 evaluation that Slovakia overtaken and ranked 21st in this dimension, with the Czech Republic occupying the 24th place.

In Hungary, the Superfast Internet project has deployed FTTH technology, which allows predicted speeds in Gigabit company targets. The project aims to cover all Hungarian households (the connection of almost 410000 households is financed by the EU Structural Funds) by networks providing broadband connections of at least 30 Mbit/s by 2023. For areas that are not economically viable, a EUR 250 million State aid scheme has been developed to ensure broadband deployment. The project implementation is reflected in an increase in rural FTTP coverage from 4 % in 2015 to 29 % in 2019. At the end of 2019, 213064 households were covered by a broadband connection of 30 Mbit/s. The Hungarian government is also strongly engaged in the roll-out of 5G networks and its vision is Hungary as the main European 5G development hub.

Poland ranked 15th in the connectivity dimension of DESI. It made significant progress in terms of coverage of very high capacity networks (60 % compared to 29 % in the 2019 report), thanks to two factors – an increase in the deployment of FTTP and an update of cable networks to DOCSIS 3.1. In order to address the difficulties with broadband roll-out, a number of legislative amendments were adopted in 2019 creating a new broadband fund with a budget of approximately EUR 33 million to provide parallel or complementary support to projects funded under the Operational Programme Digital Poland as of 2021.

In addition, further changes are aimed at removing barriers to broadband deployment. Among other things, they address problems hampering the application of the Directive **on measures to reduce the cost of deploying high-speed electronic communications networks** (BB CRD). These are the following changes:

- better mapping of existing electronic communications infrastructure (including fibre and other cable networks);
- data will have to be provided twice a year from 2022;
- simplification of permits (significantly lower fees applicable to all local authorities);
- amended rules on access to buildings.

Poland ranked 15th in the EU in DESI 2020, surpassing Slovakia by six places.

Sweden ranks second in connection with a score of 64.4, well above the EU average (50.1). Overall fixed broadband penetration increased from 78 % in 2017 to 86 % in 2019, above the EU average of 78 %. Following a regulation by the Swedish Government, the Swedish Transport Administration has managed

³⁹ <https://www.doingbusiness.org/en/rankings?region=oezd-high-income>, [Doing Business 2020, 01.10.2020](#)

to shorten and streamline the authorization procedure for buildings in order to address delays in deployment in sparsely populated areas due to permit granting procedures.

The best example of good practice from Sweden is probably the Stockholm City's optical electronic communications infrastructure project, one of the world's most successful and well-known examples of a publicly owned broadband network operated by a public authority. The only public funds used by the City of Stockholm were SEK 50000 (approximately EUR 5500) for the registration of Stokab, responsible for the installation and operation of the optical fibre. The rest of the funds came from bank loans and proceeds from the rental of non-involved optical fibres.

In the **Netherlands**, high capacity network coverage (VHCN) increased by 57 percentage points year-on-year in 2019. The increase from 32 % in 2018 to 89 % in 2019 largely reflects the upgrade of cable networks to DOCSIS 3.1. There is no national fixed broadband financing scheme in the system. The Dutch Central Authorities assist regional and local authorities in creating the right conditions for market participants to deploy fast internet by sharing knowledge and best practices. The Netherlands ranked 6th in DESI 2020 connectivity dimension.

Strong competition in the area of electronic communications infrastructure in **Romania**, especially in urban areas, is reflected in indicators where the country is doing very well, namely the coverage of the very high capacity fixed network (VHCN) and the use of fixed broadband of at least 100 Mbps (68 % and 49 %). To address the urban-rural digital divide, Romania has used EU resources in the 2014-2020 financial framework. Firstly, EUR 100 million from the European Regional Development Fund (ERDF) is allocated from the Romanian Competitiveness Operational Programme. Secondly, the 2014-2020 Operational Programme for Rural Development initially set an indicative amount of EUR 25 million from the European Agricultural Fund for Rural Development (EAFRD) under the LEADER programme, of which less than EUR 2 million was actually allocated to measures related to broadband electronic communications infrastructure. In addition, the Ronet project to support the deployment of backhaul networks in 'white areas' has received a financial contribution from the ERDF of EUR 45 million, providing a backhaul broadband electronic communications infrastructure for 696 sites. At the end of December 2019, the national authorities notified the completion of works at 606 sites, while the works are at an advanced stage of completion at a further 82 sites.

The new grant scheme for next generation network deployment (NGN) with a total contract budget of EUR 59 million provides support to private network operators using remote access infrastructure and last mile for other sites in white areas. The aim of the project is to cover 160000 households in "white areas". The success of the roll-out of these networks in the case of Romania was demonstrated by placing it 11st among the EU countries in the connectivity dimension.

2.3.2 Human capital

The European leader of this dimension is **Finland**, whose results in DESI have long been at the top of the ranking. Finland openly supports Mass Open Online Courses (MOOCs) to improve digital skills, and its MOOC project Elements of AI is also recommended by the European Commission for other Member States. **Estonia's** approach to digital transformation, which ranked 3rd in DESI 2020, can also be a great inspiration for Slovakia. In Estonia, 87 % of schools used electronic solutions before the coronavirus crisis. Estonian teachers are trained in digital education and online security. The country's goal was to digitise all its educational materials as early as 2015. An example of an inclusive and comprehensive digital skills development strategy is the **UK**, which includes all components of society, including the deployment of pilot projects to develop the digital skills of government employees and seniors.

However, we do not have to look for examples that far. The Czech Education Policy Strategy for 2030+40 of October 2020 is a very good example of practice that defines the key points of success. The government not only respects the strategy itself, but, above all, implements it. The prime minister considers digitalization and digital skills to be key, and the government's representative for IT and digitalization has full support, which is also presented personally by the Prime Minister by participating in key events and presentations of achievements. This document builds on the previous Digital Education Strategy 2020,41with an overview of deductions available online42.

At European level, the **SELFIE** project can be an example of good practice on how to better integrate digital technologies into education43. It is a very successful tool, developed in cooperation with a team of experts from schools, ministries of education and research institutes across Europe. It is free of charge and is designed to help schools integrate digital technologies into teaching, learning and evaluation. It is based on research and has been developed under the European Commission's framework for promoting education in the digital age in educational organizations.

It is also worth mentioning **the EU Code Week initiative, which** aims to promote computational thinking, coding and the creative and critical use of digital technologies through the involvement of schools. Interest in participating in the event is growing, and despite the interest of a part of Slovak schools, there is insufficient awareness about the event and its benefits.

2.3.3 Use of Internet services

It should be stressed that it is difficult to find examples of good practice in other Member States aimed at increasing the share of internet users, as they are primarily concerned with improving e-communications infrastructure or digital skills and education, which ultimately has an impact on increasing the share of internet services.

However, one of the few examples worth following is **Ireland**, which has a long-term stable position in the third dimension. Since DESI 2015, it has steadily progressed in the ranking and its ranking has risen by 12 places by 2020. This may be due to the targeted measures launched by the National Digital Strategy for Ireland44 in 2013. The strategy had the ambition to halve the number of people who do not use the internet by 2016. The strategy focused mainly on upskilling digital skills, preparing a grant funding scheme for citizens' digital skills training and developing a tool for online identification of learning opportunities in digital skills. At the same time, the government, together with industry, has launched a promotional campaign to show people who don't use the internet what the internet and internet services could help them, what can be done in the online space, and people who use the internet should show other uses and opportunities they might not have known until then.

2.3.4 Integration of digital technologies

The premises of subdivision 4a – business digitalization are **Finland** (particularly ahead of cloud services) and the **Netherlands**.

Finland is a member of the EuroHPC Joint Undertaking and it is in Finland that one of the three European supercomputers approaching the exascale power threshold (10¹⁸ calculations/s) will be set up. Finland is a signatory to the European Blockchain Partnership and the Declaration on Cooperation on Artificial

40<https://www.edu.cz/vlada-schvalila-strategii-vzdelavaci-politiky-cr-do-roku-2030-nejdulezitejsi-dokument-ceske-skolstvi/>

41<http://www.msmt.cz/vzdelavani/skolstvi-v-cr/strategie-digitalniho-vzdelavani-do-roku-2020>

42<http://digivzdelavani.jsi.cz/>

43https://ec.europa.eu/education/schools-go-digital/about-selfie_sk

44<https://assets.gov.ie/27518/7081cecc170e34c39b75cbec799401b82.pdf>

Intelligence.

The Digital Finland Framework Programme 45 coordinates sustainable digital transformation in Finland. The Framework Programme brings together key perspectives: 1. Digital innovation leveraging the benefits of the platform economy and transformation of flagship industries; 2. Smooth support for a sustainable digital transformation; and 3. Responding to global megatrends and the Sustainable Development Goals. The Finnish government uses direct equity financing and regional grants to support various digital projects carried out by municipalities in 2018-2022 amounting to EUR 400 million, resulting from the Digital Finland Framework Programme.

The Accelerating the Digitalization of SMEs programme was launched in the Netherlands in 2018 and uses five regional smart industry centers and research competence centers to support knowledge and skills transfer for SMEs.

The best results in subdivision 4b – e-commerce is ahead of **Ireland** (due to the residence of large online platforms) and then surprisingly **Czechia**.

Ireland remains at the forefront of the Dimension Integration of Digital Technologies. SMEs in Ireland continue to excel in e-commerce: 35 % of them sell online (EU average 18 %) and 18 % sell cross-border to other EU Member States (EU average 8 %). In a March 2019 report, the EIB wrote that it saw scope for improving financing for SMEs interested in deploying digital technologies or developing and supplying digital products and services. Subsequently, the EIB states that the existing financial channels are sufficient, but there is room for better use of these channels. The government therefore plans to help SMEs make better use of existing financial instruments, such as the EU COSME pilot scheme launched in October 2019.

The EIB refers to a number of government initiatives to support the digitalization of businesses in Ireland (for example, the long-term Trading Online Voucher Scheme to support SMEs' online entrepreneurship), but recalls the lack of overall coordination of policies and strategies. Ireland's Industry 4.0 strategy has been implemented since December 2019 and a new national strategy for the digitalization and development of artificial intelligence is also at an advanced stage of preparation.

As regards the integration of digital technologies in the Czech Republic, e-commerce remains the main driver in this area. In Czechia, 28 % of SMEs sell online, and e-commerce turnover already accounts for more than a fifth of their revenues. This is the second highest score in the EU. Czechia also has the third highest share of SMEs selling online to other EU countries and the seventh largest share of companies with high and very high levels of digital intensity.

Among the neighbouring countries, there are also **warning examples in this dimension**, which should serve to make Slovakia more ambitious in its approach. **Hungary** only notes very unsatisfactory results on the integration of digital technologies and states that the Hungarian Chamber of Commerce and Industry provides free consultation and recommendations to SMEs to digitise their business, which has benefited more than 11 thousand businesses in the long term. However, this is clearly not a sufficient form of aid and no systematic efforts by the State to reverse the unfavourable trend can be seen.

In 2019, **Poland** launched a number of flagship initiatives, including the Future Industry Foundation Platform (Fundacja Platforma Przemysłu Przyszłości). The platform aims to increase the competitiveness of businesses by supporting their digital transformation. The platform will coordinate,

45<https://www.businessfinland.fi/496a6f/globalassets/julkaisut/digital-finland-framework.pdf>

standardise and support the activities implemented by the Polish Digital Innovation Hubs (DIH). Under the Industry 4.0 programme, the Minister for Development launched the competition “Standardisation of ECDI Services to Support the Digital Transformation of Enterprises”, which will help build capacity and select future ECDI.

2.3.5 Digital public services

As mentioned above, **Estonia** has been a stable leader in this dimension since the creation of DESI. This country leads a number of international, not just European, quality rankings for digital public services. In 2018, it updated its Digital Agenda 2020 strategy paper⁴⁶ and adopted in 2019 a specific strategy for the exploitation of AI in both public and private sector services.

In recent years, Estonia has focused on creating, according to its own words, “invisible” and proactive services based on the concept of life situations in the field of digital public services. The basic goal was to achieve maximum efficiency and convenience for the user, who should handle everything with minimal interaction with the state, and even if the state itself invites him to do so, that his activity is necessary. Estonia now reports that 99 % of its services are fully digitalised.

At the same time, one of the priorities of the latest digital strategy was to strengthen the capacity of the public sector to use data analysis and research. In this context, Estonia has focused not only on the technical and procedural aspects of this issue, but also on building advanced digital skills of civil servants.

Estonia is also aware of the increasing volume and value of the data collected and the demand for the widest possible use of the data. For this reason too, it focused on creating legal, technical and institutional conditions so that citizens can control themselves at any time. At any time, they can obtain information about who, when and how they use their data. The premise is that this makes it easier and more willing to use data on them for research and development of new services.

The backbone of interoperable services in Estonia is the X-Road⁴⁷solution, which was established in 2001. In 2017, the platform was extended to Finland and since then, both countries have been working to jointly develop cross-border services. X-Road is a distributed platform for data exchange through the integration layer of different registers and information systems, including those in the private sector.

3 Strategic objectives and priorities

3.1 Areas of intervention

In general, given the methodology for compiling the DESI index, a slight improvement in Slovakia’s score can also be envisaged by appropriate steps towards better coordination of DESI-related processes at national level. In this context, we recommend focusing intervention in particular in the following areas where the greatest benefit of targeted measures can be expected:

- ④ **An annual analysis of the results achieved following the publication of the DESI report** and its submission to relevant entities to reflect this feedback in the further implementation of measures and strategic planning.
- ④ **Development of a map of processes and stakeholders involved in the collection and provision of data** supporting the evaluation of DESI. Regular and systematic cooperation and exchange

⁴⁶https://www.mkm.ee/sites/default/files/digitalagenda2020_final_final.pdf

⁴⁷<https://e-estonia.com/solutions/interoperability-services/x-road/>

of information between all relevant actors in the process and MIRRI should be established.

- ③ **Setting up a coordination working group composed of representatives of the heads of existing strategy papers** with an impact on Slovakia's position in DESI. The objective of the Working Party would be to systematically monitor the progress of the implementation of the tasks and measures related to the DESI indicators and to consider possible on-going adjustments to appropriate measures.
- ③ **Consider** the proposed priorities, objectives **and measures with regard to their impact on improving Slovakia's position in DESI when updating the identified strategic and conceptual documents related to DESI**, as well as when creating new ones.

In relation to the different dimensions of DESI, based on the results of the analysis, we identified the following recommendations and areas of intervention.

3.1.1 Connectivity

- ③ Given a number of problematic aspects of definitions and how data is collected for indicators of this dimension (see Annex 4: Analysis of DESI indicators) requires **active cooperation with Member States and the EC to refine and improve the methodology used**. The data underlying the calculation of the score should come from a combination of sources in order to describe the reality on the market as reliably as possible. We consider as professionally and methodologically the most accurate data collected by RÚ directly from the market (ideally automated electronic form). Any discrepancies in the data from network operators could then be corrected by a public consultation. Statistical data from the Statistical Office of the Slovak Republic and Eurostat should be a complementary source.
- ③ Improving the assessment of this dimension depends on the **implementation of all CFP recommendations and conclusions**. These have the potential to increase scores especially in the area of VHCN coverage as well as preparedness for 5G networks. At the same time, they will promote competition that will have a positive impact on the price of fixed broadband services.
- ③ Increasing the use of fixed high-speed internet connectivity is only possible **through investments** by network operators **and the State in adequate electronic communications infrastructure and last-mile connections**. In doing so, the State's investments should focus exclusively on those locations where it is not profitable for network operators to build networks from a market point of view. However, it is necessary to realise that Slovakia's results in this indicator are significantly limited by the morphological disadvantage of its territory, which increases the price for excavation works in difficult and hilly terrain.
- ③ In addition to investments, it is also essential for the construction of electronic communications infrastructure to translate legislation into application practice and to enforce it consistently in order to reduce administrative obstacles in construction works.
- ③ In the area of data package prices, an open discussion with stakeholders is needed to discuss the methodologies for measuring this indicator and to identify the source of inaccuracies that the indicator shows in relation to the observed market reality. In mid-2020, network operators presented an offer of mobile broadband packages, which cut prices by up to 50 % in some cases. [Slovakia is in regular communication with the Commission in order to ensure the most realistic inputs of price data.](#)
- ③ Mobile broadband take-up should be encouraged **by promoting benefits and educating consumers about smart technology solutions** that require the use of SIM cards for the Internet

of Things and Machine-to-Machin⁴⁸. These measures will help Slovakia achieve leading positions within the EU and support Slovak industry, especially in the field of automation and implementation of Industry 4.0 principles. The growth of the knowledge-based and knowledge-based economy will also be an accompanying manifestation.

- ⊕ In order to increase broadband take-up, it is also necessary **to support demand by incentivising residents to purchase internet connectivity**. The state should popularise the benefits of the Internet, for example through more active development and promotion of digital public services (eGovernment/mGovernment), as well as in cooperation with the market, by supporting projects aimed at attracting new clients (pensioners, students, residents of sites with recently introduced internet coverage)⁴⁹. These activities would also be linked to the objectives of the third dimension to promote the use of the Internet among the population.

3.1.2 Human capital

- ⊕ Fundamental **reform of education** is a crucial condition for any changes in the human capital dimension in Slovakia. The need to change the education system is insufficiently responsive by the state and most activities (particularly with regard to digital skills) are managed by a third sector or by private enterprises. The current setting of the education system causes a mismatch between produced graduates and the demand of the labour market or the departure of students abroad (Slovakia has the second highest share of students abroad in OECD countries). It is therefore necessary, on the one hand, to reform the education system (including rethinking the efficiency of schools, their number and structure) and, on the other hand, **to support initiatives and projects aimed at creating a model of education and training for young people for the current and prospective needs of the knowledge society** and the labour market with a focus on IT and ICT.
- ⊕ Consideration of the importance of digital skills is equally necessary **in terms of remuneration**. We consider it essential **to financially motivate ICT teachers at all levels** in such a way that they are not incentivised to go to the private sector, but on the contrary, that top ICT specialists have the incentive to return and pass on their experience.
- ⊕ Last but not least, in the field of education, it is **necessary to address wide differences in the level of technical equipment of schools, the quality of their internet connection, as well as the digital skills of their teachers**. These factors have proven to be determining the quality and efficiency of distance learning online during the current COVID-19 pandemic.
- ⊕ In Slovakia, there is no **vision and strategy for lifelong learning and its systematic support from the state**. This results in low participation of adults in lifelong learning and a growing mismatch between labour market requirements and the skills of the available workforce. The level of basic as well as advanced digital skills can be increased by more substantial support from the state and motivation for education after the initial formal education, mutual professional discussions between the state, educational institutions (public and private) and representatives of employers and sectoral associations. Education in society should also be supported by more coordinated provision of information on other opportunities and the need for adult learning in

⁴⁸Machine-to-Machine (M2M) is the automated exchange of information between terminal equipment, such as machines, vending machines, vehicles or containers, or between terminals and central control centers, which increasingly use the internet and various wired and wireless access networks. One of the applications is remote monitoring, control and maintenance of machines, equipment and systems, traditionally referred to as telemetry.

⁴⁹Vouchers in this sense will be the subject of a feasibility study in the framework of the implementation of the CFP.

digital skills and linking them to increasingly required social skills, such as critical and creative thinking, ability to adapt to change, commitment to learn or empathy.

- ⊕ Despite the fact that Slovakia has the best score in the Visegrad Four region in the area of basic digital skills, the threat of automation and robotisation, as well as the ever-increasing demands on the labour market and the mismatch between labour supply and demand, calls for **more active support in the field of continuing adult education, i.e. education of working-age adults**. Specific attention should be paid to **low-income groups or people employed in automated professions at risk** in order to prevent them from falling into the safety net of the social system. Last but not least, the current pandemic has shown that minimum basic digital skills are also needed for people of retirement age to enable their inclusion in private, social and professional life.
- ⊕ The results of the analysis also show a fundamental **need to increase the number of women with advanced digital skills in the ICT sector**. The number of ICT specialists should be supported at national and international level, e.g. by adopting a national strategy to increase the share of women and girls in ICT and ensure its budgetary coverage. Experience so far shows that all sectors are interested in this support and can *de facto* benefit from it, given the increasing penetration and usability of digital technologies, e.g. in research, education, health and industry. At the same time, a higher number of ICT specialists will help eliminate gender biases, often unknowingly embedded in the creation of smart digital solutions and their applications.

3.1.3 Use of Internet services

- ⊕ The assessment of indicators of this dimension can only be directly influenced by the state to a very limited extent. Their level is rather a by-product of State measures in other areas, which lead to favourable conditions for a higher take-up of internet services. From the point of view of DESI, in order to improve Slovakia's position in this dimension, there is **primarily a need for sufficient digital skills of the population, while increasing the availability of electronic communications infrastructure and a sufficiently fast internet connection**. Failure to meet the specific objectives of the first two dimensions of DESI will lead to a stagnation and a gradual deterioration of Slovakia's assessment also in this dimension.
- ⊕ Given that the evaluation of all indicators of the Internet usage dimension is based on the content of the questionnaire in the Eurostat statistical survey, **it is essential that the content of the questionnaire is representative and reflects current technological and user trends**. At the same time, in order to improve the quality of the collected data, **a thorough comprehensibility of the specific questions of the questionnaire** is crucial in order to ensure that respondents from different social groups and age groups understand them correctly and that their answers reflect reality as accurately as possible. This may be facilitated by additional questions or explanations that the interviewer may use in addition to the main questions formulated by Eurostat. It is therefore essential that Slovakia participates actively and in a coordinated manner in the annual preparation of the text of the questionnaires within Eurostat working groups. At national level, there is a need to continue to provide accurate translation of the original questionnaire with the addition of comprehensible examples, as well as thorough training of interviewers and presentation of examples and additional questions that can lead the respondent to a more precise answer.
- ⊕ For individual measures to improve the location of Slovakia in this dimension, taking into account the structure of the dimension, it is necessary to focus in particular on improving

subdivision 3a (Use of the Internet). **By reducing the number of people who have never used the Internet** (indicator 3a1), **and simultaneously increasing the number of internet users** (indicator 3a2), there will be an increase in subdivision scores of 3b Online Activity and 3c Banking. This is because these two dimensions calculate the share of users of each internet service from the set of Internet users captured in subdivision 3a.

3.1.4 Integration of digital technologies

- ④ In order to achieve a higher score in dimension 4, it is necessary **to promote the use of digital technologies at the level of small and medium-sized enterprises** and the use of internet communication channels. The use of cloud solutions and the processing of big data already score relatively high, but still have the potential for further improvement. However, according to the analysis of the evolution of the indicators in Annex 2, it appears that the strengthening of these indicators can only contribute to a limited extent to Slovakia's overall shift in the assessment of this dimension.
- ④ The indicators in the fourth dimension are evaluated on the basis of questionnaire surveys of a representative sample of enterprises, with a number of questions being listed only every second year (alternation of questions is carried out to reduce the total length of the questionnaire). However, it is still only a sample survey and not market-wide aggregate data that could be considered as more objective information on businesses, even with a shorter data collection interval. From a methodological point of view, it is appropriate to **encourage a debate at European Commission level, where further data sources are being sought to develop indicators with high relevance** on the integration of digital technologies in the EU.
- ④ Furthermore, a **precise and concise translation of questions must be ensured, so that there are no diverging national outcomes due to different interpretations** of the meaning of the questions, which in the past has led to some significant differences between States.

3.1.5 Digital public services

- ④ The indicator of the number of eGovernment users is defined in DESI very narrowly, which causes the observed decrease of Slovakia in the rating. As indicated by the analysis of the indicator (see Annex 4: Analysis of DESI indicators), only the user who sent the electronic form is considered to be a user of digital public services. Given the general trend to abandon eForms as part of the modernisation of electronic services, it is therefore logical that the set of users thus defined will be reduced. In September 2020, the Commission adopted a proposal by member states to extend the definition of this indicator to any electronic interaction with public institutions where the requested transaction and the supply of services by the state takes place. As this quantity is already being detected by Eurostat, the indicator will be redefined already in DESI 2021. It can therefore be assumed that its value for Slovakia will increase. We therefore recommend **supporting proposals to broaden the definition of this indicator at EU level towards the widest possible spectrum of digital interaction with public institutions**.
- ④ Slovakia needs to **continue proactive steps towards improving the quality of user experience in the use of digital public services, including in particular the improvement of the user interface of digital public services**. The importance of indicators of user-friendly environment is clearly strengthened in the eGovernment Benchmark evaluation and therefore activities in this area will also improve Slovakia's rating in both rankings.
- ④ While the share of digitalised public services is gradually increasing year-on-year, it does not reach and catch up with the EU average. Moreover, it is not much more pronounced compared

to the fast-paced Romania, which is currently in the last place. Slovakia has been improving services for entrepreneurs in the long term. While high-quality digital public services for entrepreneurs are an important competitiveness potential in the EU single market, these benefits and convenience must be extended to private users. Based on the methodology for evaluating services in eGovernment Benchmark and the results achieved by Slovakia in the individual attributes evaluated, it would be possible to **identify priority services and their functionalities, which should be primarily targeted by electronics.**

3.2 Strategic goals of Slovakia in the dimensions of DESI

The following chapter defines the ambitions in the different dimensions of DESI that Slovakia wants to achieve. It also describes the intervention logic in specific priority areas where the proposed measures are most needed or will have the greatest impact on improving Slovakia's position in DESI.

3.2.1 Connectivity

Slovakia's strategic goal in the connectivity dimension is in line with NBP to ensure growth total fixed broadband take-up rate by one to two percentage points on a yearly basis, thus achieving the minimum EU average. In terms of connectivity coverage at a speed of at least 100 Mbit/s, the ambition is to surpass the EU average. As long as this ambition is fulfilled by building fibre networks, it will also allow Slovakia to become the leader of the EU ready to deploy 5G networks.

Slovakia needs a **powerful electronic communications infrastructure** to advance digitally in business, the lives of its inhabitants and the functioning of its public administration. To meet this ambition, it is essential **to cover all households with a connection of at least 100 Mbit/s** for downloading data with the possibility to extend to 1 Gbit/s **and socio-economic interactions⁵⁰ by connecting speeds of at least 1 Gbit/s.**

In the field of electronic communications infrastructure, these intentions are primarily capable of securing fibre networks, the lines of which will be brought to fixed or wireless access points close to the end-user. Optical cables are currently the recommended medium for interconnection between the backbone network and regional 5G wireless networks. Fulfilling this vision of building an electronic communications infrastructure within the meaning of the NBP is a prerequisite for Slovakia to become a leader in preparedness for 5G deployment, which is also one of the objectives of the NBP.

The intentions regarding the gigabit communication solution were incorporated by Slovakia into the NBP and in the Recovery Plan (RRP), the implementation of which will be directly influenced by indicators in this dimension of DESI. The availability of adequate electronic communications infrastructure will in particular be affected by indicators relating to fixed broadband take-up rates (indicators 1a1 and 1a2). However, it is necessary to realise that Slovakia's results in these indicators are significantly limited by the morphological disadvantage of its territory, which increases the price for excavation works in difficult and hilly terrain. Therefore, it is not possible to expect a territory coverage of 100 %. However, Slovakia can realistically aim to achieve at least the EU average with a gradual increase in the overall fixed broadband take-up rate (indicator 1a1) by one to two percentage points

⁵⁰Schools, transport hubs, major providers of public services, businesses using digital services, etc.

per year. In terms of coverage with a very high capacity fixed network, CFP sets a target of full coverage by 2030, bringing Slovakia to the level of EU leader as Malta is today. In the event that the recommendations under the CFP are not followed, Slovakia's aim must be at least to maintain its current position with a possible slight increase.

The Broadband Competence Office (BCO) established in cooperation between MIRRI and rú is responsible for the fulfilment of the objectives of the NBP in Slovakia. The BCO is also part of a pan-European BCO network between Member States (or regions). Another ambition of the BCO will be to help defined connectivity measures to improve Slovakia's position in DESI in the Connectivity dimension.

The state should also **act proactively in coordinating construction works and removing some administrative and financial constraints in building electronic communications infrastructure** at local level. Based on the World Bank's "Doing Business 2020" report, Slovakia is the penultimate place in the EU for the duration of the building permit (on average more than 300 days). It is therefore necessary to adopt amendments to the relevant legislation that would significantly reduce the administrative burden and simplify authorisation procedures for the construction of electronic communications infrastructure. A single electronic tool is an example of a measure which, based on the experience of other EU Member States, appears to be beneficial. It would therefore be appropriate to continue with the Atlas of Passive Infrastructure. For the construction of electronic communications infrastructure, it is also crucial to translate existing legislation into application practice and to enforce it consistently in order to reduce administrative obstacles in construction works.

3.2.2 Human capital

The strategic goal of Slovakia in the human capital dimension is to achieve a minimum average The EU, however, given the nature of the economy and the need to increase Slovakia's competitiveness, the main objective will be to outperform the EU average in the assessment over a period of 3 to 5 years.

Achieving this goal will require maximum political support and an early start to the reforms that Slovakia has been delaying for years. Human capital is extremely important and has an impact not only on other dimensions of DESI, but above all on the future of the country itself and brain drain abroad, for better education opportunities, or for living conditions. **Brain drain is one of the most pervasive problems of the Slovak education system, which needs to be addressed in the framework of improving Slovakia's position in this dimension.** According to the latest survey of the Institute of Education Policy of the Ministry of Education, Science, Research and Sport of the⁵¹ Slovak Republic, especially the most successful graduates go abroad. The consequences are evident and negative for the economy. Slovakia is losing the most successful students and the labour market of qualified workforce, science of potential doctoral candidates and scientists. If this negative trend in Slovakia is not reversed, the consequences for society as a whole will be disastrous.

Slovakia urgently needs to take measures that will not only **support STEM studies** and the gradual reintroduction of mathematics as a compulsory graduation course in schools where relevant, but especially those that encourage students to pursue such studies in Slovakia. Whether by choosing

51 <https://www.minedu.sk/data/att/18017.pdf>

secondary schools, colleges or further studies.

We consider it of the utmost **importance to take into account the importance of digital skills and to incorporate them into education from an early age, including the preparation of quality lifelong learning**. The acquisition of digital skills must be accessible to all inhabitants of Slovakia, regardless of age, education or membership of disadvantaged groups of the population. In addition to the efficient use of digital technologies, there is a need to focus on awareness-building and knowledge-building in the areas of cybersecurity, media literacy and the capacity of increasingly needed digital hygiene.

Women in Slovakia represent only 13.3 % of ICT specialists compared to the EU average of 17.7 %⁵². Despite the fact that in recent years the share of women studying ICT disciplines has increased in Slovakia, women are still under-promoted in the attractiveness and potential of their studies and careers in the IT and digital sector. We need **to eliminate persistent disinterest and enable women to be fully involved and implemented in the digital sector** by effectively promoting ICT courses and employment opportunities.

We must also not **forget the elderly, who represent one of the population groups that lag behind in digital skills in Slovakia**. This was particularly evident during the current COVID-19 pandemic, during which measures were defined that prevented many seniors from fully participating in social and economic life in an effort to reduce personal contact between people. Research conducted suggests that forced isolation and loneliness during the COVID-19 pandemic may have an impact on mental health and overall deterioration of the health status of seniors, with a possible consequence of increased mortality compared to normal non-COVID-19.

In order to ensure a modern, forward-looking and **digitally skilled public administration**, further support will be proposed for the development of digital skills of government and self-government employees.

The above objectives will help to **develop, approve and, in particular, effectively implement the National Digital Skills Strategy and the Lifelong Learning Strategy**, with an emphasis on transferable and necessary skills for the digital age. Given their horizontal nature, their importance and their impact on Slovakia's further development and position in DESI, these strategies must be considered to be cross-sectoral.

For the sake of completeness, it should be added that the excessive and improper use of digital technologies, or their early availability, especially for children, in the light of a number of available studies, is linked to negative impacts on human development, health and behaviour, including their emotional or socio-social development. As the present material focuses on the indicators evaluated by the DESI, the negative aspects mentioned above are further addressed by other adopted strategic, conceptual and implementation documents.

3.2.3 Use of Internet services

The strategic goal of Slovakia in the third dimension is to achieve a minimum average placement Slovakia in the evaluation of DESI 2025.

Due to the limited capacity of the State to intervene directly in favour of increasing the frequency of

⁵² https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=71569

use of internet services by the population, it is necessary to focus primarily on awareness-raising. It is important **to actively engage in communicating the benefits of digital transformation, thereby increasing** the willingness of the population to accept it as a positive trend and an incentive to make the most of it. The aim is **to increase the number of internet users in Slovakia and reduce to eliminate the proportion of the population that the Internet has never used**. People who have never used the internet need to communicate and simply illustrate the possibilities and services that the Internet offers them. For those who use the internet to a limited extent, there is also a need to communicate more advanced options, which they may not have known or feared to take advantage of.

Following the mapping of barriers perceived by citizens in their use of the Internet and the proposed communication campaign, it will be possible to consider and adequately set up a mechanism to support the familiarisation and use of specific internet services. It will be possible to link this tool to the above-mentioned support for internet demand by increasing the incentive for citizens to use internet services.

The popularisation of the possibilities and benefits of the Internet should be linked to measures aimed at lifelong learning and the acquisition and upgrading of digital skills, which are part of the strategy to improve Slovakia's position in the human capital dimension.

3.2.4 Integration of digital technologies

The strategic goal of Slovakia in the fourth dimension is to achieve an increase in the Slovak score in DESI 2025 by 4.4 points, bringing Slovakia to the current average of countries THE EU.

In order to achieve a substantial improvement in scores in **the fourth dimension, entrepreneurs in particular need to have sufficient digital skills to use new technologies in business**. In particular, the European Digital Innovation Hubs (ECDI) will support the transfer of professional (digital) skills to the business environment with an emphasis on the SME environment. In addition to general digital advice, ECDI will **raise awareness of how digital technologies can be used in different business sectors**, as well as provide opportunities for testing them.

ECDI is a tool that should integrate businesses, solution providers, clusters, but also platforms, which are typically a tool for effectively spreading awareness of Industry 4.0. In order to ensure that the smallest and least convinced enterprises are not left out of the process of adopting the concept of Industry 4.0, but also of digitalisation as such, attention should also be paid to building platforms that are lacking in Slovakia in this area.

Furthermore, **technological transfer within industrial and innovation clusters from the research environment to concrete examples of best practice in business needs to be promoted** with available tools. Promising technologies are, in particular, the deployment of artificial intelligence, high-performance computing for the processing of large volumes of data, blockchain, 5G, cloud, Internet of Things, as well as versatile cybersecurity to prevent future vulnerabilities.

3.2.5 Digital public services

The strategic goal of Slovakia in the fifth dimension is to achieve a minimum EU average in the assessment in the DESI 2025 evaluation, in particular in terms of the share of digitalised services, Slovakia has

the potential to overcome it.

This dimension is one of the two dimensions with the smallest weight on the total DESI score. As it builds as a matter of priority on the eGovernment Benchmark evaluation, careful attention also needs to be paid to measures to improve it. These ultimately, complemented by other measures specifically linked to the parameters followed by the eGovernment benchmark, will contribute to improving Slovakia's assessment not only in DESI, but also in this ranking.

Given that **up to two out of five indicators of this dimension relate to the use of data and registers in the provision of digital public services, action in this area should contribute most significantly to improving scores in this dimension.** It is necessary to **streamline the re-use of data** already available to the State on users in different central registers. This data should be proactively used against the backdrop of services and filled in in service handling processes without the need for the user to repeatedly detect and fill it out. In particular, data quality and the interconnectivity of registers are prerequisites for this. It is therefore essential to continue activities to improve data quality and integrate registers for the efficient exchange of available public administration data between its institutions.

With regard to open data, it is desirable **to increase the number of published datasets in user-friendly and machine-readable form.** The **Open Data Portal is much lagging behind the pan-European trends in the functionalities** it should meet. Due to the technological shift, new attributes are added within the European Data Portal evaluation, the absence of which in the case of the Slovak portal reduces our score in this ranking and subsequently in the fifth dimension of DESI.

The European Data Portal also identifies the impact and use of data in public policy making as the worst rated among the four dimensions of the ranking. This is only reinforced by the argument why **it is necessary to focus on making analytical data available and actively using them in formulating strategic visions and policies,** especially in the areas of economics, social affairs and environmental protection.

The digitalisation of services and the prioritisation and order of action in this area need to be approached in a coherent and strategic way. It is necessary to define uniform criteria for prioritisation of services and consequently to allocate human and financial resources adequately to projects relating to the services thus selected. Moreover, in view of the **need to improve the user experience in electronic communications with the state,** it is necessary to think about integrating services (process steps) into integrated wholes, life situations, within the framework of electronicisation. For this reason, it will not be sufficient to prioritise, for example, only one of the services necessary to deal with all the elements in a given life situation. Moreover, it will gradually be desirable to expand the concept of life situations by including commercial services between businesses and their consumers. Thus, the procedural integration of digital public services should also allow for the connection of commercial digital services over time for the best possible user experience and efficiency in a given life situation.

The strategic objectives of the different dimensions of DESI are matched by specific measures and tasks which they will serve as tools to achieve the objectives set. An overview of these measures for each of the five dimensions, Annex 1: Action plan to improve Slovakia's position in DESI. In general, we consider the full duration of this strategy as the deadline for their implementation. we expect their impact on Slovakia's evaluation given the index methodology

first in DESI 2025.

4 Implementation of the strategy

The present strategy and action plan contain measures aimed at establishing the conceptual or strategic frameworks needed to improve DESI indicators in its particular areas. In addition, the Strategy and Action Plan propose practically implemented initiatives and projects directly fulfilling the measured DESI indicators. The implementation of the above measures will be carried out under the supervision of the responsible and co-managers indicated directly for each action plan in Annex 1.

Last but not least, the material provides recommendations and measures of a procedural nature. These are mainly aimed at increasing coordination in the collection and evaluation of data underlying DESI, improving feedback on annual DESI results at national level, as well as strengthening the impact of indicators measured by DESI when deciding on upcoming national strategy papers and future digital initiatives. In accordance with the procedural steps described above, the submitter will initiate and cooperate with the relevant public authorities.

The Strategy promoter continuously and regularly monitors the evolution of the evaluation of Slovakia in DESI. Every year it analyses the published results of DESI and the evaluation achieved by Slovakia. Based on the results of this analysis, it may propose corrections to the content or implementation of the proposed actions of the Action Plan, depending on the observed developments in the EU or possible changes in the DESI.

4.1 Implementation structure and management system

The implementation of the strategy and action plan at the working level will be carried out within their remit by the individual guardians who are responsible for each action. The overall coordination and monitoring of the implementation of the measures shall be the responsibility of the submitter, who shall, where appropriate, provide consultations or synergies to the responsible authorities. In particular, the Working Group on Digital Transformation of the Slovak Republic, led by MIRRI, will be the platform for coordination and cooperation of stakeholders. The working group will also be used to regularly deduct the implementation of this strategy and action plan.

The petitioner is also responsible for regularly informing about the state of implementation of the Strategy and Action Plan measures. In this sense, by the end of June each year (starting in 2022), the gestoris of the measures will provide relevant evidence on the state of implementation of their actions to the material submitter. It then reports annually to the Government's Council for the Digitalisation of Public Administration and the Digital Single Market by the end of September of the year.

4.2 Risk management system and assumptions for strategy implementation

The continuous implementation of individual measures can be monitored by monitoring the result and output indicators proposed by the gestoris of the measures and listed for each of the proposed measures in Annex 1. The usual observation interval is on an annual basis.

Another advantage over other strategies is the nature of the area under review, as the purpose of the DESI strategy is an improvement in the DESI index – improvement is indicated by the shift in the DESI score. As mentioned above, the development of the evaluation of Slovakia in DESI will be monitored continuously and regularly by the submitter and, if necessary, in cooperation with the authorities of the measures, propose their corrections, in particular if there is a risk of significant deviation from the objectives of this strategy. In case of significant deviation from the objectives pursued, the Deputy Prime Minister and Minister for Investment, Regional Development and Informatisation may submit to

the Government of the Slovak Republic a proposal for additional interventions. The risks related to the measurement of individual indicators and their validity to reality are described in detail in Annex 4 as part of the analysis of each indicator. Based on this analysis, the recommendations set out in Chapter 3 have been identified.

Given the complexity of the indicators evaluated by DESI, the improvement of the Slovak position in the ranking requires a coordinated initiative aimed at almost all areas of digitalisation. The ambition to move Slovakia to higher positions in DESI must be cross-cutting across all relevant innovation agendas. It is therefore clear that the objectives of this strategy need to be coordinated and synergistically reflected in the digital agendas and initiatives of all relevant sectors. The strategy promoter will provide the departments with maximum synergy in finding optimal ways to set up future planned initiatives and strategy papers so as to contribute as much as possible to improving the evaluation in DESI. The results of the analysis of the evaluation of Slovakia in DESI and the development of its position in it, presented by this strategy, can also guide the future setting of objectives and priorities of digitalisation at national level. Their meaningfulness should also be assessed in terms of how their results will contribute to improving the evaluation of Slovakia in DESI and other international indices.

The availability of sufficient financial resources in terms of projected expenditure on proposed measures is a key prerequisite for the implementation of the strategy and the achievement of its objectives, in particular a visible improvement in the evaluation of Slovakia in DESI. Given that a number of proposed measures foresee funding from currently evolving sources, in particular EU sources, the success of the strategy depends directly on whether these measures are sufficiently included.

5 Conclusion

The strategy and action plan to improve Slovakia's position in the DESI index by 2025 is a strategic document of the Government of the Slovak Republic, which defines the recommendations, objectives and measures needed to increase the level of digitalisation of Slovakia. The document is of a cross-sectoral nature and aims to synergistically link and streamline already ongoing or planned digital initiatives at national level. At the same time, it identifies and develops a number of new tasks that address the areas not covered for the time being needed to improve the Slovak score in DESI.

The actions identified and proposed are based on an analysis of the evolution of the evaluation of Slovakia in DESI since its first publication in 2015 to today, including in the context of the evolution of digitalisation across the EU over the same period. The conclusions of the analysis point to a number of areas of digitalisation, which are the most fundamental reasons why Slovakia is stagnating and lagging behind in the DESI evaluation. It is clear that Slovakia needs to work on the two most fundamental prerequisites for successful digitalisation – connectivity and digitally skilled human capital. This is also in line with the fact that it gives the most weight to these two dimensions of the country's overall score in this index. The document also pays attention to the necessary measures in the other three dimensions of DESI.

The strategy addresses identified challenges by defining strategic priorities and ambitions in each dimension. These measures, linked to specific indicators or to a group of DESI indicators, should serve to fulfil them. By implementing these measures, we expect an improvement in the evaluation of these selected indicators, which will be reflected cumulatively by an increase in Slovakia's overall score in DESI. Rigorous implementation of the presented strategy can contribute to moving Slovakia from the last quarter of the EU ranking and reaching the EU average.

When implementing the strategy, it should be borne in mind that other EU Member States will also work to accelerate their digital transformation. The catch-up that most of the EU has compared to Slovakia therefore requires a truly focused and synergistic activity, on which strategic emphasis will be given, complemented by political support and adequate resources. At the same time, given the complexity and interdependence of the various areas of digitalisation that need to be addressed, it is important to note that the delivery of results will be significantly delayed. This is also due to the measurement methodology itself, which interprets data mostly with an annual delay. It is also important to initiate the process defined by the document as soon as possible and to strive for the quickest and most efficient implementation of the measures.

Annex 1: Action plan to improve Slovakia’s position in DESI: Measures in the DESI dimensions

I. Connectivity

I.1 Implementation of the National Broadband Plan of Slovakia

Description:	Implementation of the National Broadband Plan
The Responsible:	MIRRI SR
Deadline:	2030 ⁵³
Financial envelope:	EU resources and national budget
Expected outputs:	<p>OBJECTIVE 1: All households, whether rural or urban, will have access to internet connections of at least 100 Mbit/s expandable per gigabit by 2030.</p> <p>OBJECTIVE 2: All significant actors in socio-economic interaction, such as schools, transport hubs and major providers of public services, as well as businesses using digital services, will have access to Gigabit connectivity by 2030.</p>
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 1a1 Overall utilisation rate of fixed broadband • DESI indicator 1a2 Fixed broadband take-up rate connections with speeds of at least 100 Mbit/s • DESI indicator 1b1 Fast broadband coverage (NGA) • DESI indicator 1b2 Fixed network coverage with very high capacity (VHCN) • Desi indicator 1c3 Ready to deploy 5G networks • Desi indicator 1d1 Broadband price index <p>Supporting:</p> <ul style="list-style-type: none"> • Numbers of new connected households and significant entities socio-economic interaction

I.2 Broadband Competence Office (BCO)

Description:	As an office integrated under existing structures on MIRRI SK and rú, BCO will support broadband development and sustainability activities. The office will perform tasks related to ensuring the fulfilment of the objectives set out in the CFP, efficiency of broadband investment, obtaining and providing transparent information on the state of broadband access networks in Slovakia (for citizens, businesses), providing technical support to local and regional authorities, providing advice and assistance to citizens and businesses in
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⁵³ In line with the government-approved NBP, its implementation will go beyond the period of this strategy and action plan until 2030.

	broadband deployment, as well as with the support of the expertise of public authorities in the planning, implementation and monitoring of broadband projects. It will also focus on strengthening its expertise.
The Responsible:	MIRRI SR/RU
Deadline:	2022
Financial envelope:	EU resources and national budget
Expected outputs:	<p>The tasks of the BCO are mainly related to the following agendas:</p> <ul style="list-style-type: none"> • Strategic planning for broadband deployment • Monitoring the implementation of infrastructure development plans electronic communications • Managing the public consultation of network operators • Mapping the presence status of electronic infrastructure communications • Management of State interventions in the field of electronic infrastructure communications • The provision of information of a technical and economic nature, expertise on the administrative capacity of public authorities in planning, implementing and monitoring broadband projects • Assistance in coordination with relevant EU bodies: EIAH, Jaspers, DG REGIO, DG AGRI, DG COMP, DG CNECT
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 1a1 Overall utilisation rate of fixed broadband • DESI indicator 1a2 Fixed broadband take-up rate connections with speeds of at least 100 Mbit/s • DESI indicator 1b1 Fast broadband coverage (NGA) • DESI indicator 1b2 Fixed network coverage with very high capacity (VHCN) • Desi indicator 1d1 Broadband price index <p>Supporting:</p> <ul style="list-style-type: none"> • Number of conceptual, analytical and methodological materials

II. Human capital

11.1 Creating a National Digital Skills Strategy

Description:	Defining a cross-sectoral national digital skills strategy with its own actions, recommendations for departments with a focus on people of productive and post-productive age. The strategy would build on European documents, in particular the Digital Competences Reference Framework of DIGCOMP 2.1, the Education 2020 Action Plan, the European Skills Agenda – 2020, the recommendations of the National Strategy
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	skills ⁵⁴ , IT Fitness Test ⁵⁵ results, outputs of the National Project IT Academy – Education for the 21st Century, as well as the conclusions of the study on the state of digital skills of employees in small and medium-sized enterprises ⁵⁶
The Principal	MIRRI SR
Spolugestori:	MŠVVŠ SR/MPSVR SR/MH SR
Deadline:	2022
Financial envelope:	Not required
Expected outputs:	The strategy will help to increase the values of all indicators of the second dimension of DESI.
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 2a1 At least basic digital skills • DESI indicator 2a2 More than basic digital skills • Desi indicator 2a3 At least basic software skills • Desi indicator 2b1 ICT specialists • Desi indicator 2b2 ICT specialist • Desi indicator 2b3 ICT graduates <p>Supporting:</p> <ul style="list-style-type: none"> • Results of IT Fitness Testing

II.2 Digital skills education of seniors and civil servants

Description:	<p>Introducing regular testing of digital skills through the IT FITNESS test and creating an enabling environment for increasing the specific digital skills of seniors and civil servants. Based on the analysis carried out, the development and implementation of training programmes to acquire and increase the basic digital skills of public administration employees under the DIGCOMP framework and in relation to internationally recognised certification schemes (such as ICDL - <i>International Certification of Digital Literacy</i>) will take place. There will also be the creation and implementation of educational programs to acquire and increase basic digital skills of seniors according to the DIGCOPM framework with a focus on facilitating life situations, using e-services (also in connection with eGovernment) and making safe use of open communication opportunities in the Internet environment.</p> <p>Based on the results of the IT Fitness Test, suggest further measures to increase the level of digital skills of the target groups mentioned above.</p>
The Principal	MIRRI SR
Deadline:	2024
Financial envelope:	OPII
Expected outputs:	Increasing the digital skills of seniors and government employees.

⁵⁴ <https://epale.ec.europa.eu/sk/resource-centre/content/narodna-strategia-zrucnosti-pre-slovensko>

⁵⁵ <https://itas.sk/wp-content/uploads/2020/12/IT-Fitness-Zaverecna-Sprava-2020—A4-1.pdf>

⁵⁶ <https://www.mirri.gov.sk/aktuality/digitalna-agenda/pocitacova-gramotnost-slovenskych-firiem-je-pre-successful-digital-transformation-country-key/index.html>

Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 2a1 At least basic digital skills • DESI indicator 2a2 More than basic digital skills • Desi indicator 2a3 At least basic software skills <p>Supporting:</p> <ul style="list-style-type: none"> • Number of educational programmes • Number of civil servants involved in training • Number of ICDL certificates obtained • Results of IT Fitness Testing • Number of seniors enrolled in universities of the third age • Results of IT Fitness Testing for Seniors
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II.3 Adoption of a lifelong learning strategy promoting upskilling and reskilling in digital skills

Description:	The Lifelong Learning Strategy (LLP) will reflect the identified need to increase digital skills in the population according to the DESI index. The strategy will anchor more flexible learning paths and higher permeability of individual educational levels. It will also respond to the growing need for reskilling/upskilling of the adult population, including in response to labour market demands, in particular in the context of automation and digitalisation.
The Principal	MŠVVŠ SR
Spolugestori:	MIRRI SR/MPSVR SR
Deadline:	2021
Financial envelope:	Not required
Expected outputs:	Elaboration of complex super-departmental lifelong strategies in education, which will be submitted for approval by the Government of the Slovak Republic. The strategy will focus on measures to meet measurable lifelong learning objectives in Slovakia, including those that will lead to improvements in DESI's Digital Skills Indicators. The strategy will focus on systemic changes with an impact on the entire relevant population and encourage the acquisition of new ones; especially basic (and transferable) digital skills. The creation of an individual learning account scheme (ILA) is also
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 2a1 At least basic digital skills • DESI indicator 2a2 More than basic digital skills • Desi indicator 2a3 At least basic software skills • Desi indicator 2b1 ICT specialists • Desi indicator 2b2 ICT specialist <p>Secondary:</p> <ul style="list-style-type: none"> • Submission of a lifelong learning strategy for approval by the Government of the Slovak Republic until the end of 2021

	<ul style="list-style-type: none"> • Pilot implementation of the system of individual learning accounts (II A)
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II.4 Increasing the performance of Slovak universities

Description:	<p>Support diversification and profiling of Slovak universities and their cooperation with abroad and the private sector.</p> <p>Planned reforms:</p> <ol style="list-style-type: none"> 1. Changing the funding of higher education institutions, including the introduction of performance contracts. The methodology for the breakdown of subsidies will be adapted to take greater account of excellent research, the applicability of graduates, cooperation with the private sector, internationalisation of universities and alignment with the upcoming methodology for evaluating creative activity. A new tool will be introduced – performance contracts that will support the profiling and diversification of HEIs based on their strengths and development potential 2. Introduction of a system of periodic evaluation of creative activity. The system of periodic evaluation of creative activities of universities will be carried out with the participation of international evaluators, will ensure diversification of HEIs and identification of excellent research teams at individual HEIs. 3. A new approach to higher education accreditation. The new accreditation standards tighten the conditions for the guarantee of study programmes. 4. Reforming the governance of universities. The competences of the various (self-governing) higher education bodies will be reconfigured in order to better reflect responsibilities, allow for greater flexibility inside the university, and also remove restrictions on filling the posts of associate professors and professors, thus promoting the openness of the academic environment to both professional and foreign candidates. 5. Concentration of excellent learning capacities. The aim is to reduce the number of HEIs by promoting their integration into larger units that can withstand international competition and at the same time create a competitive and diversified environment inside. <p>Planned investments:</p>
The Principal	MŠVVŠ SR
Deadline:	2025
Financial envelope:	EU resources
Expected outputs:	<p>Higher quality universities will contribute to economic growth in two ways. Better education reflecting current and future labour market needs will contribute to higher job creation, retention and attracting of talent and thus to higher and more sustainable economic growth. Better research and cooperation with the private sector will contribute to the development of sectors with high added value, innovation and increased competitiveness of Slovak enterprises. Performance contracts will also aim to increase the share of graduates in IT fields of which there is a significant shortage. This measure will have a major impact on the DESI Advanced Skills Index indicators and will enable the development of the digital innovation economy.</p>
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • Desi indicator 2b1 ICT specialists

	<ul style="list-style-type: none"> • Desi indicator 2b2 ICT specialist • Desi indicator 2b3 ICT graduates <p>Secondary:</p> <ul style="list-style-type: none"> • Number of PhD students in ICT • Number of university graduates in technical fields who after graduation, they applied in the studied field • The long-term objective of this measure is that at least one Slovak the university has placed in the top500 universities of the world in renowned academic rankings and other universities regularly ranked in TOP1000 • A greater difference between the skills of people with higher education and
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II.5 Survey on barriers to the use of women in ICT and campaign activities to increase the motivation of women and girls

Description:	Survey among ICT firms and women of working age on existing barriers to the application of working-age women in the ICT industry. On the basis of the survey carried out, correct existing activities under measure 1.1.6. The Action Plan for the Digital Transformation of Slovakia and develop a proposal for further measures to improve the state of play. A targeted communication campaign aimed at motivating girls to take up employment in the ICT sector.
The Principal	MIRRI SR
Deadline:	2022
Financial envelope:	State budget
Expected outputs:	Identification of barriers and major problems affecting women's uptake in the ICT sector in Slovakia Increase the share of women in the ICT sector by DESI to the EU average
Indicators:	Primary: <ul style="list-style-type: none"> • Desi indicator 2b2 ICT specialist

II.6 Curriculum Reform for Education for the 21st Century

Description:	Curriculum reform of primary school will create new learning content organised in three multi-year cycles. Instead of passing on finished information, teaching will create situations in which pupils can interpret the information in confrontation with real experience. The new curriculum will require the provision of new textbooks and a change in teacher training so that these changes can be applied in everyday practice. At the same time, reform strengthens quality skills teaching and professional staff and will motivate them to lifelong professional development. The focus will also be on inclusive education and the acquisition of digital skills in the Reform:
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⁵⁷ <https://www.nucem.sk/sk/merania/medzinarodne-merania/piaac>

	<ul style="list-style-type: none"> Reform of content and forms of education (curricular and textbook reform) Preparation and development of teachers for new content and forms of teaching (change higher Teacher Training and Strengthening Teacher Professional Development) Investments: <ul style="list-style-type: none"> Digital infrastructure in schools
The Principal	MŠVVŠ SR
Spolugestori:	MIRRI SR
Deadline:	2025
Financial envelope:	EU resources
Expected outputs:	<p>The main objective of the curriculum reform is to improve the literacy and skills of pupils needed for the 21st century (critical thinking, digital and soft skills). A new approach to computational learning will help develop problem solving, creativity and collaboration skills. The reform will also improve the quality of the skills of teaching and professional staff and motivate them to pursue lifelong professional development.</p> <p>In connection with the DESI Index, we expect improvements in both basic and advanced skills.</p>
Indicators:	Primary: <ul style="list-style-type: none"> DESI indicator 2a1 At least basic digital skills DESI indicator 2a2 More than basic digital skills Desi indicator 2a3 At least basic software skills Secondary: <ul style="list-style-type: none"> Results of IT Fitness Test

III. Use of Internet services

111.1 Identification of barriers to Internet use by residents in Slovakia

Description:	<p>Conduct a survey on barriers and problems in the use of the Internet and the reasons for refusing to use the Internet by 16-74-year-olds. Based on the survey carried out, a set of recommendations and other measures will be developed to improve the state of play. The result of the survey will also feed into the content of the communication campaigns of measures III.2 and III.3. The results of the survey also have the potential to inform further activities to improve DESI indicators 1a1, 1a2, 1c2, 2a1, 5a1 and 5a3.</p>
The Responsible:	MIRRI SR
Deadline:	2022
Financial envelope:	EU resources
Expected outputs:	<p>Identification of obstacles and problems preventing citizens from using the internet. Identifying the reasons for refusing to use the internet and drafting recommendations and measures to improve the state of play.</p>
Indicators:	Primary:

	<ul style="list-style-type: none"> • Desi indicator 3a1 People who have never used the Internet • Desi indicator 3a2 Internet users • Desi indicator 3b1 News • Desi indicator 3b2 Music, videos and games • Desi Indicator 3b3 Video on Demand • DESI indicator 3b4 Video Calls • DESI indicator 3b5 Social • DESI indicator 3b6 Participation in online courses • DESI indicator 3c1 Banking • DESI indicator 3c2 Purchases • DESI indicator 3c3 Sale online <p>Secondary:</p> <ul style="list-style-type: none"> • Study carried out with recommendations and suggestions for
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III.2 Communication campaign to increase the use of the Internet by the population

Description:	Communication campaign (divided into multiple campaigns by age group 16-74) in order to communicate, in particular, to the more advanced possibilities offered by the internet in the areas of social contacts, communication with the state, education, information, entertainment, banking, purchasing and selling (e.g. use of eInvoice and eTreaty). The campaign will be carried out taking into account the outcome of the study carried out from Action III.1.
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	EU resources
Expected outputs:	For the DESI indicator, which measures the percentage of the population who use the Internet at least once a week to increase the share from the current 82 % of DESI 2020 to 90 % in DESI 2025
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • Desi indicator 3a2 Internet users <p>Secondary:</p> <ul style="list-style-type: none"> • Desi indicator 3b1 News • Desi indicator 3b2 Music, videos and games • Desi Indicator 3b3 Video on Demand • DESIindicator 3b4Video calls • DESIindicator 3b5Social networks • Desi indicator 3b6 Participation in online courses • DESIindicator 3c1Banking • DESIindicator 3c2Shopping • DESIindicator 3c3Selling online • DESIindicator 1a1Overall utilisation rate of fixed

	<ul style="list-style-type: none"> • DESI indicator 1c2 Mobile broadband usage rate connections • DESI indicator 5a1 eGovernment users
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111.3 Communication campaign to promote internet opportunities for people who have not yet used the internet

Description:	A communication campaign (divided into several campaigns by age group 16-74) implemented mainly through traditional media, which would hitherto affect residents not using the internet at all. The campaign should communicate the potential and benefits that the Internet brings to this target group and which outweigh the risks. It will also include popularising the habits of safe use of the Internet so that users are not afraid to use the Internet because of concerns caused by cyber threats. The campaign will be carried out taking into account the outcome of the study carried out from Action III.1.
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	EU resources
Expected outputs:	Reduce the percentage of the DESI indicator, which measures the ratio of the population who never used the internet, from the current 11.7 % in the DESI 2020 result to half 5.8 % in the result of DESI 2025
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • Desi indicator 3a1 People who have never used the Internet • Desi indicator 3a2 Internet users <p>Secondary:</p> <ul style="list-style-type: none"> • Desi indicator 3b1 News • Desi indicator 3b2 Music, videos and games • Desi Indicator 3b3 Video on Demand • DESIindicator3b4 Video Calls • DESIindicator3b5 Social Updates • Desi indicator 3b6 Participation in online courses • DESIindicator3c1 Banking • DESIindicator3c2 Purchases • DESIindicator3c3 Sale online • DESIindicator1a1 Overall solid utilisation rate broadband • DESI indicator 1c2 Mobile broadband usage rate connections • DESI indicator 2a1 At least basic digital skills • DESI indicator 2a2 More than basic digital skills

IV. Integration of digital technologies

V. 1 Building a network of European Digital Innovation Hubs

Description:	The objective is described in Action C of Slovakia's Digital Transformation Action Plan 2019-20225859. Once established, the ECDI network will work with other structures such as National Digital Innovation Centres, Digital Services Clusters, and Lifelong Learning Centres. However, the key ECDI mission is maintained.
The Responsible:	MIRRI SR
Deadline:	2025
Financial envelope:	DEP, RRF, ESIF
Expected outputs:	In the first phase, the establishment of max. 5 ECDI.
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 4a1 Electronic information sharing • Desi indicator 4a3 Big data • Desi Indicator 4a4 Cloud <p>Secondary:</p> <ul style="list-style-type: none"> • Number of SMEs benefiting from ECDI services – 50 cumulative from the establishment of the ECDI to 2022

IV.2 SME vouchers for the introduction of digital innovation into entrepreneurship⁵⁹

Description:	A tool for reimbursing the costs incurred by SMEs in deploying the digital technologies needed to develop modern forms of business (inspired by the EU COSME scheme in Ireland). The Facility will support the application of innovative solutions in the sense of the concept of "Industry 4.0", including increasing the cybersecurity of SMEs.
The Responsible:	MH SR/SIEA
Deadline:	2023
Financial envelope:	EU resources
Expected outputs:	Increased implementation of digital technologies in business
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 4a1 Electronic information sharing • Desi indicator 4a3 Big data • Desi Indicator 4a4 Cloud <p>Secondary:</p> <ul style="list-style-type: none"> • number of vouchers issued

58 Approved by Slovak Government Resolution No 337/2019 of 2 July 2019, <https://rokovania.gov.sk/RVL/Material/24027/1>

59At the time of its implementation, the measure will be subject to an assessment in the light of State aid rules within the meaning of Act No 358/2015 on the regulation of certain relations in the field of state aid and minimum aid and amending certain acts (the State Aid Act).

VI. 3 Strengthening staffing capacities to evaluate the impact of legislative and non-legislative proposals for the digitalisation of the economy and society in the Digital Impact Assessment (DIA) process

Description:	The expansion of MIRRI's staffing capacity will allow to further explore and oppose proposals legislative also non-legislative materials presented to the Government of the Slovak Republic with an emphasis on identifying opportunities to reduce the administrative burden on citizens and entrepreneurs in the field of digitalisation of the economy and society. The aim is to systematically remove bureaucratic barriers and regulatory constraints in the digital economy in order to improve the position of market participants, facilitate the deployment of innovation and enable the emergence of new business models. The initiative will include proposals by central state administration bodies, in particular the Ministry of Finance and the Ministry of the Economy, for legislative modifications that will create the conditions for the introduction of digital solutions to simplify commercial
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	EU resources
Expected outputs:	Removing bureaucratic obstacles, making the legislative environment clearer, preparing official opinions in the EU legislative process.
Indicators:	Number of minutes spent filling in government forms

IV.4 Supporting projects aimed at developing and applying top digital technologies

Description:	Capacities (human resources, technologies, infrastructure) in research, development and applications of High Performance Computing and quantum technologies, Artificial Intelligence, Distributed Recording Technologies, Internet will be strengthened things, analyses large volumes data, local telecommunications networks and other digital technologies in Slovakia, using in public administration, business environment and scientific research institutions. The creation and operation of a total of eight institutions and
The Responsible:	MIRRI SR
Deadline:	2025
Financial envelope:	Proposal for financing under the Recovery and Resilience Plan
Expected outputs:	Creation of separate platforms in prospective areas of the digital economy in Slovakia.
Indicators:	Primary:

⁶⁰ Approved by Government Resolution No 32/2018 of 24. 1. 2018, <https://rokovania.gov.sk/RVL/Material/22573/1>

⁶¹ National supercomputing centre, Slovak Blockchain Partnership (in preparation), platform to support the development of the artificial intelligence ecosystem in Slovakia, expansion of the Digital Coalition (in preparation), platform for the development of smart mobility in Slovakia (in preparation), platform for the development and regulation of digital media, online platforms and the fight against information operations (digital media hub), platform for improving the provision of public health services using digital innovation and technologies (digital health care hub), platform for the industrial use of IoT technologies (embedded systems) to process data from mass measurements

	<ul style="list-style-type: none"> • DESI indicator 4a1 Electronic information sharing • Desi indicator 4a3 Big data • Desi Indicator 4a4 Cloud • DESI indicator 4b1 Online sales of SMEs • Desi indicator 4b2 Turnover e-commerce • DESI indicator 4b3 Cross-border online sales <p>Secondary:</p> <ul style="list-style-type: none"> • Number of new start-ups in digital areas
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VII. Digital public services

V.1 Implementation of the national project “Open Data 2.0 – Development of central components for high quality open data security”

Description:	The project will develop and complete central technical components and means to make open government data available on a permanent basis. Implementation will be ensured technical support ecosystem open data and the provision of additional services. The measure will contribute to increasing data quality and traceability of open data. The development of the Open Data Portal will take place in line with the recommendations of the
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	OPII
Expected outputs:	Improving the overall availability of public administration data in the form of
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 5a5 Open data <p>Secondary:</p> <ul style="list-style-type: none"> • 1000 new datasets published in high format potential for re-use • 10 government institutions linked to the central platform for Open Data

V.2 Implementation of the national project “Development of the Data Integration Platform (Central Integration Platform) and Personal Data Management”

Description:	Data integration will create conditions to improve data sharing, speed up the functioning of public administration and improve the quality of data and thus decision-making processes. The project will improve the management and protection of personal data in public administration systems through a technical solution. It will also provide input for “transparent logging” of data accesses. The project also includes the expansion of functionalities and the creation of new services of the data integration platform. The project is also
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	data lifecycle processes to enhance data quality, interconnection and referencing.
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	OPII
Expected outputs:	Improving the quality, standard and accessibility of eGovernment services for citizens and entrepreneurs. Modernisation a rationalisation public news simplifying data integration. Citizens and businesses will be given access to the
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • Desi indicator 5a2 Pre-filled forms • DESI indicator 5a3 Online service provision • DESI indicator 5a4 Digital public services for businesses <p>Secondary:</p> <ul style="list-style-type: none"> • 95 % of data on citizens and entrepreneurs made available for the service “my data” • Reducing the average time for data integration (through the platform) data integration) by 25 % • Number of new simplified life situations for citizens (1 service) and entrepreneurs (1 service), implemented by a combination of electronic services • Number of additional electronic services for citizens (1 service) and entrepreneurs (1 service) that can be solved with a mobile application

V.3 Creation of a consolidated analytical layer of general government data

Description:	The main objective of the project is to improve decision-making in public administration through systematic data analysis and increase the availability of data for analytical processing by creating a consolidated analytical layer as an open platform. Better decision-making can be achieved through the application of data science methods in public administration processes. The project will provide more data for analytical processing in the required quality and in the required scope and tools for carrying out analyses and publishing results.
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	OPII
Expected outputs:	Significantly improving the capabilities and capabilities of analytical units to access and use data to improve the decision-making process in public administration. Increasing the impact of data on decision-making in public
Indicators:	Primary:

	<ul style="list-style-type: none"> • DESI indicator 5a5 (Open data) <p>Secondary:</p> <ul style="list-style-type: none"> • 20 sections of public administration where decision-making is supported analytical systems • new datasets published in format with high potential for re-use • 4 analytical units/organisational units supported by the solution consolidated Analytical Layer • 14 use cases supported by analytical data processing • 20 analytical outputs generated in the analytical layer • 30 connected data sources (in a format that allows
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V .4 implementation of the national project “Data integration: making the HR data base available, including open data, through a data integration platform”

Description:	The project will create an infrastructure for the practical implementation of the once-only principle and the making available of open management data. The activity consists of the process of connecting data providers and connecting data consumers to the central data integration platform. Data integration will ensure the interconnection of agenda systems, their secondary registers and records at the data level (in particular integration at the level of individual data storage, synchronisation, updating and referencing). There will be an environment in which data providers and data consumers can share records objects in a controlled (controlled) way.
The Responsible:	MIRRI SR
Deadline:	2023
Financial envelope:	OPII
Expected outputs:	Automation of data sharing between individual government information systems. Government data will be accessible from a single location and will also be usable for legal purposes. Reference data will be obtained from different source information systems without hindrance. Greater efficiency in the use of government data for the benefit of the citizen and the entrepreneur. Ensuring the existence, accuracy, completeness, validity and authenticity of data in electronic communications or electronic transactions Any government data which is not subject to confidentiality or does not contain sensitive or personal data shall be made available as open data through publicly accessible interfaces enabling their machine-processing for further free use. Reducing the administrative burden on citizens and entrepreneurs in the provision of digital public services.
Indicators:	DESI indicator 5a2 (Pre-filled forms)

	DESI indicator 5a5 (Open data)
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V.5 Uniform prioritisation in the digitalisation of public services

Description:	The task is based on the Revision of Informatisation Expenditure 2.0, title of the measure: Map end-to-end services provided by the State to 20 % of the priority services pursued by eGovernment Benchmark (117 services) with the largest market presence and 100 % of services (23 in total) within the Single Digital Gateway and to prioritise their development.
The Responsible:	MIRRI SR
Deadline:	2021
Financial envelope:	Not required
Expected outputs:	A uniform methodology and criteria for prioritising e-services.
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • DESI indicator 5a3 (Online service provision) • DESI indicator 5a4 (Digital public services for enterprises) <p>Secondary:</p> <ul style="list-style-type: none"> • 20 % of digital public services in eGovernment evaluation <p>The benchmark in which Slovakia scores bad scores will be identified as a priority for their complete digitisation</p>

V .6 implementation of the updated National Concept of Informatisation of Public Administration after its approval

Description:	Proposal updated NKIVS reflects also relevant attributes evaluated in international measurements of the quality of digital public services. Due to the need to link activities aimed at improving the evaluation of Slovakia in DESI, the effective implementation of tasks resulting from NKIVS will be reflected in a better position of Slovakia in DESI.
The Responsible:	MIRRI SR
Deadline:	2030
Financial envelope:	Not required
Expected outputs:	In line with the stated objectives of NCIs
Indicators:	<p>Primary:</p> <ul style="list-style-type: none"> • Desi indicators 5a1 to 5a5 <p>Secondary:</p> <ul style="list-style-type: none"> • Measurable indicators defined by NKIVS

V .7 implementing the principles of the Berlin Declaration on the Digital Society and the Value-Based Digital Government

Description:	The Berlin Declaration on the Digital Society and Value-Based Digital Government sets out concrete measures to improve the state's digital services based on principles such as respect for
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	fundamental rights and democratic values, social participation, and the strengthening of citizens' digital literacy. Measures include, for example, promoting the use of eID not only in public administration but also in the private sector, improving transparency of state services, inclusive digitalisation of state services (also aimed at disadvantaged citizens), organising workshops and trainings on digital skills, promoting the implementation of the once-only principle, implementing common standards and, where appropriate, open software, sharing experiences with the use of AI in public services, considering measures to increase the transparency of energy consumption of digital tools and infrastructure and how to improve their efficiency.
The Responsible:	MIRRI SR
Deadline:	2025
Financial envelope:	EU resources, NR
Expected outputs:	Transforming e-government services to create services that are safe, accessible to every citizen, respect human rights, inclusive, resilient to cyber threats and human-centric. Commitment creation such services will taken into account in relevant national strategy papers (NCS) and establish a basic framework for further strategic planning for the digitalisation of public administration services at national level.
Indicators:	Primary: <ul style="list-style-type: none"> • Desi indicators 5a1 to 5a5 Secondary: <ul style="list-style-type: none"> • Evaluation of the implementation of the Berlin Declaration on the basis of annual report on the state of implementation of the measures in each Member State, to be submitted in summary to the Commission

Annex 2: Analysis of DESI indicators

Dimension 1 Connectivity

Indicator 1a1: Overall fixed broadband take-up rate

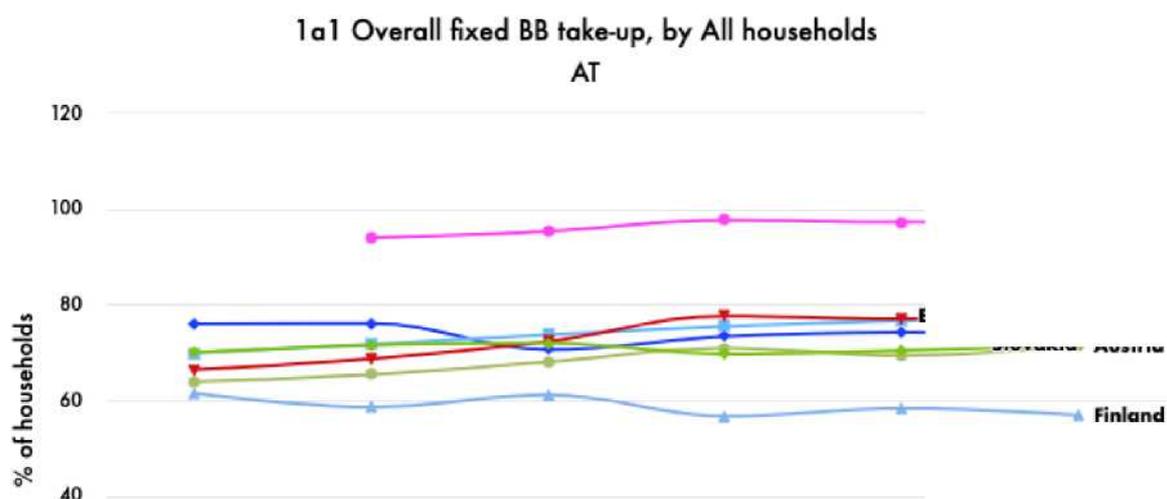
<i>Description</i>	<i>Sample</i>	<i>Unit</i>	<i>Source</i>
<i>% of households with fixed broadband subscriptions (DSL, ADSL, VDSL, cable, optical fibre, satellite, public WiFi)</i>	All households with at least one individual aged 16-74	% of households	Eurostat — Use of ICT in households and individuals

The way in which indicator 1a1 is defined does not include all available types of internet connection for households. The indicator does not count towards the proportion of covered households those who use an internet connection via wifi network operators in an unlicensed band. Due to geographical conditions, there are areas where only this type of broadband internet coverage is available. Nevertheless, this, although full coverage, does not count towards the share of households with internet connectivity, which distorts the picture of the available electronic communications infrastructure in Slovakia.

The source of the indicator is a statistical survey on a representative sample of respondents by means of a standardised questionnaire prepared annually by Eurostat. In Slovakia, collection is usually carried out in the form of face-to-face interviews with respondents carried out by surveyors of the Statistical Office of the Slovak Republic. The value of the indicator is calculated on the basis of the answer to the two questions whether and what type of internet connection the respondent has in the home. Given the highly technical nature of the question about the type of internet connection, it cannot be expected that a regular respondent is able to correctly indicate what type of connection he or she uses. At the same time, it is possible that in some activities you may not be aware that it has an internet connection in your home. For this reason, MIRRI, in cooperation with the Statistical Office of the Slovak Republic, proceeded to develop a methodological instruction for interviewers with additional questions to ensure that the respondent does not really have the internet connection of his household, as it is possible that the value of the indicator is underestimated due to inaccurate responses of respondents.

Fixed broadband take-up rates ranged from only 57 % to 98 % within the EU in 2019. The Netherlands, the United Kingdom, Luxembourg and Germany recorded the highest take-up rates, while Finland, Bulgaria, Italy, Poland and Latvia scored the lowest, which may be partly due to fixed mobile substitution. There was some progress in Slovakia in 2020, with 72 % of households subscribed to some type of fixed internet offer, slightly below the EU average. Over the past five years, Slovakia's position oscillates between 69 % and 72 %, which represents 10th to 18th place. From this, we conclude that Slovakia is slowly falling behind the evolving electronic communications infrastructure in other EU Member States. Slovakia is below the EU average.

The following graph and table include the selected group of states (V4 + AT) as well as the most successful (NL) and least successful country (FIN) according to DESI 2020. In the comparator countries, Hungary



recorded the largest increase, driven by significant government investment and the use of EU funds.⁶²

2015
2015
2017
2018
2019
2020

European Commission, Digital Scoreboard

Netherlands

European Union
Slovakia

20

1a1: Overall fixed broadband take-up rate		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	10.	12.	14.	18.	20.	18. ↑
	score in %	69.9 %	71.5 %	71.9 %	69.7 %	70.4 %	71.7 %
EU	score	69,9	71,7	73,7	75,5	76,6	77,6
The Best MS EU	order	1. LUX	1. LUX	1 LUX	1 HOL	1 HOL	1 HOL
	score	90,6	94,5	95,7	97,6	97,3	97,9
The Worst MS EU	order	28. IT	28. IT	28. IT	28. IT	28 BG	28 FIN
	score	51,5	52,6	55,2	56,7	57,9	56,9
Austria	order	17.	19.	20.	16.	21.	19.

	score	63,9	65,4	68,0	70,9	69,3	71,6
Czechia	order	7.	9.	16.	15.	14.	17.
	score	75,9	76,0	70,6	73,4	74,2	74,1
Hungary	order	14.	16.	12.	10.	12.	11.
	score	66,4	68,7	72,3	77,6	77,0	81,8
Poland	order	23.	26.	26.	25.	26.	25.
	score	59,7	57,4	58,7	61,2	59,6	62,3

⁶² Presentation Broadband Competence Office Hungary on webinar BCO Networks, Superfast Internet Program, Hungary, 23.6.2020

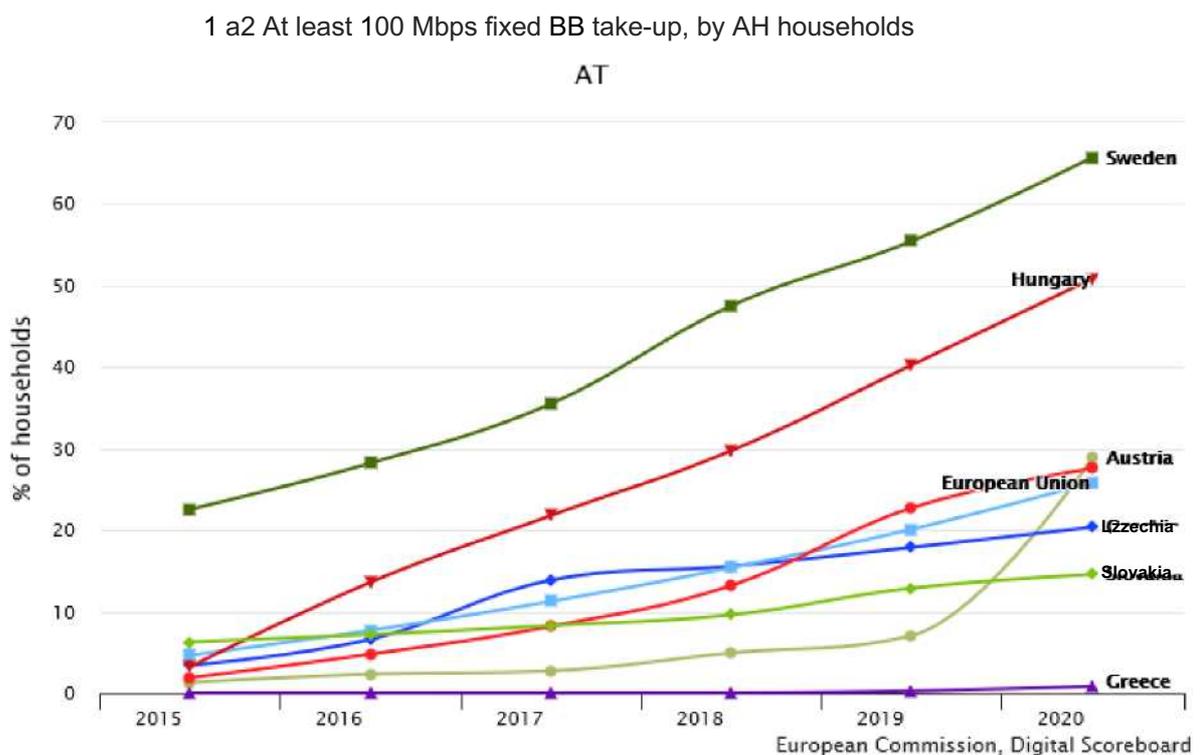
Tab. 8: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 1a2: Fixed broadband take-up rate of at least 100 Mbit/s

Description	Sample	Unit	Source
% of households that have signed up for fixed broadband at least 100 Mbit/s, calculated as total broadband usage multiplied by a percentage of fixed broadband lines of at least 100 Mbit/s	All fixed broadband connections of households	% of households	European Commission services via the Communications Committee (COCOM); Eurostat – ICT use in households and individuals

The value of indicator 1a2 is calculated from two sources. Eurostat's statistical survey provides input to the overall use of broadband. COCOM in turn has data on the share of fixed broadband lines with speeds of at least 100 Mbit/s.

In 2020, Slovakia made modest progress in this indicator, reaching 15 % of the household, but ranked 22nd among the EU Member States. Slovakia has moved from 10 % to 15 % since 2018. It oscillates between 21st and 22nd place. Slovakia ranks in the last third of the EU Member States, among the last eight countries. Sweden is the absolute leader. Since the beginning, Hungary has been increasing steadily and significantly thanks to substantial investment through European funds, but also to the country's geographical advantages. Austria jumped above the EU average in DESI 2020 when it jumped from its original location to Slovakia.



1a2: Fixed broadband take-up rate of at least 100 Mbps		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	8.	14.	17.	21.	21.	22.
	score in %	6.29 %	7.2 %	8.3 %	9.62 %	12.9 %	14.6 %
EU	score	4,65	7,72	11,3	15,4	20,1	25.9 %
The Best MS EU	order	1. LAT	1. SW	1 SW	1 SW	1 SW	1 SW
	score	23,9	94,5	35,5	47,5	55,5	65,8
The Worst MS EU	order	28. DG	28. DG	28. DG	28. DG	28 DG	28. DG
	Score in %					0,25	0,84
Austria	order	23.	23.	24.	24.	25.	13.
	score	1,33	2,33	2,74	4,94	7,09	28,9
Czechia	order	13.	15.	12.	14.	16.	19.
	score	3,42	6,63	13,9	15,6	17,9	20,4
Hungary	order	14.	7.	7.	7.	4.	4.
	score	3,25	13,6	21,8	29,8	40,3	50,9
Poland	order	21.	21.	18.	13.	12.	14.
	score	1,89	4,79	8,21	13,2	22,7	27,6

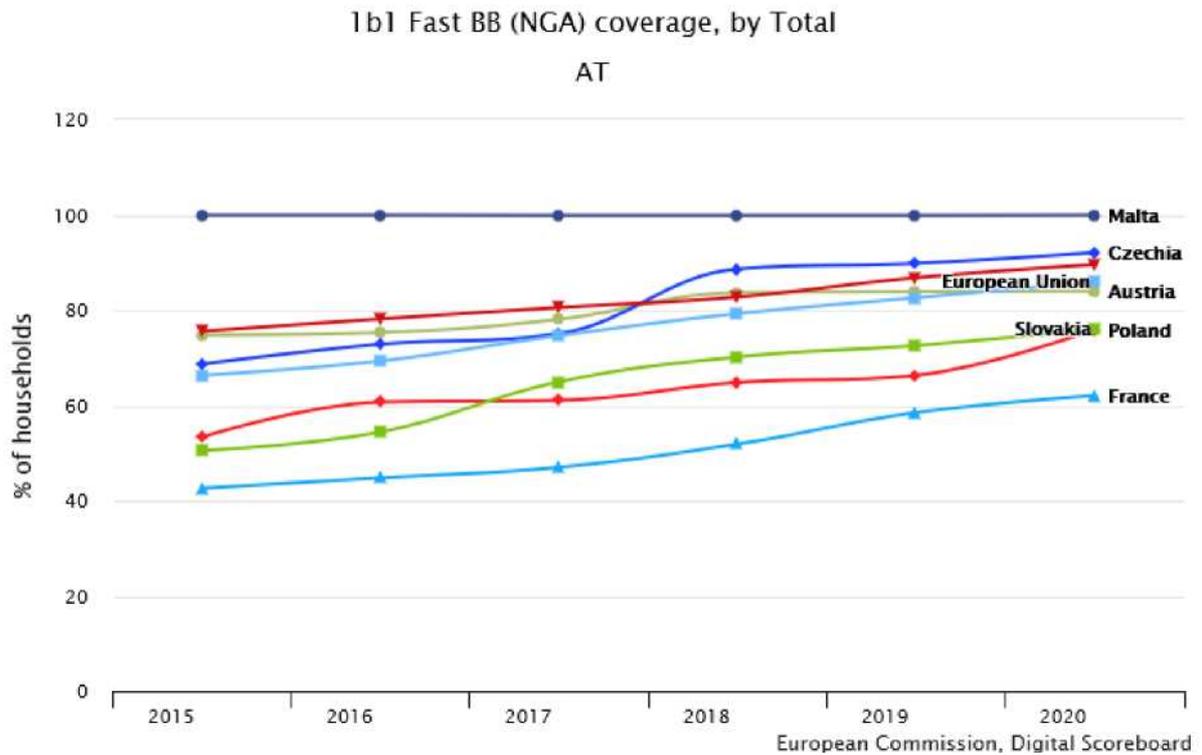
Tab. 9: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 1b1: Fast Broadband Coverage (NGA)

Description	Sample	Unit	Source
<i>% of households covered with a fixed broadband connection with a speed of at least 30 Mbit/s download. The indicator includes the following technologies FTTH, FTTB, Cable Docsis 3.0, VDSL</i>	All households	% of households	Broadband coverage in Europe, studies for the EC by Point Topic (2011-2012 figures, SMART 2011/0027 and 2012/0035) and IHS and Valdani, Vicari & Associati (2013 figures, SMART 2013/0054)

From the point of view of the definition of the 1b1 indicator, the problem is that this does not take into account fixed 4G data solutions, which are definitely up to 30 Mbit/s at speed. At the same time, the indicator should also count fixed wireless connections in the licensed band as well as in unlicensed via WiFi network operators. Due to geographical conditions, only fixed broadband Wi-Fi is available in some places.

Fast broadband coverage (NGA) in Slovakia has reached 76 % but is still below the EU average of 86 %. Slovakia has moved from 70 % to 76 % in the last three years and oscillates between 23 rd and 24th places. Slovakia is following the same trend as Poland. The leaders are Malta and Cyprus, where their morphological predisposition facilitates the expansion of NGA coverage. On the contrary, perhaps surprisingly, France ranks steadily in the last place, which is due to the poor coverage of rural areas. The country has replaced this with fixed mobile coverage, and recently with broadband investments.



1b1: Fast Broadband Coverage (NGA)		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	23.	23.	23.	23.	24.	24.
	score in %	50.5 %	54,4	64.9 %	70.2 %	72.6 %	76 % =
EU	score	66,3	69,4	74,7	79,3	82,6	85,8
The Best MS EU	order	1 MLT					
	score	100	100	100	100	100	100
The Worst MS EU	order	28. IT	28. DG	28. FR	28. FR	28. FR	28. FR
	Score in %	31,7	36,3	47	51,9	58,5	62,1
Austria	order	14.	15.	15.	14.	17.	18.
	score	74,8	75,3	78,1	83,7	83,9	84
Czechia	order	20.	18.	17.	9.	10.	11.
	score	68,7	72,9	75,1	88,6	89,8	92,1
Hungary	order	11.	12.	13.	16.	14.	13.

	score	75,6	78,2	80,6	82,7	86,8	89,6
Poland	order	22.	22.	24.	25.	25.	25.
	score	53,4	60,7	61,1	64,8	66,3	75,9

Tab. 10: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 1b2: Very High Capacity Fixed Network (VHCN) coverage

Description	Sample	Unit	Source
% of households covered by any fixed VHCN. It includes technologies such as FTTH and FTTB for 2015-2018 and FTTH, FTTB, and FTTP and Cable Docsis 3.1 for 2019	All households with at least one individuals in 16-74 years old	% of households	Broadband coverage in Europe, studies for the EC by Point Topic (2011-2012 figures, SMART 2011/0027 and 2012/0035) and IHS and Valdani, Vicari & Associati (2013 figures, SMART 2013/0054)

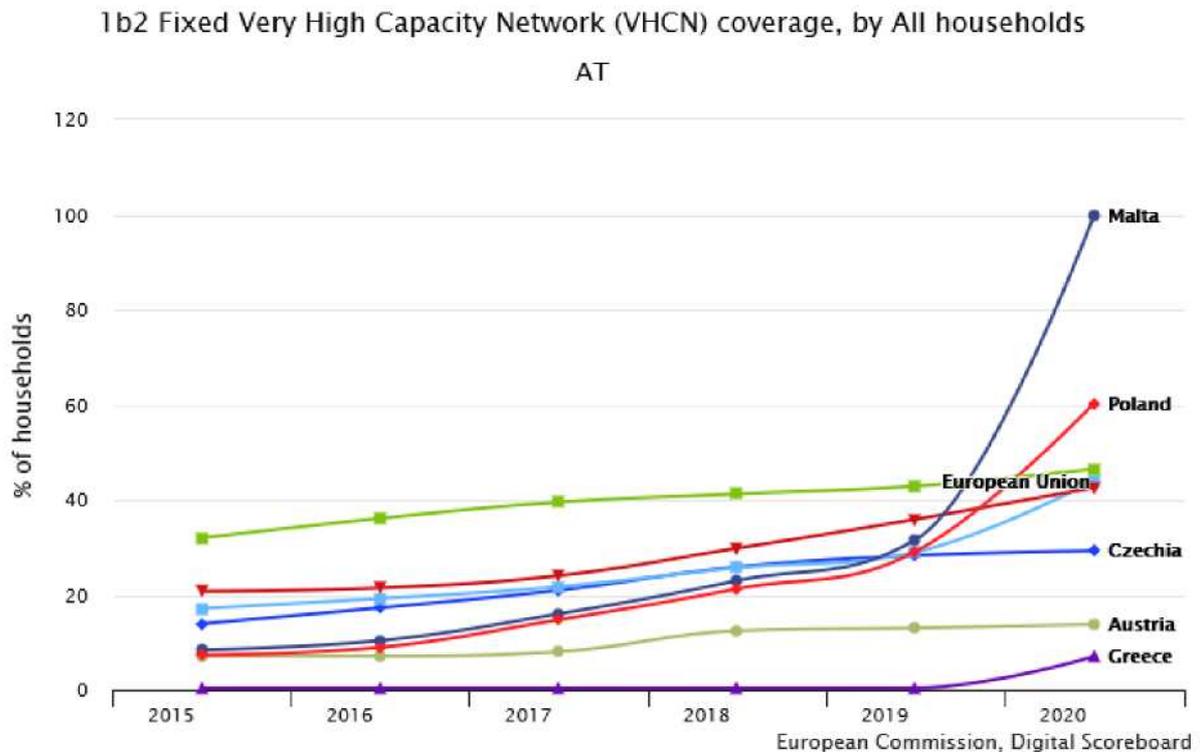
In the current DESI 2020 report, VHCN coverage is approximated as a combined footprint of FTTP (Fiber to the Premises) and DOCSIS 3.1 (Data Over Cable Service Interface 3.1).

Slovakia has a good coverage of a very high capacity network of 47 %, corresponding to a 16th place among the EU Member States. The percentage has shifted from 41 % to 47 % over the last three years, but in DESI 2020 there has been a decrease from a stable 11st place in previous scores. Nevertheless, Slovakia surpasses the EU average of 44 % in this indicator.

In Slovakia, network operators invested in the construction of VHCN networks due to the lack of electronic communications infrastructure. From an economic point of view, network operators were interested in constructing the network into new multi-apartment buildings in cooperation with developers or in multi-apartment buildings in housing estates where there is a large population density, or in cooperation on new buildings. Slovakia, together with the comparator countries, ranks among the better average (46.5 %), but Poland becomes the leader in the region (60.3 %) thanks to the state's investments in electronic communications infrastructure through loan funds, but also its geographical possibilities. The overall leader in the EU is Malta with 100 % coverage, which benefits from its small size island state. It is followed by Denmark and Luxembourg with a coverage of over 90 %. The lowest-ranked player is Greece (7 %). Austria and the Czech Republic are below 30 %.

1b2: Very High Capacity Fixed Network (VHCN) coverage		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	11.	11.	11.	11.	11.	16.
	score in %	32 %	36.1 %	39.5 %	41.3 %	42.9 %	46.5 %
EU	score	17,2	19,2	21,7	25,7	29	44
The Best MS EU	order	1. LAT	1 MLT				
	score	83,9	85	85,2	85,7	87,8	100
The Worst MS EU	order	28. CY	28. CY	28. CY	28. CY	28. DG	28. DG
	Score in %					0,39	7,05
Austria	order	22.	22.	22.	22.	22.	25.
	score	7,14	7,11	8,05	12,4	13	13,8
Czechia	order	17.	16.	16.	17.	19.	23.
	score	13,9	17,3	21	25,9	28,3	29,3
Hungary	order	15.	15.	15.	15.	14.	19.
	score	20,8	21,5	24	29,8	35,9	42,6
Poland	order	21.	21.	21.	20.	18.	13.
	score	7,31	8,98	14,8	21,3	29,1	60,3

Table 11: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 1c1: 4G coverage

Description Sample Unit Source

% of populated areas with 4G advanced mobile broadband coverage (LTE Protocol) – measured as the average coverage of network operators in each country

All households with at least one individual in 16-74 years old % of households

Broadband coverage in Europe, studies for the EC by Point Topic (2011-2012 figures, SMART 2011/0027 and 2012/0035) and IHS and Valdani, Vicari & Associati (2013 figures, SMART 2013/0054)

From the point of view of the definition of the indicator, we find it problematic that it is calculated as an average coverage. To reflect truly the entire market in a given country, a more accurate approach would be a weighted average based on the number of subscribers or SIM cards sold, or the revenues or outgoing minutes reported by individual network first-timers.

The calculation of this indicator by a simple average damages Slovakia and does not reflect the competitiveness and availability of mobile data for the market. The main reason for this is that one in four mobile network operators on the Slovak market (4ka) does not have any frequencies in the spectrum below 1 GHz. Their 4G coverage, built only at 1 800 MHz, will never be comparable in terms of % of the population covered to a standard 4G operator using 800 MHz. The remaining three MNOs, which dominate the market and cover 96 % or more of households, meet the standards for 4G network operators. In fact, this means that 4G services are available to all residents of the country⁶³.

Alternatively, the indicator could only be calculated taking into account the 2-3 largest network operators in the country, but it would be necessary to clearly set out the criteria for which network operators fall under this category. The criterion for inclusion in the calculation could also be whether the network operator has frequencies below 1 GHz spectrum or not.

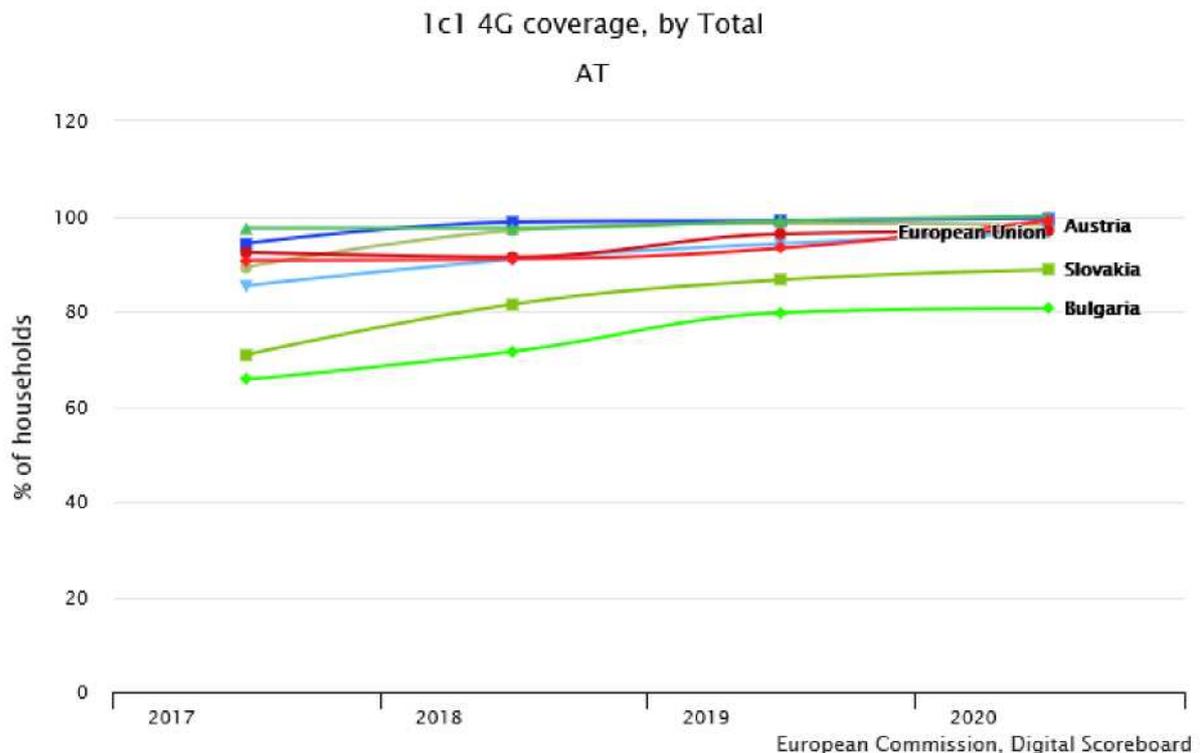
Given its source, this indicator is also one of the indicators where it would be desirable to use available objective market data instead of a study commissioned by the Commission with a private supplier. Its methodology is opaque and non-transparent, and studies tend to be available with a relatively long time lag from their completion and use of their data to calculate the score of this indicator.

The share of Slovak households with 4G coverage (average coverage) is 89 %, which remains below the EU average (96 %). Slovakia ranked third from the end of the ranking, at 26th place. Two countries report 100 % coverage (Malta, Denmark). The last one is Bulgaria. Other V4 countries and Austria are also located in front of Slovakia.

⁶³According to rú data, the first two network operators account for 97 % and 95.6 % of Slovakia's territory respectively.

1c1: 4G coverage		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	THE	THE	24.	24.	25.	26.
	score in %	THE	THE	70.9 %	81.5 %	86.6 %	88.8 %
EU	score	THE	THE	85,4	90,9	94,3	96,5
The Best MS EU	order	THE	THE	1. MLT	1. HOL	1. HOL	1. DAN
	score	THE	THE	99,3	99,6	99,6	100
The Worst MS EU	order	THE	THE	28. RO	28. BG	28. RO	28. BG
	Score in %	THE	THE	44,7	71,6	77,3	80,7
Austria	order	THE	THE	18.	11.	8.	14.
	score	THE	THE	89,3	97	98,5	98,2
Czechia	order	THE	THE	9.	3.	3.	5.
	score	THE	THE	94,3	98,8	99,1	99,6
Hungary	order	THE	THE	12.	18.	14.	21.
	score	THE	THE	92,4	91,5	96,3	96,8
Poland	order	THE	THE	14.	20.	22.	8.
	score	THE	THE	90,7	91	93,3	99,2

Tab. 12: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 1c2: Mobile broadband take-up rate

Description Sample Unit Source

Number of subscribers for mobile broadband data per 100 persons

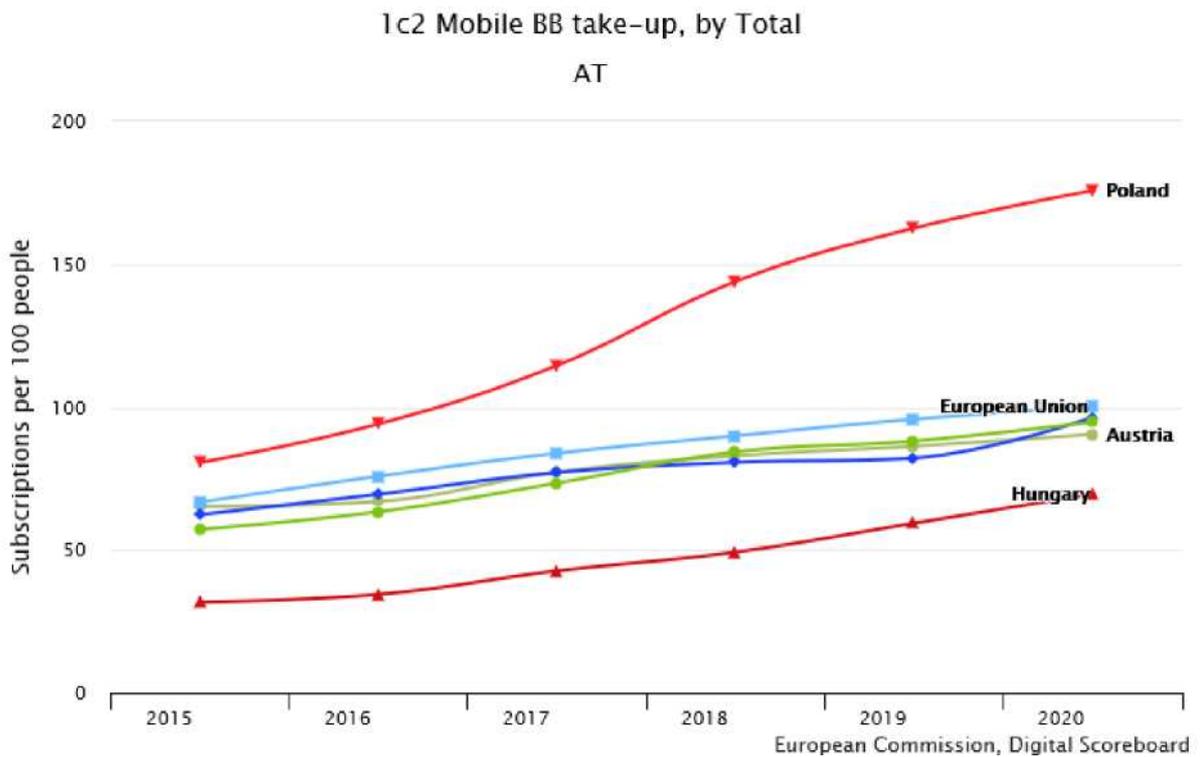
All subscribers

Number of subscribers per 100 persons

Communication Committee (COCOM) Reports – Market Indicators on Electronic Communications Collected through National Regulators

The broadband take-up rate (95 subscribers per 100 people) has increased slightly and is close to the EU average. Over the past three years, scores have increased from 84 to 95 per 100 inhabitants, which is progress, but based on data from the Slovakia, we believe that the Slovak score per 100 persons should be higher⁶⁴.

Slovakia ranks 16th among the EU Member States. Among the comparator countries (such as V4 and Austria), Slovakia is on average. The leader is Poland with almost 176 SIM cards per 100 inhabitants, while Hungary has only 67 cards per 100 people. The Nordic countries (Finland, Estonia, Denmark, Lithuania) exceeded 125 SIM cards per 100 inhabitants.



⁶⁴As at 31.12.2019, the regulator reported:
 number of broadband internet access (data) via SIM card: 4 574 272
 B) Number of broadband internet access (data) via a data SIM card (e.g. via USB modem/dongle): 760 586
 In total, there are 5334858 SIM cards that allow broadband data transfer. 896400 cards were used for active SIM cards M2M (Machine-to-Machine).

1c2: Mobile broadband take-up rate		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	17.	22.	20. ↑	16. ↑	17.	16. ↑
	users/100 inhabitants	57,2	63,4	83,8	84,3	88,1	94,7
EU	score	66,7	75,8	83,8	89,9	95,7	100,2
The Best MS EU	order	1. FIN	1. FIN	1. FIN	1. FIN	1. PL	1 PL
	score	131,2	138,6	147,2	145,9	162,5	175,7
The Worst MS EU	order	28. HU					
	Score in %	31,7	34,4	42,7	49,2	59,3	69,6
Austria	order	12.	16.	18.	17.	18.	18.
	score	165,9	67	77,2	82,9	86,3	90,5
Czechia	order	14.	14.	19.	20.	21.	14.
	score	62,3	69,5	77,1	80,6	82,1	96,3
Hungary	order	28. HU					
	score	31,7	34,4	42,7	49,2	59,3	69,6
Poland	order	5.	5.	6.	2.	1.	1.
	score	80,6	94,1	114,6	143,9	162,5	175,7

Tab. 13: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 1c3: Readiness to deploy 5G networks

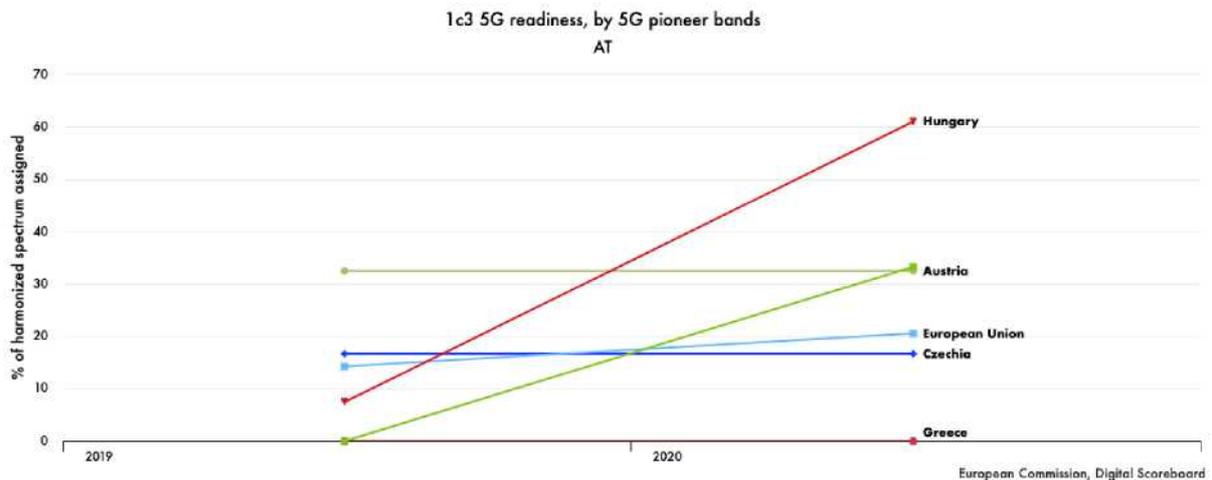
Description	Sample	Unit	Source
The number of frequencies allocated and ready to use 5G by the end of 2020 under the so-called 5G. pioneering 5G bands. These bands are 700 MHz (703-733) MHz and 758-788 MHz, 3.6 GHz (3400-3 800 MHz) and 26 GHz (1 000 MHz within 24250-2700 MHz). All three bands of the	Pioneering 5G bands	% of harmonised spectrum allocated regardless of unallocated spectrum due to lack of demand	Communication Committee (COCOM) Reports – Market Indicators on Electronic Communications Collected through National Regulators

Slovakia scores 33 % under the 5G Readiness Indicator. Slovakia ranked in the first third of the Member States. The recent (on 23.11.2020) frequency allocations in the 700, 900 and 1 800 MHz bands are expected to translate into improvements in the Slovak score and position in this indicator.

The Ministry of Transport and Construction of the Slovak Republic adopted a document entitled 'Supporting the development of 5G networks in Slovakia for 2020-2025 in order to achieve its objectives in particular in the field of spectrum and the development of electronic communications infrastructure'.⁶⁵

⁶⁵The material was approved at the level of the Minister of Transport and Construction of the Slovak Republic.

In Slovakia, 46 % of the spectrum harmonised at EU level was allocated to wireless broadband. On 31 March 2020, rú published a call for tenders to issue individual authorisations for the use of frequencies in the 700 MHz, 900 MHz and 1 800 MHz frequency bands by electronic auction. The process of releasing the 700 MHz frequency band was completed in mid-2020. Frequencies in the 3.4-3.6 GHz band were allocated in 2016, with national authorisations for frequency blocks of different sizes allocated to four network operators (O2 Slovakia, SWAN, Orange, Slovanet) by August 2025. However, selection processes for the rights to use frequencies in the upper part of the 3.6-3.8 GHz band took place in 2017, with rights granted at local (district) level until the end of 2024.



1c3: Readiness to deploy 5G connections at a speed of at least 100 Mbit/s		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order					N/A	5.
	score in %					N/A	33,3
EU	score					14,2	20,5
The Best MS EU	order					1 FIN	1 GER
	score					66,7	66,7
The Worst MS EU	order					N/A	N/A
	Score in %					N/A	N/A
Austria	order					7.	9.
	score					32,5	32,5
Czechia	order					11.	15.
	score					16,7	16,7
Hungary	order					9.	3.
	score					7,5	61,1
Poland	order					N/A	N/A
	score					N/A	N/A

Tab. 14: Comparison of Slovakia's position vis-à-vis other Member States and the EU average
Indicator 1c3 was added to the DESI evaluation shortly before the release of the report in 2019. For this reason, historical evaluation data from previous years are not available. At the same time, given the

short time to provide data, a number of Member States were not evaluated in this indicator due to the unavailability of the data (including Slovakia). We refer to missing data for these states as “N/A” in the table. Moreover, only 17 Member States have already allocated spectrum in the pioneering 5G bands and therefore EU-wide data are not available. For the same reason, the overall ranking of Member States in this indicator is also not available and it is therefore not possible to determine which Member State ranked last.

Indicator 1d1: Broadband price index

<i>Description</i>	<i>Sample</i>	<i>Unit</i>	<i>Source</i>
<i>The Broadband Price Index measures the prices of representative baskets of fixed, mobile and converged (merged) broadband bids as a % of household income</i>	All offers for fixed, mobile and merged broadband services	Score (0-100)	Access costs: Study on broadband retail prices, annual studies for the EC carried out by Empirica Income: real-time gross disposable household income per capita (Eurostat: tec00113)

The main source of the indicator 1d1 is a study contracted by the European Commission from Empirica, entitled ‘ *Mobile broadband prices in Europe 2019*’⁶⁶and ‘ *Ceny fixed broadband in Europe 2018*’⁶⁷. For the period 2019-2021, a single study on *Retail prices for broadband in Europe 2019-2021* will be⁶⁸conducted annually, which was first carried out in October 2019 for fixed and mobile broadband prices. The results of the study are transferred to the indicator, but the study itself is currently unavailable.

Based on the results of price studies, Slovakia is one of the countries with high prices for data services and products (together with the Czech Republic, Greece and Cyprus). Slovakia scores 60 on the EU average of 64 in this indicator, placing it in the 20th place among the EU Member States, which has consistently occupied for several years in a row with a very slow-growing score. Romania is the absolute leader of low prices, which is determined by the “cheap” construction of networks, i.e. the construction of fibre networks drawn and positioned “air” on columns and buildings. When analysing all price baskets of telecommunications services (fixed, mobile, converged), Romania ranks first in the EU in the Broadband Price Indicator. It leads in terms of mobile and converged baskets with index 97 and 91 respectively. In terms of fixed broadband prices, Romania ranks second in the EU.

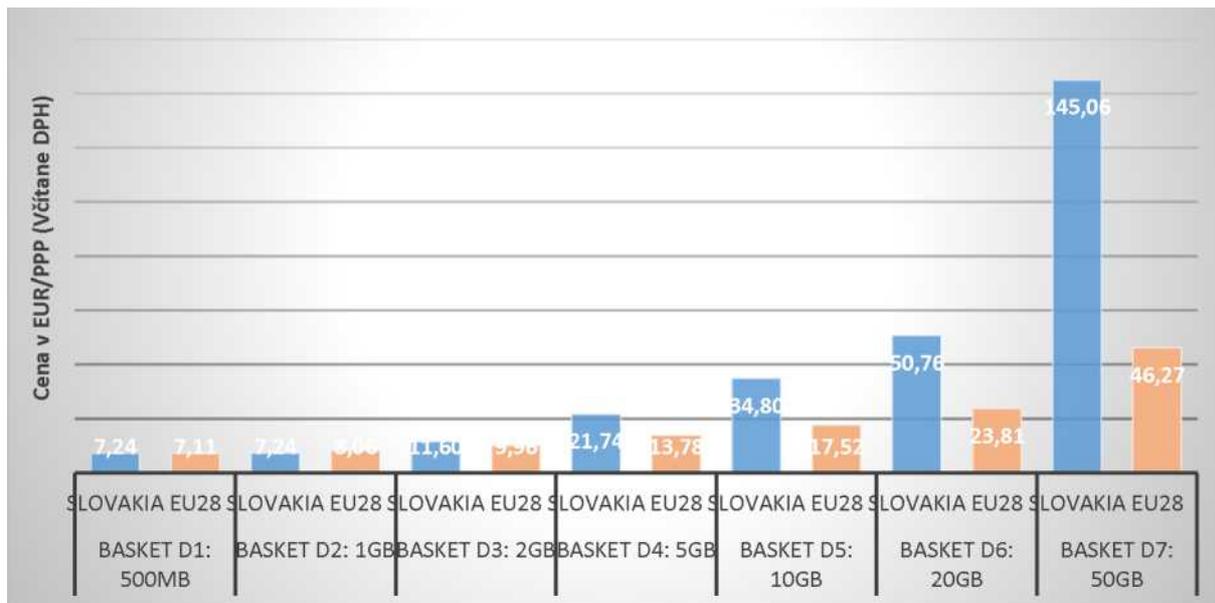
For example, prices for mobile data packages ranging from 500 MB to 2 GB in Slovakia are comparable to the EU average. Packages from 5 GB to 20 GB are already 2 times more expensive than the EU average. And the highest package (50 GB) is almost 6 times more expensive than the EU average (see chart below).

Price comparison of data service offers on Slovakia against the EU average

66 Mobile Broadband Prices in Europe 2019: <https://ec.europa.eu/digital-single-market/en/news/mobile-broadband-prices-europe-2019>

67 Fixed Broadband Prices in Europe 2018: <https://ec.europa.eu/digital-single-market/en/news/fixed-broadband-prices-europe-2018>

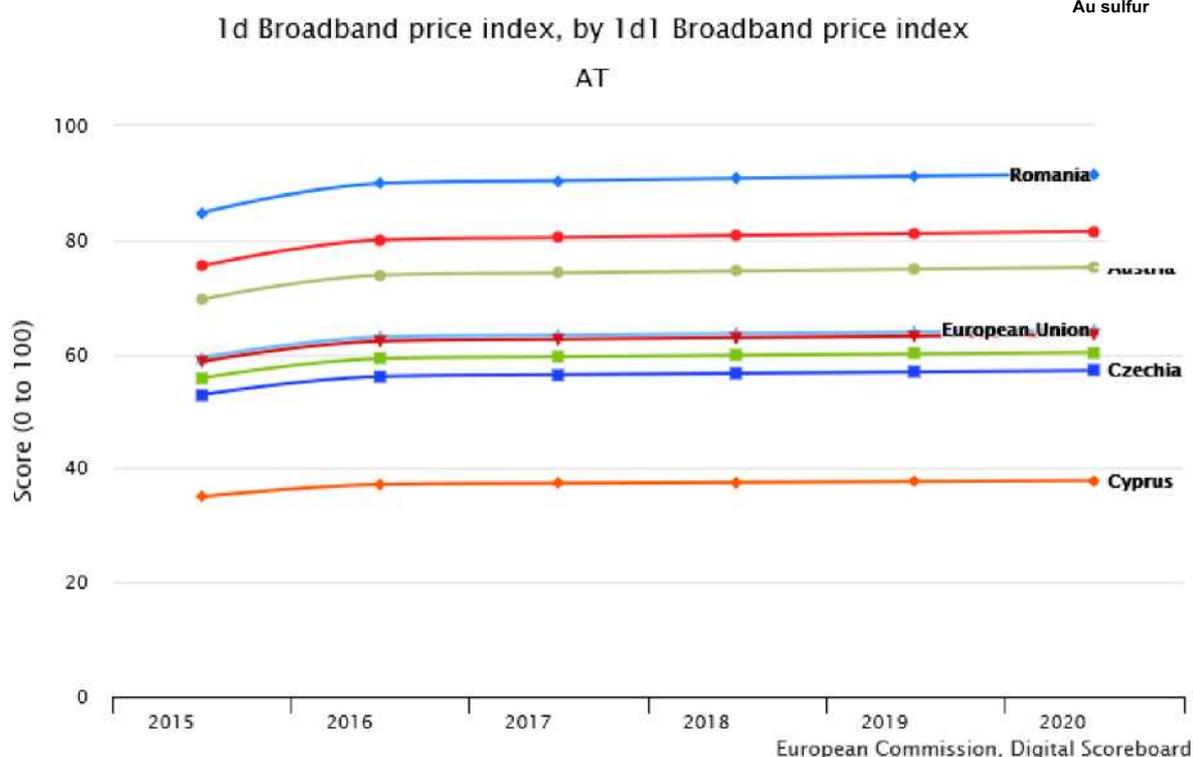
68 Retail Broadband Prices in Europe, 2019-2021: <https://empirica.com/news/single-view/empirica-contribution-to-latest-desi-report-study-on-retail-broadband-prices-in-europe-2019-2021/>



Source: Simulation tool for the study “Mobile broadband prices in Europe 2019”

It is important to note that the price data presented in the graph above were still collected during October 2019. The study was subsequently published in February 2020, after which there was a gradual decrease in the price of data packages offered by network operators in the course of the year. We expect this fall in prices to be reflected in a study published in the course of 2021, which will be based on data collected in October 2020. Slovakia could move up by around five places in this assessment thanks to the price reduction.

Slovakia contradicted the inaccuracy of the collected data, but it was only possible after it was published. Slovakia commented in particular that the price inputs used by Empirica were drawn only from the websites of the two largest mobile network operators. Consequently, the contractor of the study did not take into account the various promotional offers of data packages which provided lower prices than those indicated in publicly available information sources. Slovakia also pointed out that the third MNO should also be included in the assessment according to the study methodology. The two largest MNOs shall be considered only if their market share in terms of number of voice customers is more than 70 %. In the case of Slovakia, it is therefore necessary to evaluate the bids of the third largest mobile network operator. Empirica itself admits that the current methodology may potentially exclude the cheapest bids of data packages that are often offered by smaller mobile network operators.



1d1: Broadband price index		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	19.	20.	20.	20.	20.	20.
	score	55,8	59,2	59,5	59,8	60,1	60,3
EU	score	59,4	63	63,3	63,6	63,9	64,2
The Best MS EU	order	1. RO	1 RO				
	score	84,8	89,9	90,4	90,8	91,2	91,6
The Worst MS EU	order	28. CY					
	Score in %	35	37,2	37,4	37,5	37,7	37,9
Austria	order	7.	7.	7.	7.	7.	7.
	score	69,6	73,8	74,2	74,6	74,9	75,2
Czechia	order	20.	21.	21.	21.	21.	21.
	score	52,9	56,1	56,4	56,6	56,9	57,1
Hungary	order	15.	15.	15.	15.	15.	15.
	score	58,7	62,3	62,2	62,9	63,2	63,4
Poland	order	2.	2.	2.	2.	2.	2.
	score	75,4	80	80,4	80,8	81,1	81,5

Table 15: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Dimension 2 Human Capital

Indicator 2a1: At least basic digital skills

Description	Sample	Unit	Source
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<p>% Of people with “basic” or “more than basic” digital skills in each of the following four dimensions: information, communication, problem solving and content creation software (measured by the number of activities carried out during the previous 3 months)</p>	<p>All people (aged 16-74)</p>	<p>% of people</p>	<p>Eurostat — Use of ICT in households and individuals</p>
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In 2014, a model of the Digital Skills Indicator was developed for the baseline requirements of DG CONNECT Eurostat (Working Group on the Information Society). This model follows the digital competence framework developed by the JRC and DG EAC, which is used for the self-assessment of individuals on Europass. Eurostat subsequently included the necessary modules in the questionnaire of the survey on ICT usage in households and individuals and launched an annual systematic data collection.

The Eurostat survey and the above-mentioned digital skills model evaluate all three skills indicators (2a1, 2a2, 2a3) under the second dimension of DESI.

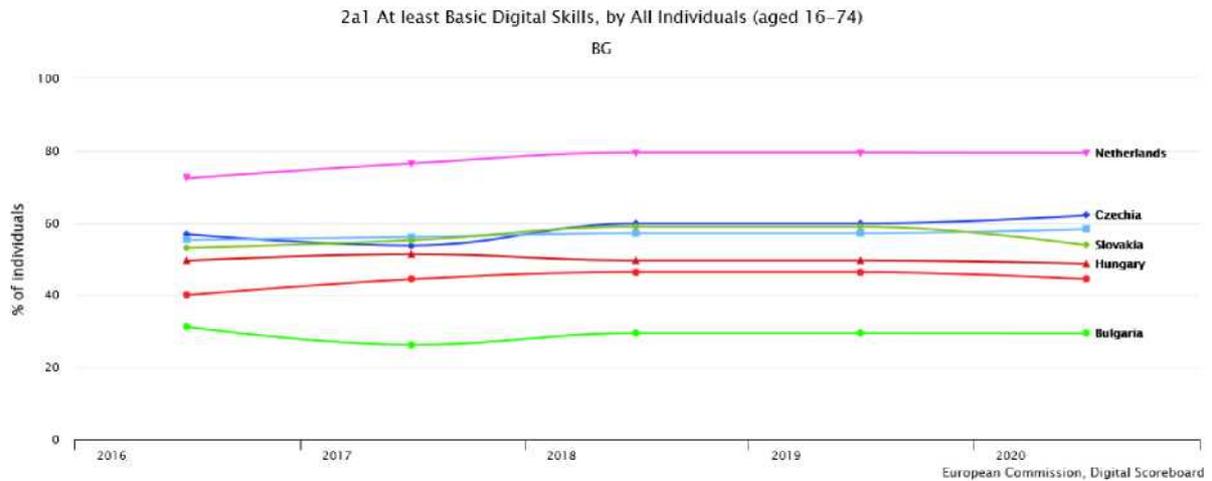
The Digital Skills Framework identifies five competency domains: information, communication, content creation, security and problem solving. However, Eurostat’s questionnaire collects data on internet users’ activities carried out in the last 3 months in four of these five domains (the skills area in the security domain does not yet contain the questionnaire, as adequate indicators in 2014 were not yet available in this area).

In each of the evaluated domains, a set of activities (usually 4-7) is defined that reflect the necessary competences defined for that domain in the aforementioned Digital Competence Framework. Depending on what activities the user indicates in the questionnaire, his level of digital skills will be evaluated. Persons carrying out certain activities are presumed to have the appropriate skills.

The Digital Skills Indicators in DESI are linked to four question modules in the Eurostat questionnaire. The first question module includes: *ability to copy or move files, upload them to internet storage, obtain information from public administration portals, search for information about goods or services or search health-related information*. Another question module relates to communication skills (*working with emails, social networks, making calls over the Internet or uploading your own content to any website for publication*). The third module with two subsets concerns troubleshooting (*set A: moving a file between computers or other devices, installing software or applications, changing the settings of the software, operating system or security programs; set B: shopping online, selling online, using online education, internet banking*). The fourth file concerns software work (*set A: use of a text processor, use of a spreadsheet, software for editing videos, photos or audio files; set B: create a presentation or document with text, pictures, tables or charts, use advanced spreadsheet functions to organise or analyse data such as sorting, filtering, formulas or charting, writing code in the programming language*). Based on the responses and their combination, Eurostat then evaluates the level of basic skills, more than basic skills or at least basic software skills.

The problem with the above methodology for calculating the level of digital skills is its relative obsolescence, given that it was defined on the basis of reality in 2014. With technological progress

it also changes the view of the concept of digital skills and creates new skills requirements that DESI does not currently reflect.



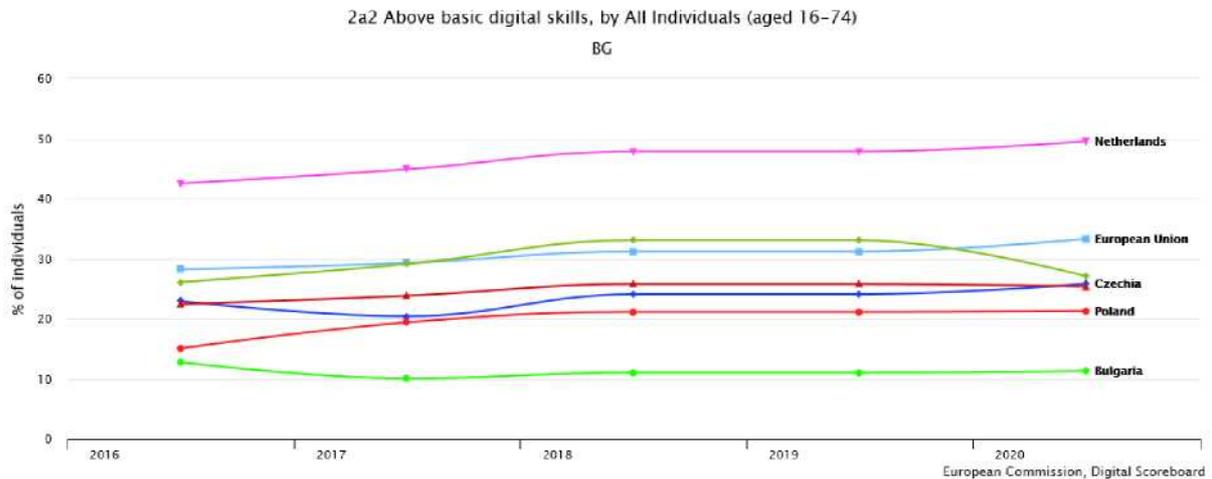
2a1: Basic digital skills		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	N/A	14	12↑	11↑	11	18
	score	N/A	53.1 %	55.3 %	59.0 %	59.0 %	53.9 %
EU	score	N/A	55.3 %	56.2 %	57.2 %	57.2 %	58.3 %
The best country	order	N/A	DK	DK	NL	NL	NL
	score	N/A	74.9 %	77.6 %	79.5 %	79.5 %	79.4 %
The Worst Country	order	N/A	RO	RO	RO	RO	BG
	score	N/A	26.3 %	26.2 %	29.0 %	29.0 %	29.4 %
Czechia	order	N/A	10	14	10	10	9
	score	N/A	56.9 %	53.8 %	59.8 %	59.8 %	62.1 %
Hungary	order	N/A	19	18	20	20	23
	score	N/A	49.5 %	51.4 %	49.6 %	49.6 %	48.7 %
Poland	order	N/A	26	23	23	23	25
	score	N/A	40.0 %	44.4 %	46.4 %	46.4 %	44.4 %

Tab. 16: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 2a2: More than basic digital skills

Description	Sample Unit	Source
% of people with "more than basic" digital skills in each of the following four dimensions: information, communication, problem solving and content creation software (measured by the number of activities carried out during the previous 3 months).	All the people (in age 16-74) and in individuals	Eurostat — Use of ICT % of people in households

In terms of the content of Eurostat’s questionnaire, indicator 2a2 relies on two activity modules or questions, which are in addition to the indicator 2a1 (basic skills). The difference is a communication skills module (working with emails, social networks, Internet calls or uploading your own content to any website for publication) and a troubleshooting set (set A: moving a file between computers or other devices, installing software or applications, changing the settings of the software, operating system or security programs; set B: online shopping, selling online, using online education, internet banking).



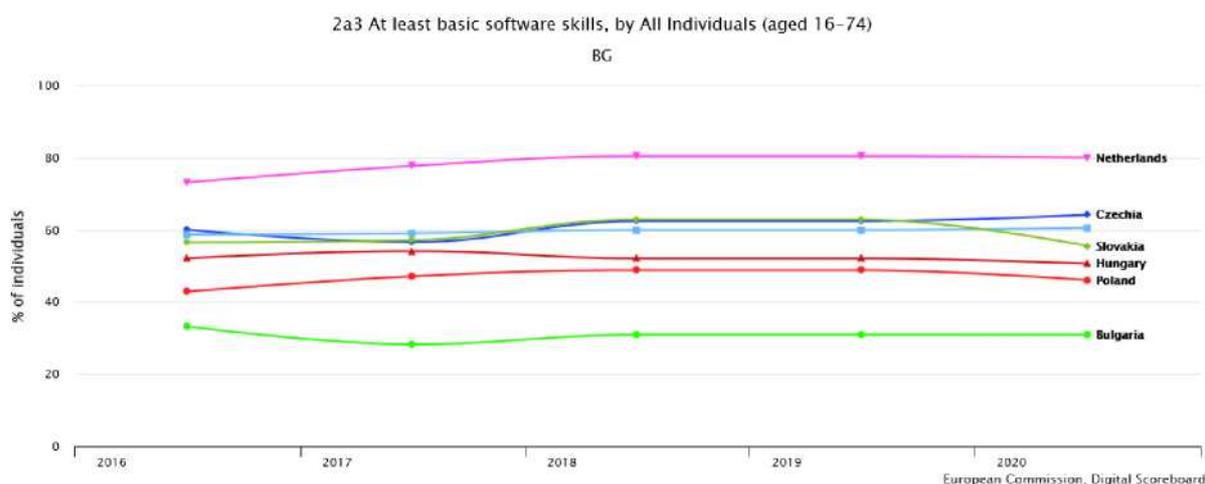
2a2: More than basic digital skills		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	N/A	17	15 ↑	10 ↑	10	20–
	score	N/A	26.1 %	29.1 %	33.1 %	33.1 %	27.1 %
EU	score	N/A	28.2 %	29.3 %	31.2 %	31.2 %	33.3 %
The best country	order	N/A	DK	DK	NL	NL	FI
	score	N/A	48.5 %	53.0 %	47.8 %	47.8 %	50.1 %
The Worst Country	order	N/A	RO	RO	RO	RO	RO
	score	N/A	9.0 %	8.6 %	10.1 %	10.1 %	10.3 %
Czechia	order	N/A	21	23	21	21	21
	score	N/A	22.9 %	20.4 %	24.1 %	24.1 %	25.8 %
Hungary	order	N/A	22	21	20	20	22
	score	N/A	22.4 %	23.8 %	25.8 %	25.8 %	25.4 %
Poland	order	N/A	26	25	23	23	27
	score	N/A	15.1 %	19.4 %	21.1 %	21.1 %	21.3 %

Comparison of Slovakia’s position vis-à-vis other Member States and the EU average

Indicator 2a3: At least basic software skills document integrating text, images and tables or graphs or writing code in the programming language.

Description	Sample	Unit	Source
% of people who, in addition to using basic software features such as text processing, used advanced table functions, created a presentation, or	All people (aged 16-74)	% of people	Eurostat — Use of ICT in households and individuals

In the case of indicator 2a3, Slovakia again copied fairly faithfully the European average until the fall in this year's assessment, when it fell by more than 7 percentage points. This indicator counts the positive responses of survey participants in the software work module. It includes two sets of activities. Set A contains: use a text processor, use a spreadsheet, software to edit videos, photos or audio files. Set B contains: create a presentation or document with text, pictures, tables or charts, use advanced spreadsheet functions to organise or analyse data such as sorting, filtering, formulas, or charting, writing code in programming language.



2a3: At least basic software skills		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	N/A	14	13↑	9↑	9	20–
	score	N/A	56.5 %	57.2 %	62.9 %	62.9 %	55.6 %
EU	score	N/A	58.7 %	59.1 %	60.0 %	60.0 %	60.6 %
The best country	order	N/A	DK	DK	NL	NL	NL
	score	N/A	80.2 %	78.9 %	80.4 %	80.4 %	80.1 %
The Worst Country	order	N/A	RO	BG	BG	BG	BG
	score	N/A	28.6 %	28.3 %	30.9 %	30.9 %	30.9 %
Czechia	order	N/A	11	15	10	9	9
	score	N/A	60.1 %	56.6 %	62.4 %	62.4 %	64.2 %
Hungary	order	N/A	20	17	21	21	23
	score	N/A	52,1	54.1 %	52.1 %	52.1 %	50.6 %
Poland	order	N/A	26	24	24	24	25
	score	N/A	42.9 %	47.1 %	48.8 %	48.8 %	46.1 %

Table 17: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 2b1: ICT specialists

Description	Sample	Unit	Source
% Of ICT specialists employed. A broad definition based on the ISCO-08 classification and covering jobs such as ICT service managers, ICT professionals, ICT technicians and service staff.	Employed people aged 15-74	% of employed people aged 15-74	Eurostat — Labour Force Survey

Finland is a clear leader, followed closely by Sweden and Estonia, which are significantly moving away from the European average. We expect this indicator to grow very naturally and should reflect the market situation where the share of ICT specialists in all sectors is expected to increase.



2b1: ICT specialists		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	18	19	18↑	20 -	20	19 ↑
	score	2.6 %	2.8 %	2.8 %	2.9 %	2.8 %	3.2 %
EU	score	3.4 %	3.4 %	3.5 %	3.7 %	3.7 %	3.9 %
The best country	order	1 FI					
	score	6.5 %	6.4 %	6.5 %	6.6 %	6.8 %	7.2 %
The Worst Country	order	DG	DG	DG	DG	DG	LV
	score	1.6 %	1.3 %	1.2 %	1.4 %	1.6 %	1.7 %
Czechia	order	10	15	12	16	16	12
	score	3.7 %	3.4 %	3.7 %	3.5 %	3.6 %	4.1 %
Hungary	order	12	13	14	15	16	17
	score	3.5 %	3.5 %	3.6 %	3.6 %	3.6 %	3.7 %
Poland	order	18	21	20	21	20	21
	score	2.6 %	2.6 %	2.6 %	2.7 %	2.8 %	3.0 %

Tab. 18: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 2b2: ICT specialists

Description	Sample	Unit	Source
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% of ICT specialists employed. A broad definition based on the ISCO-08 classification and covering jobs such as ICT service managers, ICT professionals, ICT technicians and service staff.

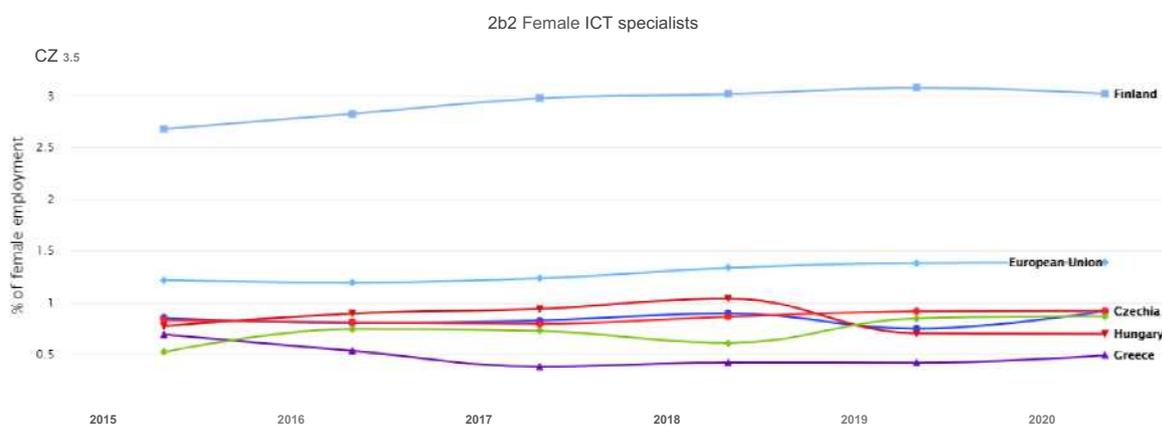
Employed women aged 15-74

% of employed women aged 15-74

Eurostat – Labour Force Survey

The 2b2 indicator entered DESI for the first time in 2019, but thanks to the relative clarity of the indicator, we also have data for the last five years. Slovakia is following the European trend of slow growth, but even the best country (Finland) is not progressing significantly despite a good starting position. The proportion of ICT specialists is influenced by a number of factors that are not quite easy to influence in the short term, which we think is perhaps the biggest challenge.

From the point of view of the definition of this indicator, it should be borne in mind that it indicates the share of women employed in ICT trade unions in total female employment across all sectors. The indicator could be more noticeable if it was defined as the share of women in total employment in ICT trade unions.



2b2: ICT specialists		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	28	25 ↑	27	28	24 ↑	24
	score	0.5 %	0.7 %	0.7 %	0.6 %	0.8 %	0.9 %
EU	score	1.2 %	1.2 %	1.2 %	1.3 %	1.4 %	1.4 %
The best country	order	1 FI					
	score	2.7 %	2.8 %	3.0 %	3.0 %	3.1 %	3.0 %
The Worst Country	order	29 EL	29LV				
	score	0.7 %	0.5 %	0.4 %	0.4 %	0.4 %	0.5 %
Czechia	order	19	23	22	24	25	23
	score	0.9 %	0.8 %	0.8 %	0.9 %	0.7 %	0.9 %
Hungary	order	24	19	20	20	27	27
	score	0.8 %	0.9 %	0.9 %	1.0 %	0.7 %	0.7 %
Poland	order	22	22	25	26	23	22
	score	0.8 %	0.8 %	0.8 %	0.9 %	0.9 %	0.9 %

Tab. 19: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

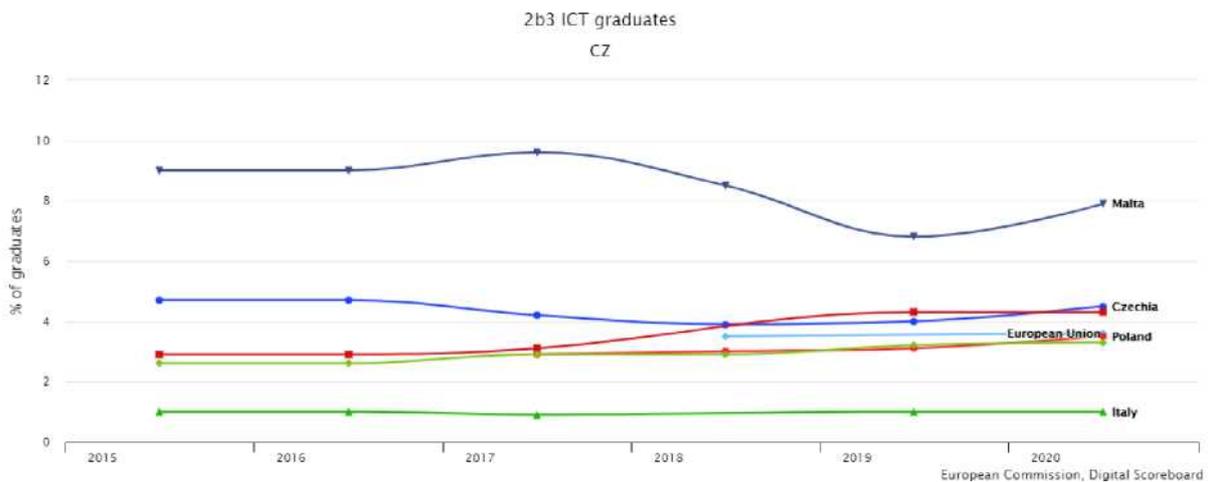
Indicator 2b3: ICT graduates

Description	Sample	Unit	Source
% of people with a degree in information and communication technology	Graduates	% of graduates	Eurostat – Administrative data on education (Department of graduates by level of education and field of study)

The definition of this indicator is quite vague in the DESI methodology. In the dataset listed as the source of this indicator, the number of graduates in a number of ICT fields of study is measured. It is not clear from the definition which departments are or are not included in the calculation of the value for this indicator in DESI and why the field was or was not included in the calculation.

At the same time, it should also be pointed out that this indicator often reports very outdated data (for example, in DESI 2020 for Slovakia, it gives figures from 2017). Understandably, the number of graduates changes every year and therefore, if DESI does not work with the last available numbers, the optics of this indicator's development are very distorted. This indicator is among the examples for which it would be appropriate to draw directly from the national statistics available to MS from universities operating in them.

Again, indicator 2a3 is a very unambiguous indicator that should ideally replicate the rapidly growing demand for ICT specialists in all sectors. Unfortunately, this is not the case, and as DESI shows, not even at European level. As with ICT specialists, there are too many factors whose changes are



they will show up with a greater time lag.

2b3: ICT graduates		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						

Slovakia	order	21	21	19 ↑	23	18 ↑	21 –
	score	2.6 %	2.6 %	2.9 %	2.9 %	3.2 %	3.3 %
EU	score	N/A	N/A	N/A	3.5 %	N/A	3.6 %
The best country	order	MT	MT	MT	MT	MT	MT
	score	9.0 %	9.0 %	9.6 %	8.5 %	6.8 %	7.9 %
The Worst Country	order	IT	IT	IT	IT	IT	IT
	score	1.0 %	1.0 %	0.9 %	N/A	1.0 %	1.0 %
Czechia	order	6	6	9	13	13	11
	score	4.7 %	4.7 %	4.2 %	3.9 %	4.0 %	4.5 %
Hungary	order	19	19	18	N/A	11	12
	score	2.9 %	2.9 %	3.1 %	N/A	4.3 %	4.3 %
Poland	order	N/A	N/A	19	20	20	20
	score	N/A	N/A	2.9 %	3.0 %	3.1 %	3.5 %

Tab. 20: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Dimension 3 Use of Internet services

Indicator 3a1: People Who Never Used the Internet

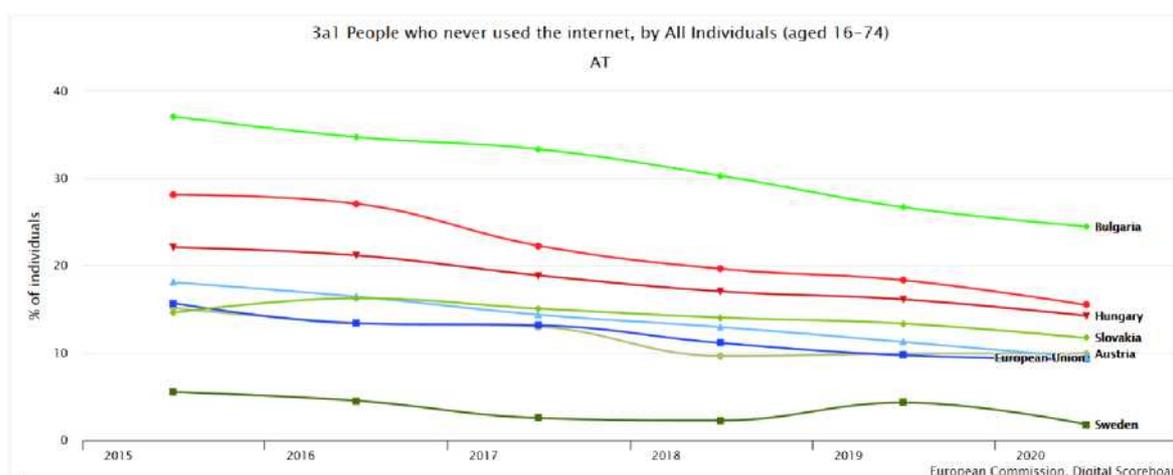
Description	Sample	Unit	Source
% of people who have never used the internet in their	All people aged 16-74 years old	households and individuals	Eurostat – ICT use in

Indicator 3a1 is very important from the DESI point of view, as it defines a set of Internet users, from which then determines the proportions of users performing individual online activities measured in other indicators of this dimension. Therefore, it is very important to ensure that respondents to the Eurostat questionnaire question whether they have ever used the internet in their lives understand where and in which activities and services they may have encountered the internet. Low digital literacy of the respondent may be a problem for the correct answer to the question, but on the other hand, if young people in particular are so experienced using the internet that they no longer realise where they use it. The result of the measurement can therefore be significantly influenced by the appropriate selection of additional questions, giving concrete examples of activities that use the Internet.

The share of people in Slovakia who have never used the internet in their lives has fallen to less than 12 % compared to DESI 2019, but is still above the EU average (9 %).

3a1: People Who Never Used the Internet		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	11.	13.	14.	14.	15.	16.
	score in %	14.6 %	16.3 %	15.1 %	14.0 %	13.3 %	11.7 %
EU	score	18.1 %	16.4 %	14.4 %	12.9 %	11.3 %	9.5 %
The Best MS EU	order	1 DK	1 LU	1 LU	1 DK	1 DK	1 SE
	score	2.6 %	2.2 %	1.9 %	2.0 %	1.7 %	1.81 %
The Worst MS EU	order	28 RO	28 BG				
	score	38.6 %	34.7 %	33.3 %	30.3 %	26.7 %	24,5
Czechia	order	13.	11.	12.	12.	11.	13.
	score	15.7 %	13.4 %	13.1 %	11.1 %	9.7 %	9.3 %
Hungary	order	17.	18.	17.	17.	19.	20.
	score	22.1 %	21.2 %	18.9 %	17.0 %	16.1 %	14.2 %
Poland	order	23.	23.	21.	22.	22.	22.
	score	28.1 %	27.1 %	22.3 %	19.6 %	18.3 %	15.5 %

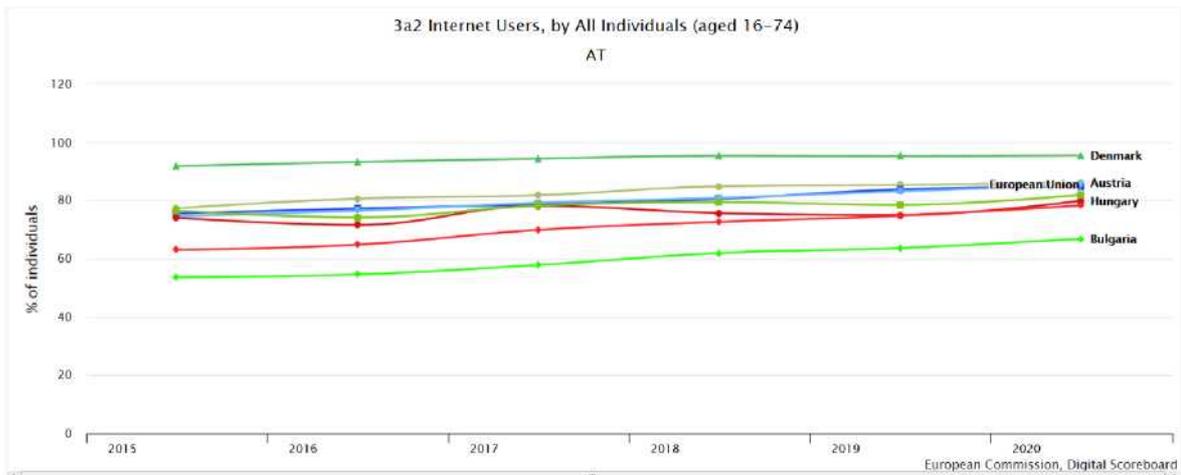
Tab. 21: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 3a2: Internet users

Description	Sample	Unit	Source
% of people who use the Internet at least once a week	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

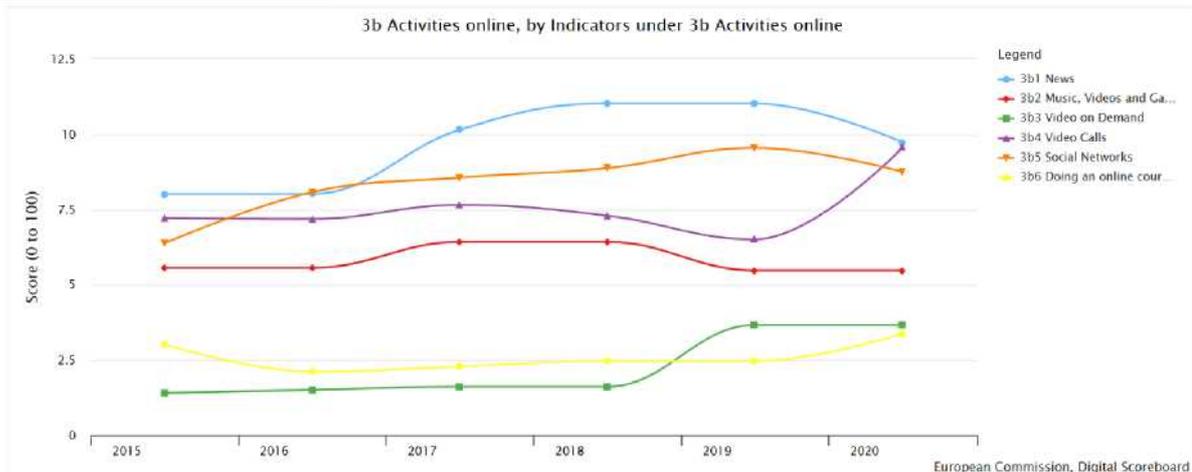
This indicator follows the previous indicator 3a1 and is equally important from the DESI perspective as it co-creates a set of Internet users, from which the proportions of users performing online activities measured in other DESI indicators are subsequently determined. In Slovakia, the number of internet users increased to 82 % (compared to 79 % according to DESI 2019), still below the EU average (85 %).



3a2: Internet users		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	11.	17.	15. ↑	17.	19.	18. ↑
	score in %	76.5 %	74.2 %	78.2 %	79.4 %	78.5 %	82.0 %
EU	score	74.6 %	76.4 %	79.2 %	80.9 %	83.1 %	85.3 %
The Best MS EU	order	1 LU	1 LU	1 LU	1 LU	1 DK	1 DK
	score	93.3 %	96.8 %	96.6 %	96.4 %	95.2 %	95.5 %
The Worst MS EU	order	28 RO	28 RO	28 RO	28 RO	28 BG	28 BG
	score	74.6 %	76.4 %	79.2 %	80.9 %	83.1 %	85.3 %
Czechia	order	13.	13.	14.	14.	12.	16.
	score	75.5 %	77.2 %	78.6 %	80.5 %	83.8 %	84.7 %
Hungary	order	15.	18.	16.	21.	21.	21.
	score	74.1 %	71.6 %	78.1 %	75.6 %	75.0 %	79.9 %
Poland	order	23.	24.	23.	23.	22.	22.
	score	63.0 %	64.8 %	69.9 %	72.7 %	74.8 %	78.3 %

Tab. 22: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Subdivision 3b: Online activities



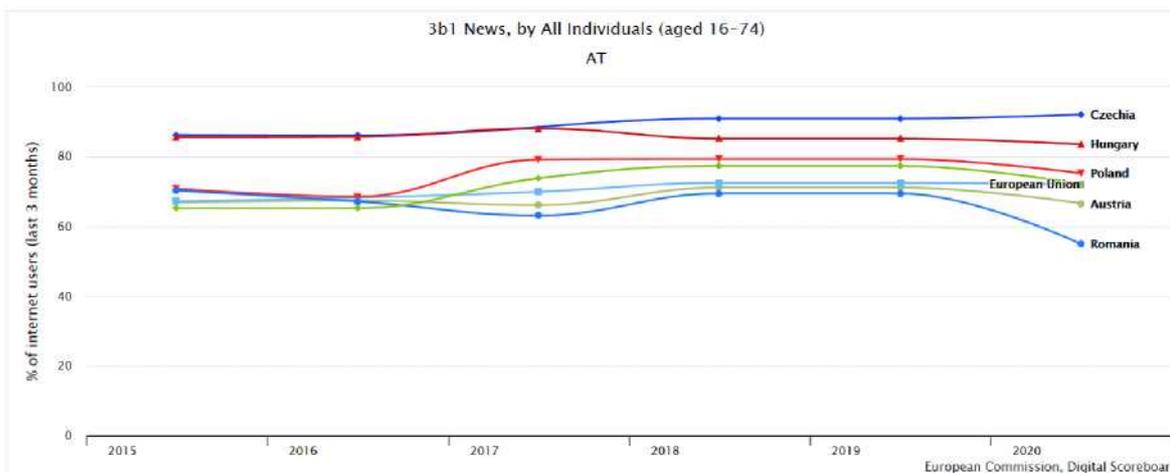
From the point of view of online activities, it is clear that these indicators are either stagnating for a long time or tending to decline in the case of Slovakia. Slovakia has made significant progress in the use of video calls,

with 66 % of people now using this service, an increase of 15 percentage points compared to the previous year. On the contrary, Slovakia is more lagging behind in the use of video-on-demand, where the number of users is stagnating at 17 %, while the EU average is as much as 35 %. This indicator has long been the weakest in this subdivision for Slovakia. In the DESI 2020 evaluation, the use of online courses became the most problematic, where while the number of Slovak users rose from 4 % to 6 % (EU average 11 %), it remains one of the lowest scores in the EU.

Indicator 3b1: News

Description	Sample	Unit	Source
% of people who have used the internet to read messages at least once in the last 3 months; or online magazines	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

Indicator 3b1 is related to monitoring the use of the Internet to obtain information. However, its current definition as well as the wording in the Eurostat questionnaire response offered are strictly limited to reading news via internet newspapers or magazines. However, the question in the questionnaire does not reflect the current trends in the production and consumption of online news, when more and more audio-visual news content is getting to the fore, which is preferred by users and many media are moving to these formats.



3b1: News		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	21.	22.	15. ↑	17.	17.	22.
	score in %	65.2 %	65.2 %	73.8 %	77.3 %	77.3 %	72.1 %
EU	score	67.2 %	68.3 %	70.0 %	72.5 %	72.5 %	72.2 %
	order	1 LU	1 CZ				

The Best MS EU	score						
		94.4 %	93.6 %	93.2 %	93 %	93 %	92.1 %
The Worst MS EU	order	27 IE	27 IE	26 IE	27 IT	27 IT	28 RO
	score	46 %	47.7 %	49.4 %	55.5 %	55.5 %	54.9 %
Czechia	order	5.	6.	THE	3.	3.	1.
	score	86.2 %	86.1 %	THE	90.9 %	90.9 %	92.1 %
Hungary	order	6.	7.	4.	9.	9.	8.
	score	85.6 %	85.7 %	88.1 %	85.2 %	85.2 %	83.5 %
Poland	order	17.	19.	10.	15.	15.	18.
	score	70.8 %	68.6 %	79.1 %	79.3 %	79.3 %	75.2 %

Tab. 23: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3b2: Music, Videos & Games

<i>Description</i>	<i>Sample</i>	<i>Unit</i>	<i>Source</i>
<i>% of people who used the internet at least once in the last 3 months to play or download games, pictures, movies or music</i>	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

Indicator 3b2 was introduced in the DESI 2017 measurement and aims to evaluate the rate of Internet use for private entertainment, regardless of where the user was given access to the internet or what device he used. The indicator is evaluated on the basis of a question where, from a number of options for answering different online activities for private purposes, the respondent selects all that he/she has carried out in the last three months.

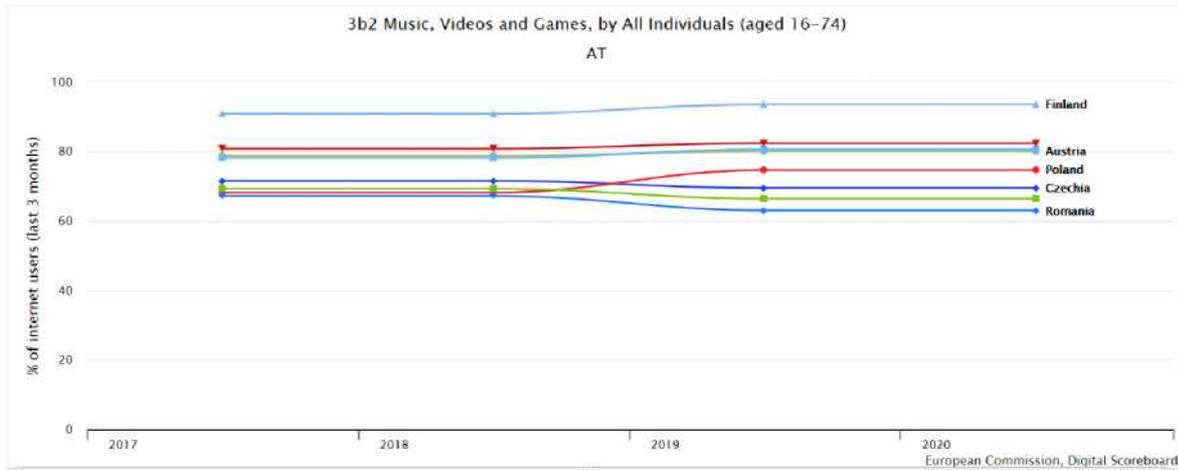
Unlike the 3b3 indicator, the indicator focuses on consuming video content from internet TVs or online archives, as well as free access to videos via sharing platforms such as YouTube. In this case, it could be said that the definition of the indicator goes beyond the indicator 3b3, while, for example, the use of online TV archives with a time lag compared to the original broadcast of content should rather be included in the 'on-demand video'.

In terms of music, the indicator includes listening to Internet radio, streaming services (Spotify, Apple Music), as well as downloading music from the Internet.

In relation to video games, the indicator includes playing them online as well as downloading them from the internet and then playing offline (in the question in Eurostat's questionnaire, the option "Playing or downloading video games" is offered among the answers). It is also questionable whether DESI should measure such use of the internet at all and thus, in essence, promote a higher level of video gaming. We believe that DESI should focus on measuring positive trends in the digitalisation of society, while it is clear that overplaying games can also have negative consequences for the individual and society.

The reference to 'images' should be removed from the definition of the DESI indicator, as the corresponding measured indicator in the Eurostat data file is marked as 'playing/downloading games, listening to music or watching videos (except video on demand)' and thus does not include images. At the same time, none of the options or questions in Eurostat's questionnaire asks about such activity.

Slovakia is of the opinion that this indicator could in the future focus more on the consumption of audiovisual content as such for personal entertainment (music, radio, videos, video-on-demand, podcasts, audio books, etc.).



3b2: Music, Videos &		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	THE	THE	25.	25.	26.	26.
	score in %	THE	THE	69.3 %	69.3 %	66.4 %	66.4 %
EU	score	THE	THE	78.1 %	78.1 %	80.6 %	80.6 %
The Best MS EU	order	THE	THE	1 SE	1 SE	1 FI	1 FI
	score	THE	THE	90.9 %	90.9 %	93.6 %	93.6 %
The Worst MS EU	order	THE	THE	26 BG	27 BG	27 RO	28 RO
	score	THE	THE	63.9 %	63.9 %	63.1 %	63.1 %
Czechia	order	THE	THE	24.	24.	25.	25.
	score	THE	THE	71.6 %	71.6 %	69.5 %	69.5 %
Hungary	order	THE	THE	12.	12.	14.	14.
	score	THE	THE	80.8 %	80.8 %	82.4 %	82.4 %
Poland	order	THE	THE	26.	26.	21.	21.
	score	THE	THE	68.2 %	68.2 %	74.6 %	74.6 %

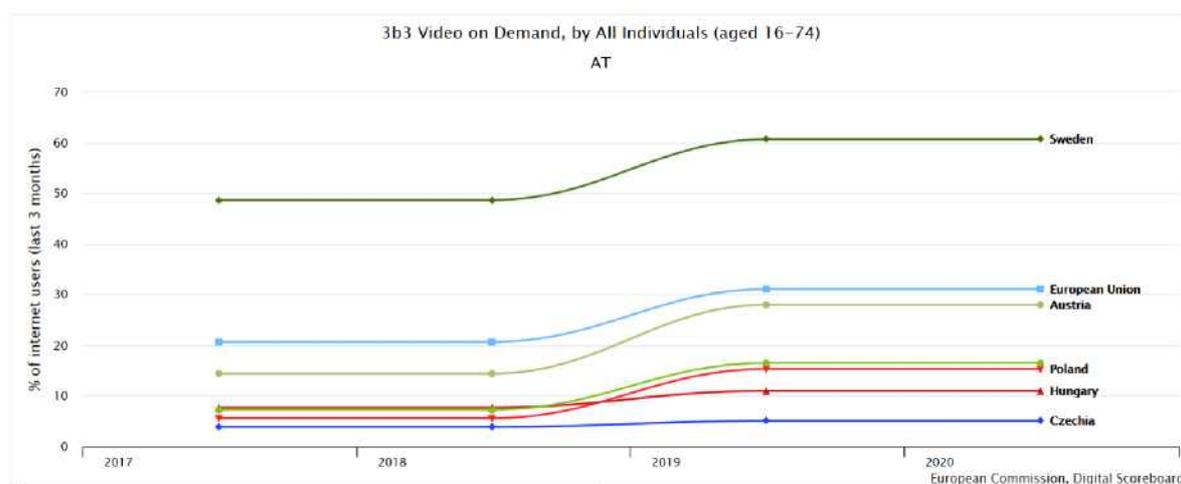
Tab. 24: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3b3: Video on Demand

Description	Sample	Unit	Source
% of people who used the internet at least once in the last 3 months to watch movies and TV via video on demand	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

The indicator focuses on paid commercial streaming services that allow a customer to watch a movie, series or program of their choice based on a subscription (such a service).

they provide e.g. Netflix, HBO GO, Amazon Prime, Maxdome, Magio Go, Orange TV, Voyo, Skylink, etc.).



3b3: Video on Demand		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	THE	THE	25.	25.	17. ↑	17.
	score in %	THE	THE	7.3 %	7.3 %	16.5 %	16.5 %
EU	score	THE	THE	20.7 %	20.7 %	31.1 %	31.1 %
The Best MS EU	order	THE	THE	1 DK	1 DK	1 SE	1 SE
	score	THE	THE	49 %	49 %	60.7 %	60.7 %
The Worst MS EU	order	THE	THE	28 CZ	28 CZ	28 CZ	28 CZ
	score	THE	THE	3.9 %	3.9 %	5.1 %	5.1 %
Czechia	order	THE	THE	28.	28.	28.	28.
	score	THE	THE	3.9 %	3.9 %	5.1 %	5.1 %
Hungary	order	THE	THE	24.	24.	23.	23.
	score	THE	THE	7.7 %	7.7 %	11.0 %	11.0 %
Poland	order	THE	THE	26.	26.	19.	19.
	score	THE	THE	5.6 %	5.6 %	15.3 %	15.3 %

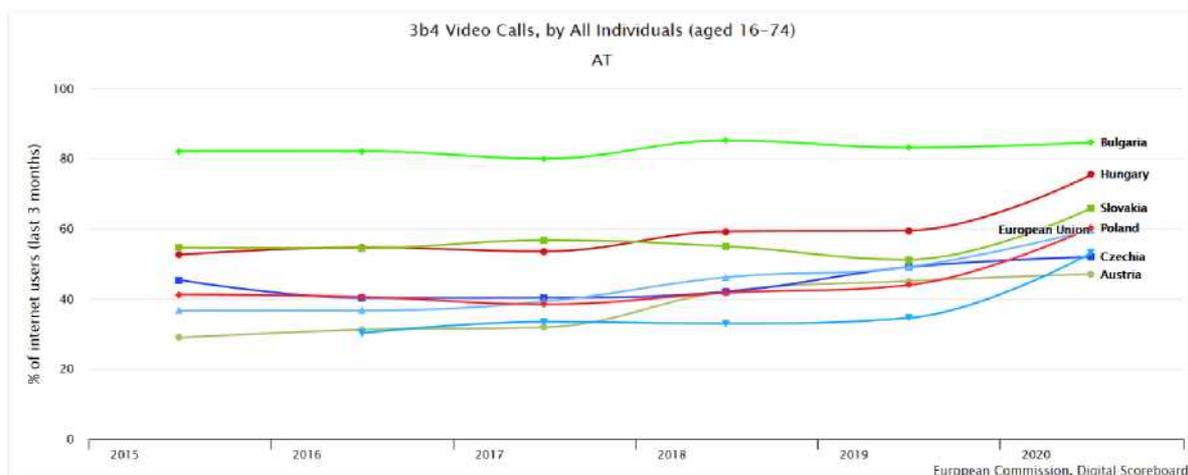
Tab. 25: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3b4: Video calls

Description	Sample	Unit	Source
% of people who have used the internet at least once in the last 3 months to make a phone or video call	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

The indicator includes phone calls, including video calls over the Internet, such as Skype, Messenger, Teams, Webex, WhatsApp, Facetime, Viber, Snapchat. In addition to these applications, it is also possible to make phone calls via the so-called Voice-over-Internet Protocol (VoIP), which is offered by specialised companies as well as internet service providers. Respondents with lower digital

with literacy, they may not even realise that they use VoIP. The scope of the indicator could potentially be expanded in relation to online communication tools in general, including e-mail, instant messaging, calls and video calls via internet/mobile applications. The indicator thus defined would reflect more on the daily habits of users and the tools they use to communicate on the Internet, as focusing only on the use of video calls seems limited in this context.



3b4: Video calls		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	5.	6.	5. ↑	10.	14.	9. ↑
	score in %	54.6 %	54.5 %	56.8 %	55.0 %	51.2 %	65.9 %
EU	score	36.7 %	36.7 %	39.3 %	46.2 %	49.2 %	59.8 %
The Best MS EU	order	1 BG					
	score	82.2 %	82.2 %	80.1 %	85.2 %	83.2 %	84.7 %
The Worst MS EU	order	27 DE	28 EC	28 EC	28 FR	28 FR	28 AT
	score	27.5 %	28.7 %	31.2 %	33.0 %	34.6 %	47.2 %
Czechia	order	10.	18.	19.	23.	18.	25.
	score	45.4 %	40.3 %	40.4 %	42.1 %	49.1 %	52.1 %
Hungary	order	6.	5.	7.	6.	9.	3.
	score	52.7 %	54.7 %	53.6 %	59.2 %	59.5 %	75.5 %
Poland	order	15.	17.	22.	24.	26.	16.
	score	41.3 %	40.6 %	38.5 %	41.8 %	44.0 %	60.4 %

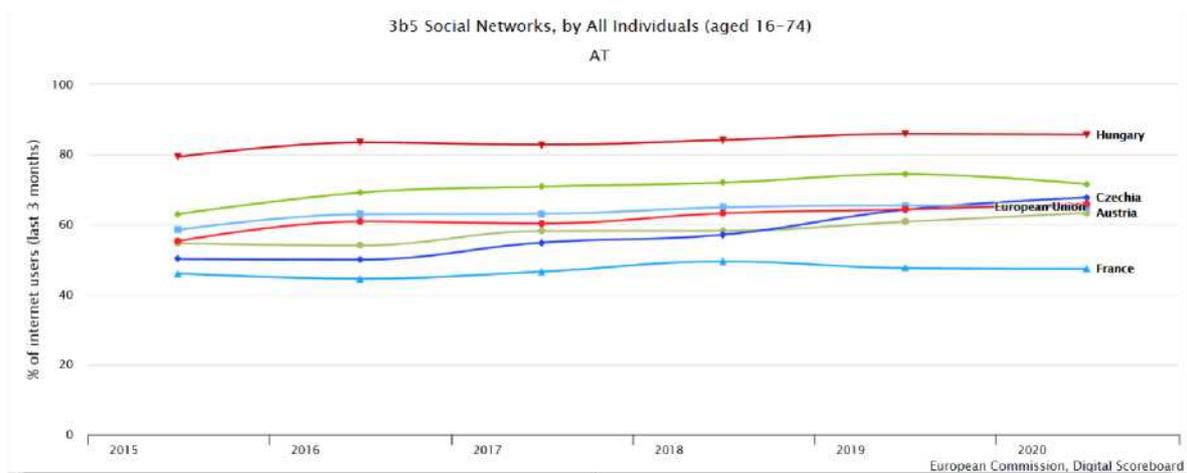
Tab. 26: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3b5: Social networks

Description	Sample	Unit	Source
% of people who have used the internet at least once in the last 3 months for social networking activities (creating a profile, sending messages or other content)	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

The 3b5 indicator focuses on activities on global social networks (Facebook, Twitter, Instagram, Snapchat, etc.) or local (Pokec). Social networks can be distinguished from other communication activities by the aspect of creating a profile, often with personal data, on certain websites.

Although Slovakia has significantly outperformed the EU average in the use of social networks for a long time, this indicator is again worth considering its positive contribution in the context of the increasing digitalisation of society. Despite the fact that social networks are undoubtedly an unmistakable phenomenon, in the context of the spread of disinformation, harmful and illegal content, privacy issues and others, incentives to increase their use may not be beneficial. Perhaps it would be more appropriate to distinguish for what activities and for what purpose users use them.



3b5: Social networks		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	16.	11. ↑	12.	13.	10. ↑	16.
	score in %	63.0 %	69.1 %	70.8 %	72.0 %	74.4 %	71.5 %
EU	score	58.5 %	62.9 %	63.1 %	64.9 %	65.4 %	64.9 %
The Best MS EU	order	1 HU	1 HU	1 HU	1 MT	1 RO	1 HU
	score	79.3 %	83.4 %	82.8 %	87.1 %	86.0 %	85.7 %
The Worst MS EU	order	28 FR	27 FR	28 FR	28 FR	28 FR	28 FR
	score	46.0 %	44.5 %	46.5 %	49.5 %	47.5 %	47.3 %
Czechia	order	50.2 %	50.0 %	54.8 %	57.1 %	64.2 %	67.7 %
	score	26.	27.	26.	26.	23.	20.
Hungary	order	79.3 %	83.4 %	82.8 %	84.1 %	85.9 %	85.7 %
	score	1.	1.	1.	2.	2.	1.
Poland	order	55.3 %	60.9 %	60.3 %	63.2 %	64.3 %	65.9 %
	score	24.	23.	23.	22.	22.	21.

Tab. 27: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

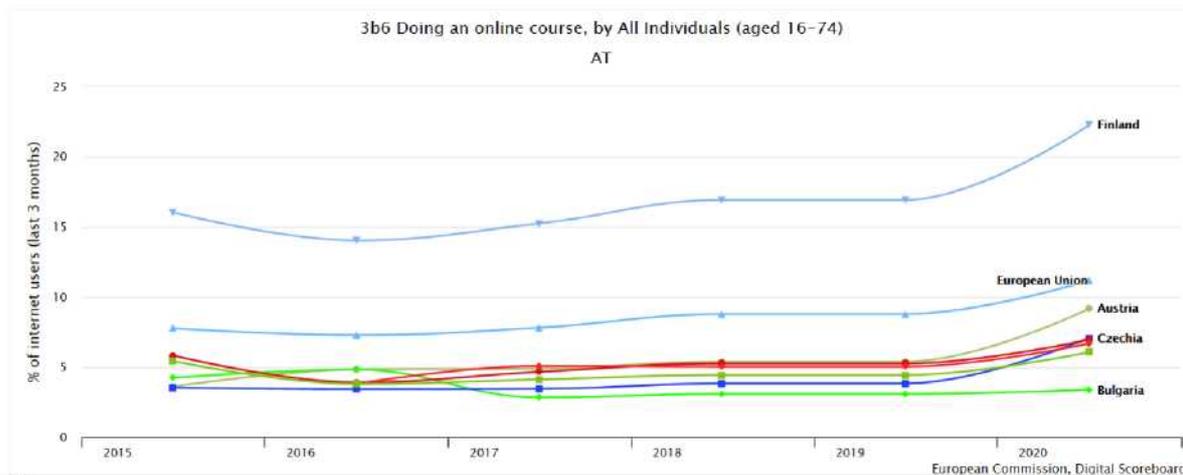
Indicator 3b6: Participation in online courses

Description	Sample	Unit	Source
<i>% of people who have used at least once in the</i>	All people aged 16-74 years old	% of people	Eurostat — Use of ICT

courses.

Indicator 3b6 focuses on people’s participation in online courses, which are conducted remotely, assuming the need to register in advance. This indicator also covers courses that are only partially done online, in any case it must be a comprehensive learning course. It does not matter whether an individual takes a course for private purposes (personal growth, hobby) or as part of professional development.

Despite the fact that the Eurostat questionnaire offers a number of responses to the online learning activities used by the user, DESI only includes a narrowly defined type of online learning. In order to monitor the extent to which users learn or develop thanks to the internet, it would be appropriate to broaden the definition. The indicator should also include distance learning in school training (a student’s communication with a teacher via videoconferencing tools), as well as the use of online learning tools and materials for personal development and learning (payable/free of charge) outside of comprehensive courses, such as online follow-up of freely available lectures (e.g. TED Talks).



3b6: Participation in online courses		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	18.	27.	24. ↑	25.	25.	25.
	score in %	5.4 %	3.8 %	4.1 %	4.4 %	4.4 %	6.1 %
EU	score	7.8 %	7.3 %	7.8 %	8.8 %	8.8 %	11.2 %
The Best MS EU	order	1 FI	1 FI	1 FI	1 SE	1 SE	1 FI
	score	16.0 %	14.0 %	15.2 %	18.4 %	18.4 %	22.3 %
The Worst MS EU	order	27 CZ	28 CZ	27 BG	28 BG	28 BG	28 BG
	score	3.5 %	3.4 %	2.8 %	3.1 %	3.1 %	3.4 %
Czechia	order	27.	28.	26.	26.	26.	19.
	score	3.5 %	3.4 %	3.5 %	3.8 %	3.8 %	7.1 %
Hungary	order	16.	25.	20.	22.	22.	20.
	score	5.8 %	3.9 %	4.7 %	5.3 %	5.3 %	7.0 %
Poland	order	THE	26.	16.	23.	23.	21.
	score	THE	3.8 %	5.1 %	5.0 %	5.0 %	6.7 %

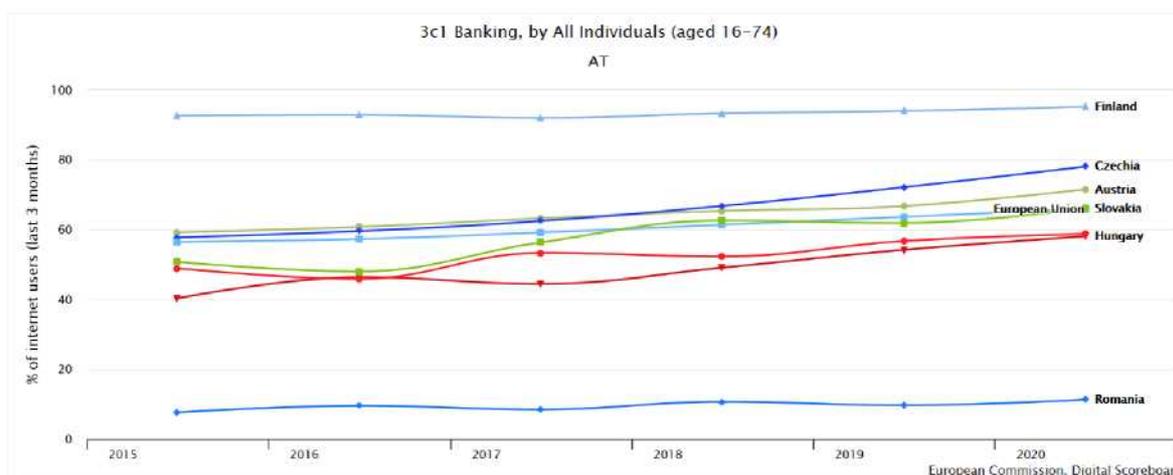
Table 28: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3c1: Banking

Description	Sample	Unit	Source
% of people who have used the internet for online banking at least once in the last 3 months	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

The 3c1 indicator deals relatively conservatively with communications with the bank (via the bank's website or app) and does not reflect, for example, new trends in fintech services. This completely lacks the use of contactless mobile payments or smart watches, and it would therefore be advisable to adjust the indicator in the light of current trends in the banking and financial services market, as its current form does not sufficiently reflect them.

However, this indicator shows a significant improvement, as Slovakia improved by four percentage points to 66 %, thus reaching the current EU average.



3c1: Banking		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	17.	18.	17. ↑	15. ↑	17.	15. ↑
	score in %	50.7 %	48 %	56.4 %	62.6 %	61.9 %	66.1 %
EU	score	56.5 %	57.3 %	59.2 %	61.4 %	63.7 %	66 %
The Best MS EU	order	1 FI					
	score	92.7 %	92.8 %	92 %	93.3 %	94 %	95.2 %
The Worst MS EU	order	27 RO	28 BG	27 BG	28 BG	28 BG	28 RO
	score	7.7 %	9.44 %	7.41 %	8.65 %	9.71 %	11.3 %
Czechia	order	15.	15	14.	13.	10.	10.
	score	57.8 %	59.6 %	62.5 %	66.8 %	72.2 %	78.1 %
Hungary	order	22.	20.	22.	22.	20.	21.
	score	40.3 %	46.4 %	44.5 %	49.1 %	54.2 %	58.1 %

Poland	order	19.	22.	19.	19.	18.	19.
	score	48.9 %	45.9 %	53.4 %	52.3 %	56.8 %	58.8 %

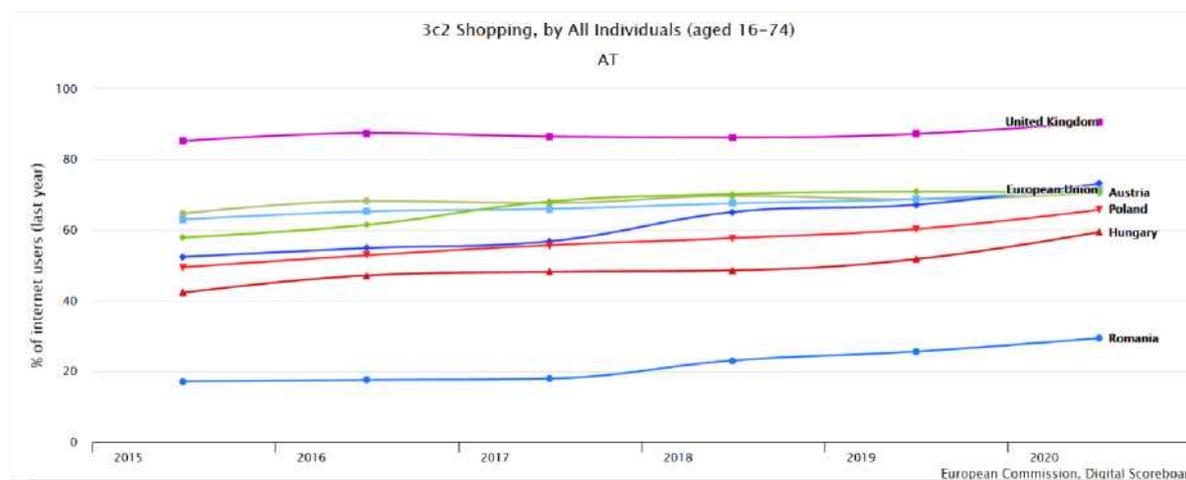
Tab. 29: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3c2: Shopping

Description	Sample	Unit	Source
% of people who have used the internet at least once in the last 12 months to buy goods or services online	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

In relation to indicator 3c2, Eurostat's questionnaire contains a whole separate module dedicated to e-commerce. The module contains questions about the purchase of various goods and services over the internet (websites as well as mobile applications) for private purposes, and it is irrelevant whether the person purchased for himself or for another person. It is important to order goods or services via the internet, subject to payment, which may not be made online. The indicator does not include Internet banking payments for goods or services ordered outside the Internet. The indicator also does not cover goods or services that have been ordered via the Internet but are free of charge (free apps, freeware, reservation in a restaurant, cinema, etc.).

Eurostat also monitors in the questionnaire whether cross-border online shopping from sellers from or outside the EU, as well as purchases from private individuals through online marketplaces.



3c2: Shopping		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	13.	14.	10. ↑	9. ↑	9.	13.
	score in %	57.9 %	61.5 %	68.1 %	70.1 %	70.9 %	70.7 %
EU	score	63.0 %	65.3 %	66.0 %	67.6 %	68.7 %	71.5 %
The Best MS	order	1 UK					
EU	score	85.2 %	87.4 %	86.5 %	86.2 %	87.2 %	90.5 %
	order	28 RO	28 RO	28 RO	27 RO	28 RO	28 RO

The Worst MS	score						
EU		17.2 %	17.6 %	18.0 %	23.1 %	25.6 %	29.4 %
Czechia	order	15.	15.	15.	13.	14.	11.
	score	52.4 %	54.9 %	56.8 %	65.1 %	67.2 %	73.1 %
Hungary	order	20.	20.	20.	20.	21.	19.
	score	42.3 %	47.2 %	48.2 %	48.6 %	51.8 %	59.5 %
Poland	order	17.	17.	16.	17.	18.	17.
	score	49.5 %	52.9 %	55.7 %	57.7 %	60.3 %	65.7 %

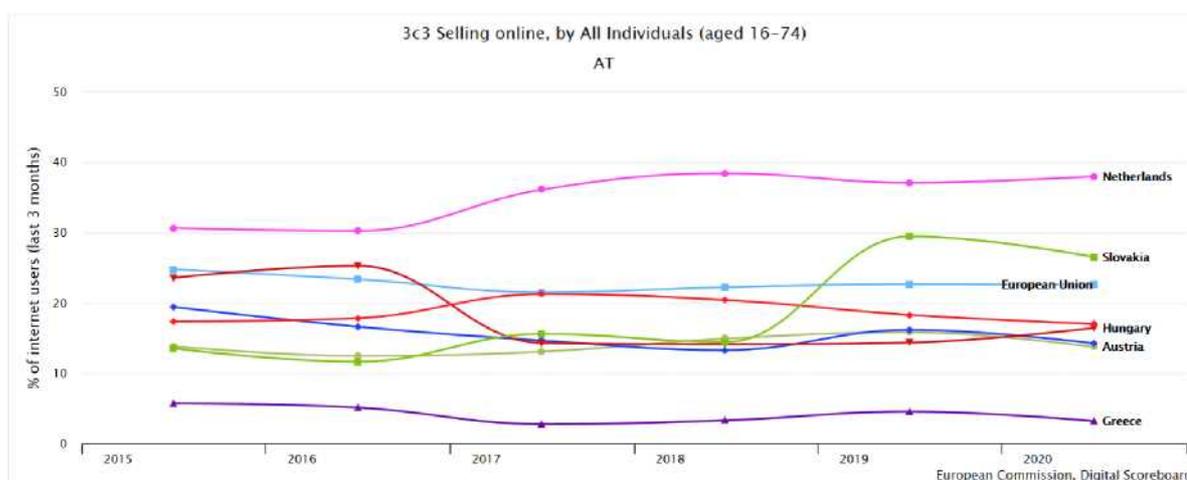
Tab. 30: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 3c3: Selling online

Description	Sample	Unit	Source
% of people who used the internet to sell goods or services online at least once in the last 3 months	All people aged 16-74 years old	% of people	Eurostat – ICT use in households and individuals

Indicator 3c3 covers the sale of services by a private natural person selling services for private purposes through online marketplaces and auctions, thus distinguishing it from a similar indicator 4b3 in the fourth dimension. This may include, for example, renting accommodation via an online platform (e.g. Airbnb) or selling goods and services through platforms for private individuals (e.g. eBay, Facebook Marketplace, Bazoš, Willhaben, etc.). This indicator does not require the goods or service to be paid for and delivered online. It is essential that the shop is concluded online via a website, not by phone or e-mail.

The share of citizens selling online goods or services fell from 29 % to 27 % in 2019, but remains above the EU average of 23 %.



3c2: Selling online		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
States	parameter						
Slovakia	order	20.	22.	14. ↑	18.	6. ↑	8.

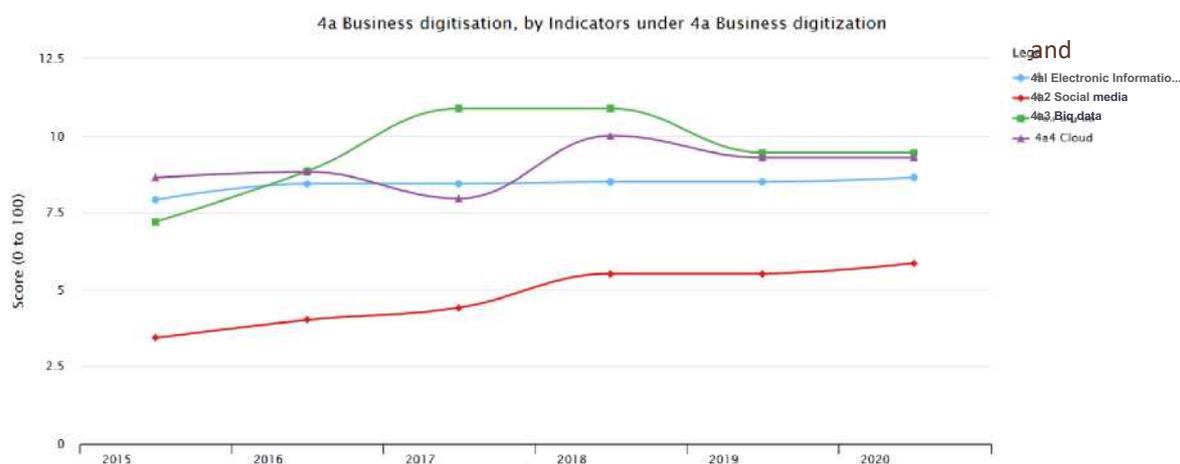
	score in %	13.5 %	11.6 %	15.6 %	14.4 %	29.5 %	26.5 %
EU	score	24.8 %	23.4 %	21.5 %	22.2 %	22.7 %	22.6 %
The Best MS EU	order	1 YOU ARE	1 HR	1 HR	1 NL	1 NL	1 NL
	score	40.3 %	50.1 %	38.2 %	38.4 %	37.1 %	38.0 %
The Worst MS EU	order	28 CY	28 CY	28 EL	28 EL	28 CY	27 EL
	score	1.4 %	2.7 %	2.8 %	3.3 %	3.0 %	3.2 %
Czechia	order	13.	15.	16.	20.	16.	18.
	score	19.4 %	16.6 %	14.7 %	13.3 %	16.2 %	14.3 %
Hungary	order	10.	8.	18.	19.	19.	15.
	score	23.6 %	25.3 %	14.3 %	14.2 %	14.4 %	16.5 %
Poland	order	14.	14.	12.	14.	15.	14.
	score	17.4 %	17.8 %	21.3 %	20.4 %	18.3 %	17.0 %

Table 31: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Dimension 4 Integration of digital technologies

Indicators 4a1, 4a2, 4b3 are determined by a questionnaire survey only in odd years. 4a3 only in even years. Data are available for the period 2015-2020. The source of the data is Eurostat – ICT Enterprises Survey.

Subdivision 4a: Business digitalisation



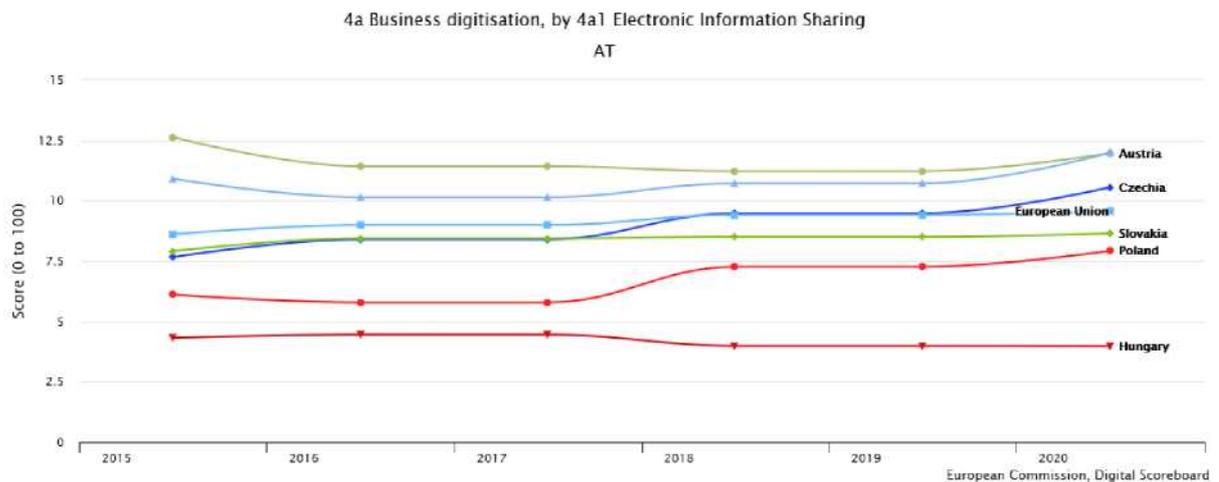
The European Commission. Digital Scoreboard

Subdivision 4a indicators show a very small shift over time, with the exception of indicator 4a2 Social media, which is growing slightly, i.e. increasing the number of businesses that use social networks, wiki pages, or blogs to communicate with customers, business partners and among employees. Indicator 4a1 Electronic information sharing has not changed at all since 2015, and barriers need to be identified as why only 30 % of businesses use software tools to plan resources (customs, accounting, marketing, inventory, etc.). Indicators 4a3 Large data and 4a4 Cloud oscillate on a narrow scale (changes are only within statistical dispersion) and obstacles to greater use of these technologies need to be identified. In general, however, there is very little spread of new technologies among entrepreneurs. Awareness-raising and training activities and support tools to increase the use of software tools to run a business could bring improvements, which can be fundamentally supported by ECDI and SBA activities.

Indicator 4a1: Electronic information sharing

Description	Sample	Unit	Source
Enterprises that use a software package for enterprise resource planning to share information between different sectoral areas (e.g. accounting, planning, marketing, production)	All enterprises (except the financial sector, 10+ employees)	% of enterprises	Eurostat – Use of ICT and e-commerce in enterprises

The rate of use of software packages for enterprise resource planning in Slovak enterprises has stagnated for a long time and growth towards the EU average is very slow. The market for software packages in Slovakia is affected by frequent legislative changes, especially at the national level, which must be constantly incorporated into the program by the package developers. However, in most of the comparator countries, long-term change is also not visible and national performance is kept at a comparable level, so it can be assumed that decisive factors are extremely stable and difficult to influence. The exception may be the Czech Republic, which has been able to gradually increase the use of software packages for enterprise resource planning and progresses upwards.



4a1: Electronic information sharing		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	17	14 ↑	14 =	14 =	14 =	19
	score	28.5 %	30.4 %	30.4 %	30.6 %	30.6 %	31.1 %
EU	score	31.0 %	—	—	33.9 %	33.9 %	34.4 %
The best country	order	1 BE					
	score	47.3 %	50.0 %	50.0 %	54.0 %	54.0 %	52.6 %
The Worst Country	order	24 HU	24 HU	24 HU	25 HU	25 HU	28 HU
	score	15.5 %	16.0 %	16.0 %	14.4 %	14.4 %	14.3 %
Austria	order	2	6	6	7	7	7
	score	45.5 %	41.1 %	41.1 %	40.4 %	40.4 %	43.1 %
Czechia	order	19	16	16	—	—	12

	score	27.6 %	30.2 %	30.2 %	—	—	38.0 %
Hungary	order	24	24	24	25	25	28
	score	15.5 %	16.0 %	16.0 %	14.4 %	14.4 %	14.3 %
Poland	order	22	23	23	20	20	22
	score	22.0 %	20.9 %	20.9 %	26.2 %	26.2 %	28.5 %

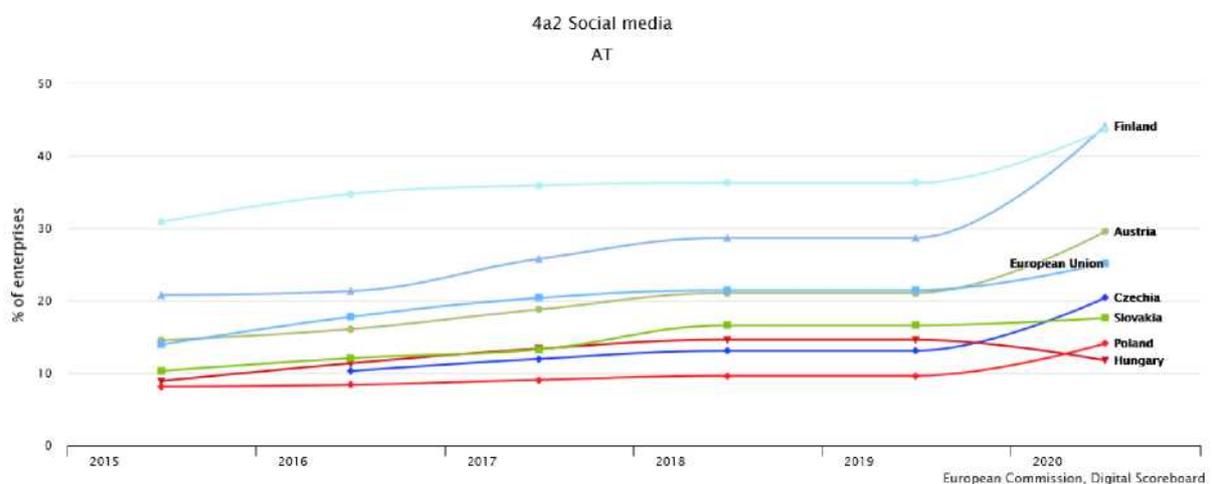
Table 32: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 4a2: Social media

Description	Sample	Unit	Source
<p><i>Businesses that use two or more types of social media: social networks, enterprise blog or microblog, multimedia content sharing websites, tools for sharing "wiki" information.</i></p> <p><i>Using social media means that an enterprise has a user profile, account or license depending on the requirements and type of social media.</i></p>	All enterprises (except the financial sector, 10+ employees)	% of enterprises	Eurostat – Use of ICT and e-commerce in enterprises

The indicator does not take into account the level of digitalisation of business processes. While the use of social media is an important component of marketing, the mere existence of an enterprise profile does not reflect the degree of use of these tools. If the indicator is to be useful, its definition should be changed to reflect the extent of the added value of social media for the management of the enterprise and the overall economy.

The level of use of social media by businesses vis-à-vis customers and business partners, as well as internally among business workers, is below average in Slovakia compared to the EU and shows only a small increase. Slovakia is lagging behind, while other countries, in particular in the last year 2020, show a general upward trend in terms of the share of enterprises that use social media.



4a2: Social media		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	14	13 ↑	16	15 ↑	15 =	14 ↑

	score	10.3 %	12.1 %	13.3 %	16.6 %	16.6 %	17.6 %
EU	score	13.9 %	17.8 %	20.4 %	21.4 %	21.4 %	25.2 %
The best country	order	1 NL	1 NL	1 UK	1 UK	1 UK	1 FI
	score	37.1 %	37.3 %	39.9 %	42.4 %	42.4 %	44.2 %
The Worst Country	order	25 RO	28 RO	28 RO	28 BG	28 BG	28 RO
	score	5.9 %	6.5 %	8.4 %	8.9 %	8.9 %	8.4 %
Austria	order	13	14	14	12	12	10
	score	14.5 %	16.1 %	18.8 %	21.1 %	21.1 %	29.6 %
Czechia	order	—	23	24	23	23	19
	score	—	10.3 %	12.0 %	13.1 %	13.1 %	20.4 %
Hungary	order	19	22	21	22	22	26
	score	8.9 %	11.4 %	13.4 %	14.6 %	14.6 %	11.8 %
Poland	order	21	27	27	26	26	25
	score	8.1 %	8.4 %	9.0 %	9.6 %	9.6 %	14.1 %

Tab. 33: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Indicator 4a3: Big data

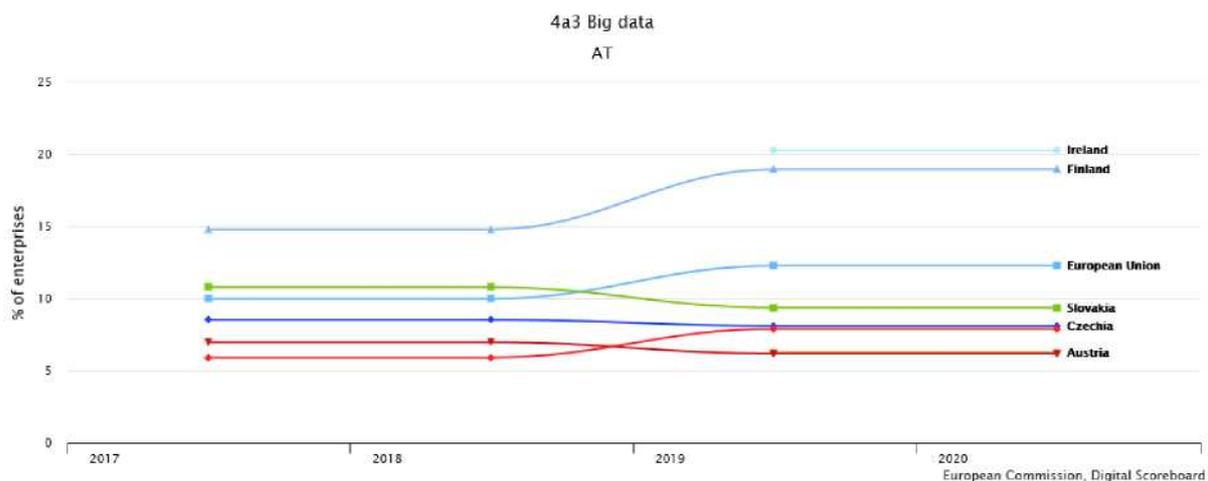
<i>Description</i>	<i>Sample</i>	<i>Unit</i>	<i>Source</i>
<i>Businesses that analyse big data from any source</i>	All enterprises (except the financial sector, 10+ employees)	% of enterprises	Eurostat – Use of ICT and e-commerce in enterprises

The definition should specify more clearly the type of data used or its purpose, e.g. optimisation of internal processes or better targeting of marketing, or it should be made clear that this indicator covers all purposes and all types of data. We propose to consider renaming this indicator, for example, to “Use of data”, and to add a more detailed explanation in the definition.

The rate of enterprises that use the analysis of large volumes of data in their business activity is generally low and has even declined slightly compared to previous years. It is likely that businesses either do not see the benefits of using big data or do not have access to the customer data itself, which could be analysed. Finland and Ireland are significant predictors in the EU for the use of large volumes of data. Neighbouring countries have a comparatively unfavourable score as Slovakia.

4a3 Big data		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	—	—	14	14 =	19	19 =
	score	—	—	10.8 %	10.8 %	9.4 %	9.4 %
EU	score	—	—	10.0 %	10.0 %	12.3 %	12.3 %
The best country	order	—	—	1 NL	1 NL	1 MT	1 MT
	score	—	—	19.1 %	19.1 %	24.4 %	24.4 %
The Worst Country	order	—	—	26 CY	26 CY	27 CY	27 CY
	score	—	—	2.6 %	2.6 %	4.7 %	4.7 %
Austria	order	—	—	—	—	25	25
	score	—	—	—	—	6.3 %	6.3 %
Czechia	order	—	—	20	20	21	21
	score	—	—	8.5 %	8.5 %	8.1 %	8.1 %
Hungary	order	—	—	22	22	26	26
	score	—	—	7.0 %	7.0 %	6.2 %	6.2 %
Poland	order	—	—	23	23	21	21
	score	—	—	5.9 %	5.9 %	7.9 %	7.9 %

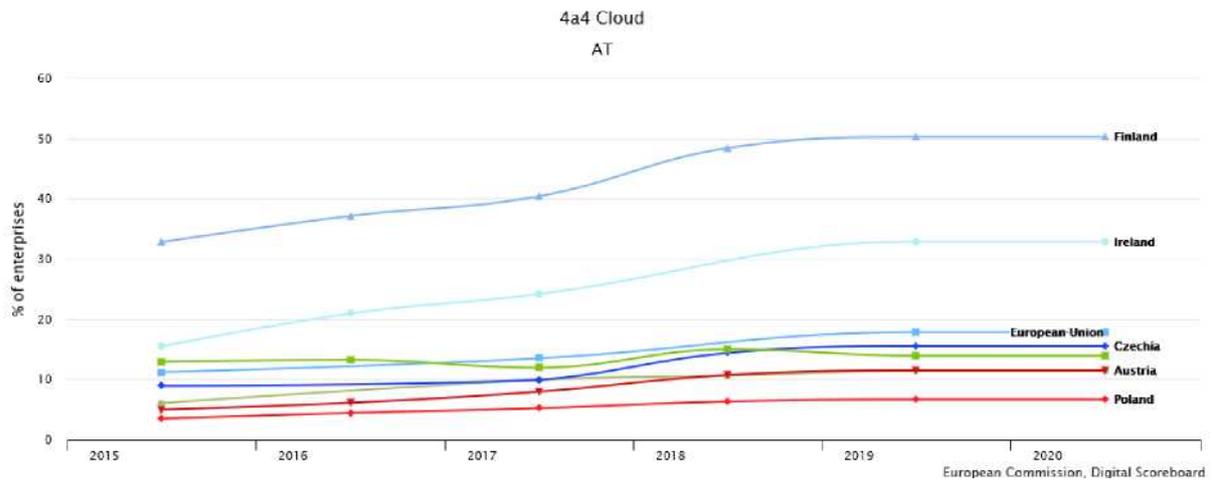
Table 34: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator: 4a4 Cloud

Description	Sample	Unit	Source
Businesses purchasing at least one of the following cloud services: enterprise database hosting, software applications for accounting CRM software, computing power	All enterprises (except the financial sector, 10+ employees)	% of enterprises	Eurostat – Use of ICT and e-commerce in enterprises

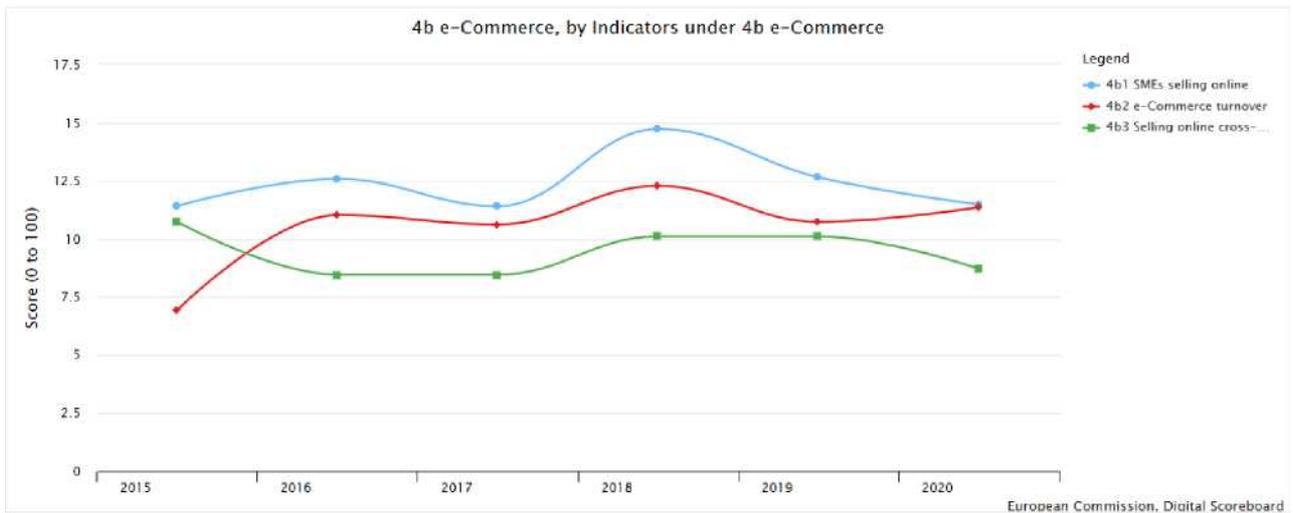
Given the generally low take-up rate of digital services, it is foreseeable that the use of internet services for data storage and databases also has low penetration among Slovak businesses. Finland and Ireland are strong leaders in the EU for cloud services. Neighbouring countries have a comparatively unfavourable score as Slovakia.



4a4: Cloud		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	9	6↑	15-	6↑	20-	20 =
	score	13.0 %	13.2 %	11.9 %	15.0 %	13.9 %	13.9 %
EU	score	11.2 %	—	13.5 %	—	17.8 %	17.8 %
The best country	order	1 FI					
	score	32.8 %	37.1 %	40.4 %	48.4 %	50.2 %	50.2 %
The Worst Country	order	28 RO	15 BG	28 BG	15 BG	28 BG	28 BG
	score	2.8 %	3.9 %	4.7 %	5.5 %	5.9 %	5.9 %
Austria	order	21	—	19	12	23	23
	score	6.1 %	—	9.9 %	10.6 %	11.4 %	11.4 %
Czechia	order	15	—	20	7	16	16
	score	8.9 %	—	9.9 %	14.4 %	15.5 %	15.5 %
Hungary	order	22	12	23	11	22	22
	score	5.0 %	6.1 %	8.0 %	10.7 %	11.5 %	11.5 %
Poland	order	26	14	27	13	27	27
	score	3.5 %	4.4 %	5.2 %	6.3 %	6.7 %	6.7 %

Tab. 35: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Subdivision 4b e-commerce



All three indicators of subdivision 4b have oscillated around the same value since the beginning of the measurements and do not show a clear growth trend, so current measures are not effective and further tools need to be used to support their growth. The indicators are interlinked – the increase in the number of traders selling online is likely to also be reflected in higher volumes of online sales and the number of cross-border transactions will increase. We recommend increasing the digital skills of entrepreneurs, providing practical toolkits for the introduction of online sales and providing motivational support to increase the demand for the deployment of online trading platforms in business.

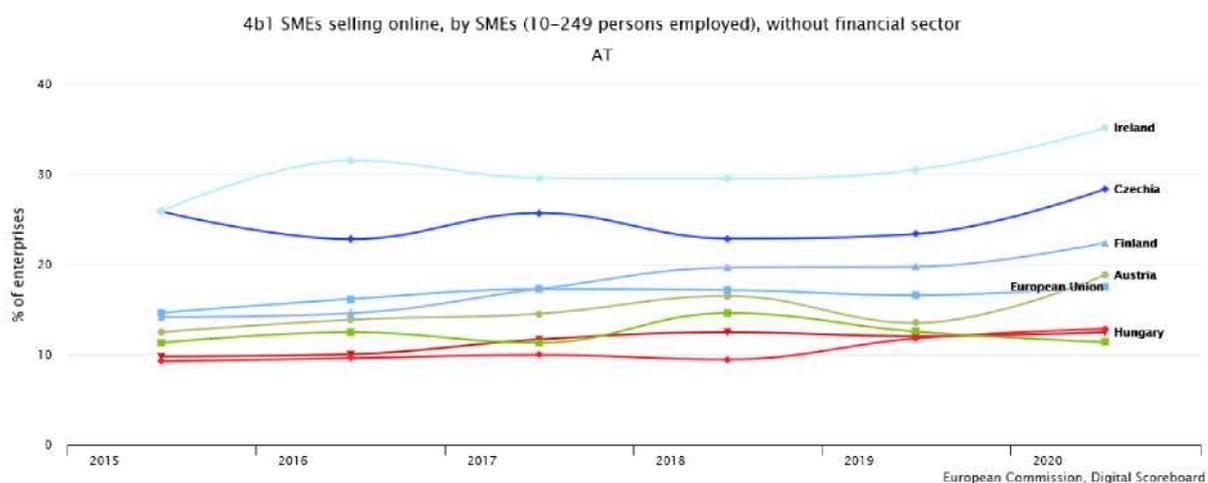
Indicator 4b1: Online sale of SMEs

Description	Sample	Unit	Source
SMEs selling online (at least 1 % of turnover)	SMEs (excluding the financial sector, 10-249 employees)	% OF SMES	Eurostat – Use of ICT and e-commerce in enterprises

The share of SMEs selling goods and services through online shops is particularly low in Slovakia compared to premieres such as Ireland and Czechia. However, other comparisons show that Slovaks like to shop online, so it is necessary to look further into the obstacles why traders sell relatively little online. Possible causes include a lack of digital literacy among online shop operators, administrative barriers to online business, or a lack of offer of support services (payment systems, delivery services for sending goods).

4b1: Online sale of SMEs		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	18	19	22 ⁻	20 [↑]	20 =	24 ⁻
	score	11.3 %	12.5 %	11.3 %	14.6 %	12.5 %	11.4 %
EU	score	14.6 %	16.2 %	17.2 %	17.2 %	16.6 %	17.5 %
The best country	order	1 IE	1 IE	1 IE	1 IE	1 DK	1 IE
	score	25.9 %	31.5 %	29.6 %	29.5 %	30.8 %	35.1 %
The Worst Country	order	28 IT	28 BG	28 BG	28 BG	28 BG	28 BG
	score	5.1 %	5.7 %	5.2 %	7.1 %	5.5 %	7.3 %
Austria	order	16	18	18	15	19	12
	score	12.5 %	13.8 %	14.5 %	16.5 %	13.5 %	18.8 %
Czechia	order	2	6	4	6	5	5
	score	25.9 %	22.8 %	25.7 %	22.9 %	23.4 %	28.4 %
Hungary	order	21	22	21	21	22	21
	score	9.8 %	10.0 %	11.7 %	12.5 %	12.0 %	12.5 %
Poland	order	22	23	24	25	24	20
	score	9.3 %	9.6 %	9.9 %	9.5 %	11.8 %	12.8 %

Tab. 36: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



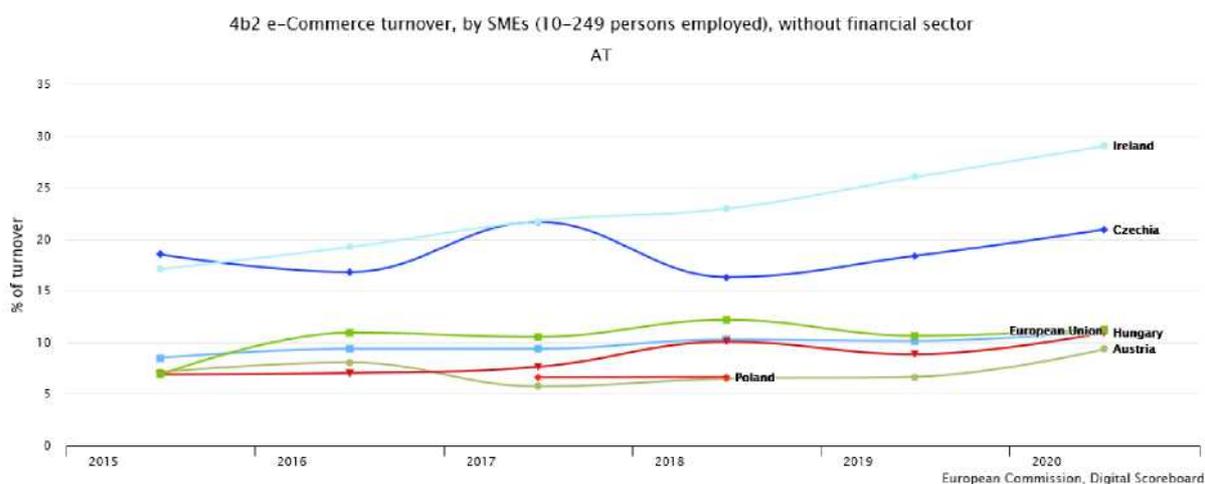
4b2 Turnover of e-commerce

Description	Sample	Unit	Source
Total turnover of e-commerce SMEs	SMEs (excluding the financial sector, 10-249)	% of turnover	Eurostat – Use of ICT and e-commerce in enterprises

Like the previous indicator 4a1, barriers need to be analysed in this case, why SMEs in Slovakia make only a small proportion of online sales and what measures can increase the share of online sales.

4b2: E-commerce turnover		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	17	8↑	9-	7↑	12-	11↑
	score	6.9 %	10.9 %	10.5 %	12.2 %	10.6 %	11.2 %
EU	score	8.5 %	9.4 %	9.4 %	10.3 %	10.1 %	11.1 %
The best country	order	1 CZ	1 IE				
	score	18.5 %	19.2 %	21.8 %	22.9 %	26.0 %	29.0 %
The Worst Country	order	24 BG	24 BG	26 BG	25 BG	24 BG	25 BG
	score	1.4 %	3.1 %	1.7 %	3.5 %	2.0 %	2.2 %
Austria	order	15	16	23	20	19	17
	score	7.1 %	8.0 %	5.7 %	6.5 %	6.6 %	9.3 %
Czechia	order	1	2	2	2	3	2
	score	18.5 %	16.8 %	21.7 %	16.3 %	18.4 %	20.9 %
Hungary	order	16	21	17	14	16	14
	score	6.9 %	7.0 %	7.6 %	10.0 %	8.8 %	10.9 %
Poland	order	—	—	18	18	—	—
	score	—	—	6.6 %	6.6 %	—	—

Table 37: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

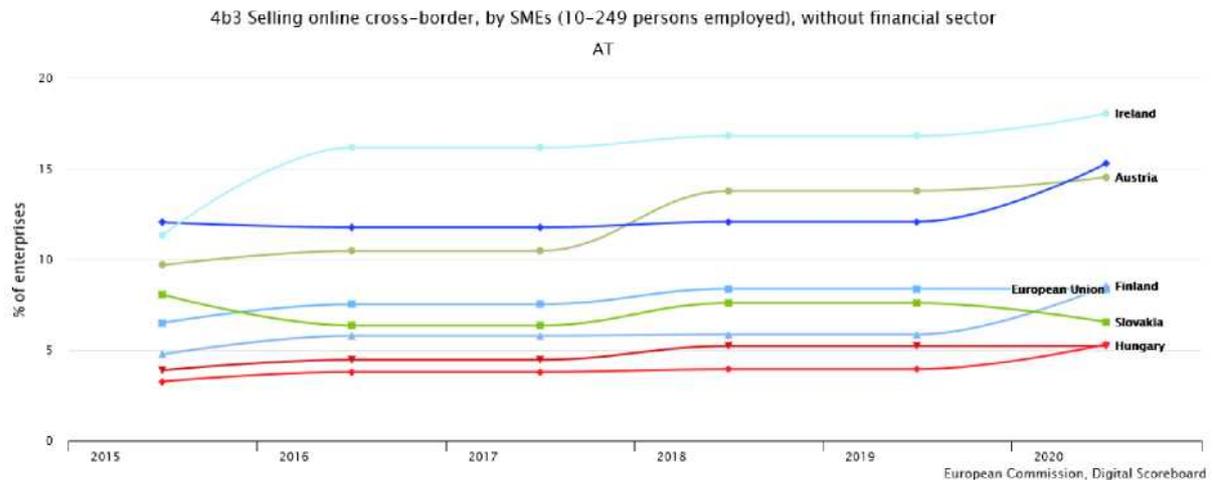


Indicator 4b3: Cross-border online sales

Description	Sample	Unit	Source
SMEs that have made electronic sales in other EU countries	SMEs (excluding the financial sector, 10-249)	% OF SMES	Eurostat – Use of ICT and e-commerce in enterprises

Slovakia is a relatively small country neighbouring other EU Member States and therefore has a high potential for cross-border online sales. A language barrier may be an obstacle, as most sellers offer goods and services only in the Slovak language. Furthermore, insufficient use of international payment gateways and delivery services to serve foreign customers is hampered. The long-term trend is without

more pronounced fluctuations, although Slovak businesses have a good potential to increase this parameter of online commerce.



4b3: Cross-border online sales		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
Slovakia	order	12	17 TO17	17 =	18	18 =	19
	score	8.1 %	6.3 %	6.3 %	7.6 %	7.6 %	6.5 %
EU	score	6.5 %	7.5 %	7.5 %	8.4 %	8.4 %	8.4 %
The best country	order	1 MT	1 IE				
	score	12.4 %	16.2 %	16.2 %	16.8 %	16.8 %	18.0 %
The Worst Country	order	28 BG	27 BG				
	score	2.1 %	2.8 %	2.8 %	3.4 %	3.4 %	3.2 %
Austria	order	7	6	6	2	2	4
	score	9.7 %	10.5 %	10.5 %	13.8 %	13.8 %	14.5 %
Czechia	order	2	3	3	4	4	3
	score	12.0 %	11.8 %	11.8 %	12.1 %	12.1 %	15.3 %
Hungary	order	24	23	23	24	24	24
	score	3.9 %	4.5 %	4.5 %	5.2 %	5.2 %	5.2 %
Poland	order	26	25	25	26	26	23
	score	3.3 %	3.8 %	3.8 %	3.9 %	3.9 %	5.3 %

Table 38: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Dimension 5 Digital Public Services

The dimension consists of only one subdivision and is calculated as the weighted average of five indicators after normalisation of their score⁶⁹. In the case of the fifth dimension, all five indicators have the same weight on the total dimension score. It is important to note that the same weight of these indicators does not reflect the true importance and breadth of the measured aspect of digital public services. For example, while indicator 5a2 evaluates a very partial aspect, which are pre-filled forms, which may not relate to a

⁶⁹Due to the fact that different DESI indicators are presented in different units, the calculation of the aggregate score at the level of the subdivision, dimension and, finally, the overall score takes place after the indicators normalise. In this process, the value of each indicator is designed on a scale from 0 to 1 by the minimum-maxima method, where the 0 position is attributed to the minimum value of the indicator unit and the position 1 maximum value.

number of services and are just one of the ways electronic services proactively interact with background data, for example, the indicator 5a5 evaluates a broad topic of open data with a number of attributes and factors. Therefore, it cannot be agreed that each of the indicators evaluated gives sufficient and equal testimony on all relevant aspects of digital public services.

DESI's fifth dimension, evaluating digital public services, contains five indicators and, in terms of their resources, it is clear that the dimension is strongly based on the evaluation carried out in the eGovernment Benchmark ranking. In addition, the Eurostat questionnaire survey on the use of ICT in households and individuals,⁷⁰ as well as the study on the maturity of open data⁷¹ from the European Data Portal, are sourced.

In terms of coverage of digital public services, it cannot be said that the five indicators chosen in this dimension describe all or at least the most relevant aspects of this dimension. Even a close link with eGovernment Benchmark does not show that the most key eGovernment Benchmark indicators are chosen among the DESI indicators. The selected aspects of this assessment are also not from the same or comparable levels of the structure of this ranking. The DESI fifth dimension indicators should respect and reflect the structure and priorities of the eGovernment benchmark – for example, all four basic dimensions of the eGovernment benchmark should be represented. For example, the fifth dimension of DESI does not cover, for example, the cross-border mobility of services, the related eID issue, as well as the transparency of services and the handling of personal data.

Indicator 5a1: EGovernment users

Description	Sample	Unit	Source
<i>Individuals who have submitted a completed form to public institutions over the last 12 months via the Internet</i>	All individuals aged 16-74	% of internet users who needed to fill in the form in the last 12 months	Eurostat — Use of ICT in households and individuals

The current definition of this indicator is too narrow and does not reflect all kinds of digital public services and their uses. Only users who have sent a digitally completed form to a public institution cannot be considered to be users of digital public services. First of all, not all digital public services include forms. At the same time, in view of technological progress, it is increasingly desirable that electronic services carry out a number of background processes and re-use user data already held by public institutions without the need to refill them in forms. In a number of Member States, such a definition of an indicator also excludes those users who, for example, use automatically triggered electronic services without the need for their request. These users, of course, will not indicate in the questionnaire that they have used such a service, as they are not even aware of it.

Another problem is that the question instructions in the questionnaire state that there must be a personal use of the service, thus excluding from the definition of the indicator users of assisted services where an employee of a public institution, in the presence and at the request of the user, performs the service on his behalf. In doing so, this mechanism is crucial for maintaining equality in access to national e-services for those users who do not have access to the internet, computers or sufficient digital skills.

Moreover, the current form of the questionnaire on the question relevant to indicator 5a1 offers only very

⁷⁰ICT usage in households and in individuals

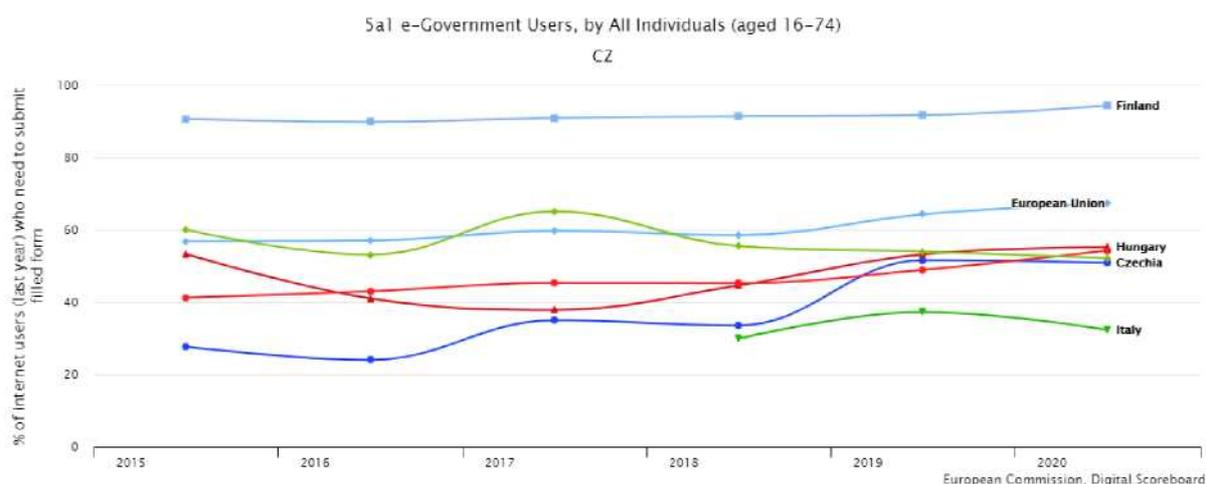
⁷¹ Open Data Maturity study <https://www.europeandataportal.eu/en/impact-studies/open-data-maturity#2019>

limited possibilities for replying with examples of three activities carried out by the user in the context of electronic communication with public institutions (retrieval of information from their websites, withdrawal of forms, online submission of forms). However, it should be noted that, in the context of the preparation of the next editions of the questionnaire, it is clear that the issue will include a wider and more representative range of activities offered as opportunities for interaction with public institutions.

Under ideal circumstances, the best source of such an indicator should be national statistics directly from the information systems of each Member State in relation to a predefined basket of services. Indicator 5a1 is another example where the questionnaire survey on a representative sample could be replaced by original and realistic data.

5a1: EGovernment users		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order	16	20 –	13 ↑	17 TO 17	19	23
	score	60.0 %	53.1 %	65.1 %	55.5 %	54,0	52,2
EU average	score	56.9 %	57.1 %	59.7 %	58.5 %	64,3	67,3
The best country	order	1 EE	1 EE	1 EE	1 EE	1 SE	1 FI
	score	93.5 %	94.7 %	93.2 %	96.1 %	93,1	94,4
The Worst Country	order	28 CZ	28 CZ	28 CZ	28 IT	28 EL	28 IT
	score	27.7 %	24.0 %	34.9 %	29.9 %	36,2	32,3
Czech Republic	order	28	28	28	27	22	25
	score	27.7 %	24.0 %	34.9 %	33.5 %	51,5	50,8
Poland	Order	25	25	24	23	25	21
	score	41.3 %	43.0 %	45.3 %	45.2 %	48,9	54,2
Hungary	order	19	26	27	24	20	20
	score	53.3 %	41.0 %	37.8 %	44.6 %	53,2	55,2

Table 39: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 5a2: Pre-filled forms

Descr	Sample	Unit	Source
Amount of pre-filled data in online public service forms	Services rated by eGovernment Benchmark	Score 0-100	eGovernment Benchmark

The 5a2 indicator in the DESI index directly draws data from eGovernment Benchmark, where it corresponds to the indicator “authentic sources”⁷² within the key instrument dimension. This is an evaluation of the extent to which electronic services automatically and separately draw data on the service user from available national registers. While the interconnection of registers and the re-use of data already held by public institutions are undoubtedly the right attributes for evaluating digital public services, the definition of this indicator is also too narrow. The indicator evaluates only those services that in their process involve filling in and submitting an electronic form. However, the trend in the light of technological advances is that services will gradually process more and more background data and automatically without the need to submit forms. However, this aspect does not currently include the indicator.

5a2: Pre-filled forms		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order	21	24 ⁻	21 [↑]	20 [↑]	22 ⁻	23
	score	22,2	19,1	27,9	33,5	35,1	37,6
EU average	score	45,5	48,7	48,8	53,3	57,9	59,4
The best country	order	1 EE	1 EE	1 MT	1 MT	1 MT	1 MT
	score	92,7	95,1	98,3	100	100	100
The Worst Country	order	28 HR	28 RO	28 EL	28 RO	28 RO	28 RO
	score	2,0	5,5	4,6	11,9	10,4	10,4
Czech Republic	order	19	19	15	16	18	18
	score	27,6	29,1	43,1	49,4	51,0	52,5
Poland	Order	9	11	13	17	17	16
	score	67,9	63,0	58,1	48,1	53,9	58,0
Hungary	order	22	25	23	23	23	20

⁷² Authentic sources

	score	19,4	19,0	23,0	27,7	31,0	41,8
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Tab. 40: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 5a3: Provision of an online

Description	Sample	Unit	Source
Share of online administrative steps/services linked to major life situations	Services rated by eGovernment Benchmark	Score 0-100	eGovernment Benchmark

The indicator 5a3 in DESI corresponds to the “online availability” indicator within the user-focused dimension, which is evaluated in the eGovernment Benchmark index. The services included in each of the eight life situations are evaluated in terms of the extent to which the service is available online (from inaccessible to providing information about the service, but with the need to equip it offline, to a fully digitised service where the whole process takes place online).

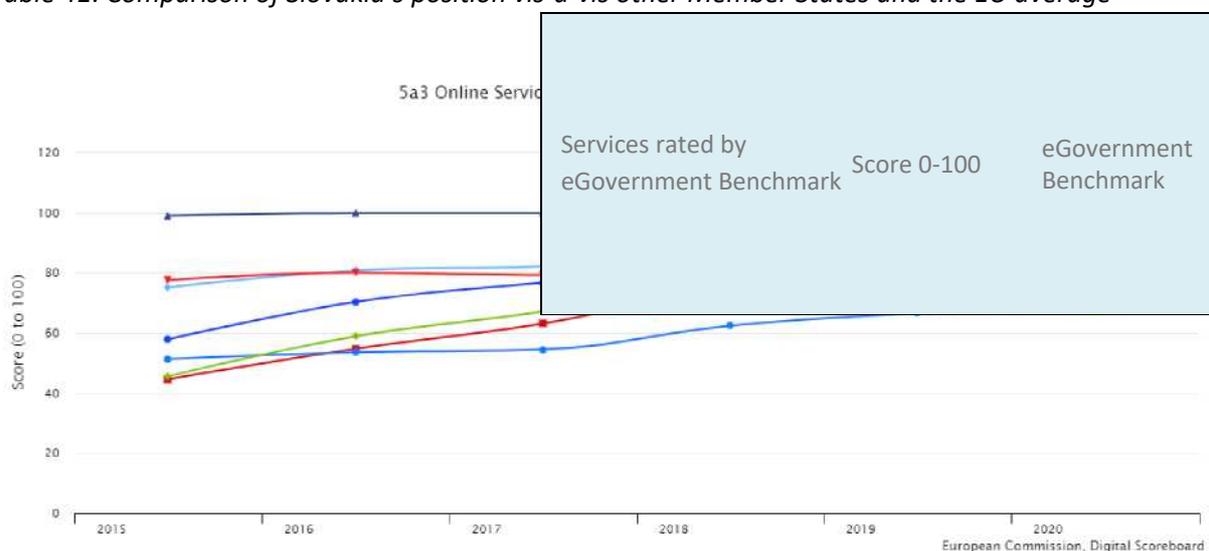
However, for DESI’s needs, the definition is inaccurate in that it refers to ‘major life situations’, without specifying which of the eight life situations of Benchmark eGovernment considers them to be. However, given the comparison of published results of DESI and eGovernment Benchmark, it appears that DESI takes into account all eight life situations and the score for this indicator is therefore the same in both indices.

Slovakia is growing gradually in this indicator, but although its score improves relatively significantly year-on-year, it still falls short of the EU average and the gap does not narrow significantly. Although Slovakia’s location has improved by five places since DESI 2015, it currently reaches the best level, but the difference with the last country is not so pronounced. At the same time, it should be noted that the recent latest Romania very quickly and significantly improves its score in this indicator.

5a3: Provision of an online service		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order	27	25 ↑	24 ↑	22 ↑	24 -	22 ↑

	score	45,6	58,9	67,1	77,6	79,4	85,0
EU average	score	75,2	80,7	82,1	85,5	87,4	89,8
The best country	order	1 MT					
	score	99,0	99,9	99,9	99,9	100	100
The Worst Country	order	28 HU	28 RO	28 RO	28 HR	28 HR	28 RO
	score	44,6	53,6	54,5	61,6	63,8	70,3
Czech Republic	order	23	22	20	18	21	24
	score	57,9	70,3	76,8	81,8	82,4	82,1
Poland	Order	15	18	18	21	20	20
	score	77,6	80,0	79,3	81,0	83,6	86,8
Hungary	order	28	26	26	25	23	21
	score	44,6	54,7	63,1	75,3	81,6	86,8

Table 41: Comparison of Slovakia's position vis-à-vis other Member States and the EU average



Indicator 5a4: Digital public services for businesses

Description	Sample	Unit	Source
<i>Share of public services needed to set up a business and carry out normal business operations, which are provided online to domestic and foreign entrepreneurs. (Services provided through the single portal are rated higher scores than services for which only information is available online but must be performed in person.)</i>			

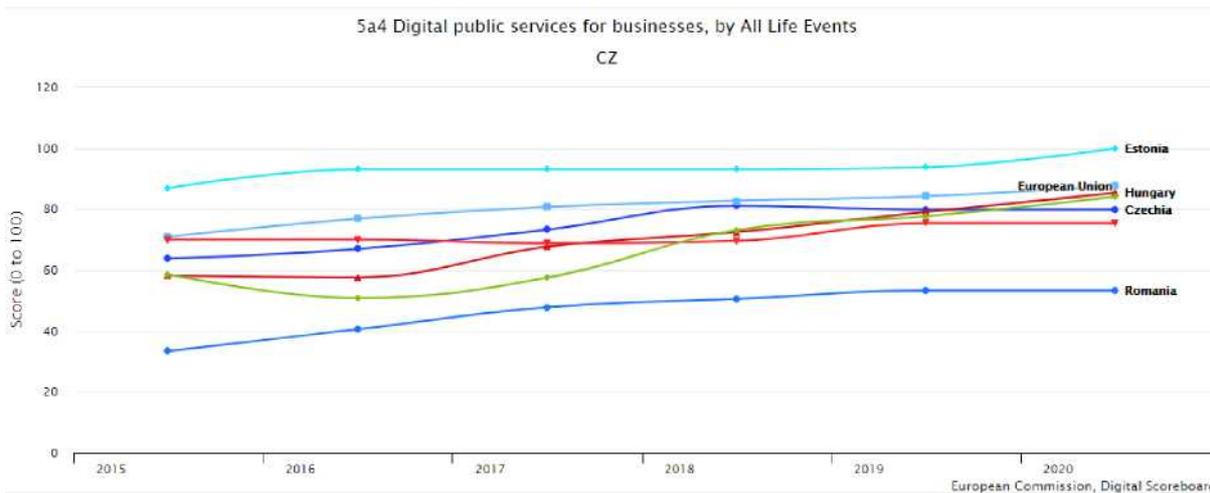
Indicator 5a4 in DESI is closely linked to business life situations evaluated in eGovernment Benchmark. However, eGovernment Benchmark assesses two types of life situations related to entrepreneurship (starting up a business and regular business operations). The definition of the DESI indicator gives the impression that the score indicates the overall level of digital public services for businesses. However, a more in-depth analysis should be made to point out that the scores given in the DESI reports correspond to the assessment of only one of the four dimensions which eGovernment Benchmark assesses in relation to the 'start-up of a business' life situation. It follows that that score shows nothing about the services included in the second business situation or the qualitative aspects related to the other three dimensions which eGovernment Benchmark assesses in the life situation.

It follows from the above that it cannot be argued that indicator 5a4 is sufficiently indicative of the overall level of digital services for entrepreneurs or of the share of digitalised services for them as defined in indicator 5a4 in the DESI methodology.

Also in this indicator, Slovakia is gradually improving its scores and is also gaining speed in reducing the distance from the EU average, which is still below. On the other hand, its location does not significantly improve, although it currently reaches the best level (22nd place). Only Hungary scores better in the V4 region by less than a percentage point. It is important to note that high-quality digitalisation of services for entrepreneurs has the potential to be an essential competitive advantage in terms of creating a favourable business environment.

5a4: Digital public services for businesses		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order	24	26 [–]	27	22 [↑]	23	22 [↑]
	score	58,6	50,8	57,5	73,1	77,7	84,1
EU average	score	71,0	76,8	80,7	82,7	84,3	87,6
The best country	order	1 DK	1 DK	1 DK	1 DK	1 DK	1 EE
	score	100	100	100	100	100	100
The Worst Country	order	28 EL	28 RO	28 RO	28 RO	28 RO	28 RO
	score	29,2	40,6	47,8	50,6	53,3	53,3
Czech Republic	order	20	22	21	17	20	23
	score	63,8	66,9	73,3	81,1	79,8	79,8
Poland	Order	17	20	22	25	24	25
	score	70,0	70,0	68,8	69,6	75,4	75,4
Hungary	order	25	25	23	24	22	20
	score	58,3	57,6	67,7	72,5	79,1	85,3

Table 42: Comparison of Slovakia’s position vis-à-vis other Member States and the EU average



Indicator 5a5: Open data

Description	Sample	Unit	Source
Composite indicator measuring the degree to which the State has an open data policy in place (including the transposition of the PSI Directive), the estimated political, social and economic impact of open data and the characteristics of the national data portal (functions, availability and rate of use of the data)	Aggregated score	% of maximum score	European Data Portal

Desi takes the indicator 5a5 from the evaluation Study on Open Data Maturity⁷³, published annually by the European Data Portal. The study assesses the level of maturity by four dimensions – rules, portal, impact and quality – and divides countries into four categories according to the level of maturity of their open data. It also makes recommendations for each country in view of its assessment.

Based on this evaluation, Slovakia ranked 29th out of a total of 32 countries assessed by the report, which corresponds to 27th in DESI 2020. Slovakia scores only half (33 %) of the EU average score (66 %), which is only less than a percentage point better than the last EU country, Hungary (32.4 %).

Despite the fact that DESI has been evaluating this indicator since its first report in 2015, when the first reports of the European Data Portal were also released, DESI dataset since this year lacks historical data in the time series. In the DESI 2019 report, this indicator was the best rated indicator for Slovakia with 74 % and 8th place in the EU, surpassing the EU average by 10 percentage points. The sharp year-on-year decrease in the score to just over half of that from the previous year is due to a change in the evaluation methodology of the European Data Portal, the explanation of which is available above in the chapter on the sources of DESI indicators.

In particular, the problem was that Slovakia was unable to answer a number of questions in the updated questionnaire for the study. For example, the national portal data.gov.sk does not have several functionalities that are evaluated by the study (real-time data, dynamic data, tracking of data re-use, collection of information about data use, minimum linked data, impossibility of analytics). In addition, several evaluated datasets in Slovakia are still not published in the form of open data. The problem is also the lack of a uniform licensing policy.

However, most of these required functionalities are part of a new national project to build a new open data portal, the implementation of which is expected to be launched soon.

The model in the V4 region is Poland, which, according to the latest assessment, significantly surpasses the EU average with a score of 77 % and ranks 7th.

5a5: Open data		DESI 2015	DESI 2016	DESI 2017	DESI 2018	DESI 2019	DESI 2020
State	parameter						
Slovakia	order						27
	score						33.1 %
EU average	score						65.9 %
	order	1	1	1	1	1	1 IE

⁷³ Open Data Maturity Study <https://www.europeandataportal.eu/sk/impact-studies/open-data-maturity>

The best country	score						90.9 %
The Worst Country	order	28	28	28	28	28	28 HU
	score						32.4 %
Czech Republic	order						18
	score						63.6 %
Poland	Order						7
	score						77.7 %
Hungary	order						28
	score						32.4 %

Table 43: Comparison of Slovakia's position vis-à-vis other Member States and the EU average

Annex 3: Overview of strategies, objectives and measures aimed at improving the position of the Slovak Republic in DESI

Title of strategy/strategic document	Assignment to and sub-dimension of DESI	Name of objective/measure	Sub-measure/task	Indicators	Evaluation and implementation rate	
					percentage	comment
National Concept of Informatisation of Public Administration of the Slovak Republic	D5 Public digital services (15 %)	Objective 1 NKIVS: Shift to services aimed at improving quality of life	Sub-objective of NKIVS: We will increase the quality, standard and accessibility of e-services for citizens	Overall satisfaction of citizens with eGovernment services	56.0 %	The target status is 73 %, the condition gradually improves
				Overall use of eGovernment services by citizens	69.6 %	Target status 74 %
	D1 Connectivity (25 %)	Objective 1 NKIVS: Shift to services aimed at improving quality of life	Sub-objective of NKIVS: We will improve broadband coverage	Percentage of population using mobile broadband internet access	49.3 %	Target status 48 %
				Percentage of population using broadband internet regularly	92.6 %	Target status 90.0 %
D5 Public digital services (15 %)	Objective 3 NKIVS: Bringing government closer to maximum use of data	Sub-objective of NKIVS: Improve availability of VS data in the form of open data	Share of data published as open data	86.0 %	Overall target of 98.0 % ⁷⁴	
Revision of expenditure on computerisation of public administration	D5 Public digital services (15 %)			Share of authentication via eID mobile application		Target status 60.0 % – eID not yet implemented
				Use of selected electronic end services		For 2019, natural and legal persons made 4433025 electronic submissions via ÚPVS via electronic services of public authorities.
Strategy and Action Plan for making available	D5 Public digital services (15 %)	Objective 1 Achieve comprehensive progress on open data theme	Improve Slovakia's position in international comparison and become a leader in open data in the EU	Create a data inventory and create a catalogue of open data according to the methodology.		The Data Inventory and Open Data Catalogue was created by obliged persons.

The⁷⁴ indicator expresses the ratio of records objects – datasets with open data available in ISVS in the form of open data on the Open Data Portal – data.gov.sk, to the total number of records objects, but this ratio does not evaluate the overall ratio of published data

and the use of open government data		Objective 2 Improve the availability of public administration data in the form of open data	Increase the number of public administrations publishing open data	Establish a timetable for the creation and making available of datasets.		The measure is being implemented on an ongoing basis
			Increase the number of self-government institutions publishing open data	Ensure the further development of central technical components and means for permanent access to open public administration data.		The measure is being implemented on an ongoing basis
Action Plan for the Digital Transformation of Slovakia 2019-2022	D1 Connectivity (25 %)	Streamlining the regulation of the electronic telecommunications market in favor of increasing coverage of the territory with ultra-fast connectivity	Among the measures that could already help in the short term are the adaptation of the legislation and the increased pressure of the regulator to promote the sharing of existing electronic communications infrastructure and, consequently, in favour of faster, more efficient and smoother construction of fibre networks not only from the point of view of electronic communications legislation, but also from the point of view of legislation for territorial proceedings and construction.	Adaptation of legislation		Deadline: 31.12.2020, annually. The new Electronic Communications Act, which will transpose Directive (EU) 2018/1972 of the European Parliament and of the Council of 11 December 2018 establishing the European Electronic Communications Code, is at the final stage of processing. The sharing of electronic communications infrastructure is already being used in practice.
		Supporting the completion of Gigabit optical connectivity available under the EU Gigabit Society Strategy	E.g. Interventions also through European funds for the development of electronic communications infrastructure to support the market and ensure the availability of ultra-fast broadband services for all citizens of the Slovak Republic	National Broadband Access Plan of Slovakia		Deadline: 31.12.2020, annually Currently in the legislative process.
		Support for measures from 5G Action Plan for		Ensuring the availability of harmonised frequency		Deadline: 31.12.2020, annually

		Europe and Tallinn's 5G Road Map to have one big city covered by 5G by 2020		spectrum for 5G, coverage at least one city with 5G technology		Fulfilled: The capital of the Slovak Republic Bratislava was covered on 10 December 2020 by a full-fledged, not pilot, commercial 5G operation from Slovak Telekom, a. s. On 7 October 2020 O2 Slovakia launched a pilot commercial testing operation of 5G network in four urban areas of Bratislava.
D2 Human capital (25 %)	Support for action The Digital Coalition	One of the key goals of the Digital Coalition is to make education in digital technologies were up-to-date, efficient and provided every citizen of the Slovak Republic has the opportunity to develop his own digital skills and competences throughout his life in order to be successful in the labour market and he was able to use digital technologies to perform his work and on ensuring a Quality Life		Establishment of the Digital Coalition as a legal entity		Deadline: 30.9.2019 The Digital Coalition was institutionalised as ZZPO "National Coalition for Digital Skills and Occupations of the Slovak Republic", whose task will be to maintain the secretariat of the Digital Coalition.
	Preparation of the programme of computerisation of the Ministry of Education until 2030			Strategy Paper – Education Informatisation Agenda 2030		Deadline: 31.12.2019 The document has been processed, communication and comments are planned

						its content with the professional public.
		Systemic change in the education system preparing workers for the needs of economic practice	<p>E.g. Promoting and supporting high-quality studies in computer science, mathematics and, in general, technical and natural sciences.</p> <p>Supporting the teaching of algorithmic thinking, developing literacy in the fields of reading, mathematical and natural science literacy, digital skills, creativity, critical thinking, teamwork, empathy, creating quality social relationships and using a research approach in education.</p>	Design of Systemic Change of the Education System		<p>Deadline: 31.12.2020</p> <p>The aim is to make digital technologies available in schools for both teachers and pupils in special classrooms, with the possibility of renting technology and homes.</p> <p>The Ministry plans to train school staff and promote the use of digital technologies, including in electronic testing. In addition, the staffing of schools also needs to be strengthened.</p> <p>From 1. 9. In 2020, new accreditation standards issued by the Slovak Accreditation Agency for Higher Education entered into force. The colleges are at</p>

						they oblige to involve both internal and external stakeholders, such as students, graduates and employers, in the process of designing, adjusting and monitoring study programmes, which presupposes increasing workers' readiness to meet the needs of the labour market.
		Lifelong learning – comprehensive systemic change, strategy and implementation of legislative measures	E.g. Take into account new labour market requirements linked to the development of digital technologies in the National Occupational System and its development for future occupations Increasing digital skills and competences for those in employment	Proposal for a systemic change in lifelong learning		Deadline: 31.12.2019 At present, it is proposed to reinstate the amendment to Act No 568/2009 on lifelong learning in the Plan of legislative tasks of the Government of the Slovak Republic.
		Elaboration of an analysis of the state of digital skills in Slovakia with a proposal for concrete measures	Development of an analysis of the state of digital skills and competences in Slovakia with the proposal of concrete measures and the creation of digital literacy standards for citizens, including through projects	Analysis		Deadline: 31.12.2020 MIRRI implements the measure on an ongoing basis. In 12 months, a survey of digital skills among Slovak companies to which they are

					<p>quite extensive recommendations have also been made. More information about the project is here.</p> <p>The second important activity is this year's IT Fitness Test 2020, which has successfully passed more than 20 thousand participants and the results of which are currently being processed.</p>
		Supporting activities leading to an increase in the share of women in the IT and digital sector	<p>Promoting the education and study of ICT disciplines</p> <p>Supporting projects that promote the involvement of women in IT work and girls in IT studies</p> <p>Popularisation in cooperation with industry through internships, excursions and workshops</p> <p>Increased cooperation with private sector initiatives</p>	Project support and scholarships	<p>Deadline: 30.06.2020 and on-going</p> <p>It is also continuously implemented through the project IT Academy – Education for the 21st Century.</p> <p>The “International Day of Girls and Women in ICT” took place on 8.10.2020</p>
		Support to increase young people's competences for the digital era in formal education	<p>E.g. Strengthen the teaching of mathematics and informatics at the Elementary School by promoting and implementing innovative methods of education as a basis for mathematical and digital literacy for the needs of the digital economy.</p>	Increasing digital competences among young people	<p>Deadline: 31.12.2019, ongoing</p> <p>It is continuously fulfilled.</p> <p>MŠV Vaš SR approved experimental verification</p>

			<p>Ensure the development of digital skills for teachers so that they can fully benefit from digital learning and thereby motivate pupils to actively use it and acquire digital competences.</p> <p>Define and integrate competences for the digital era and digital skills into all state and school education programmes.</p>			<p>some fields of study.</p> <p>Under the Human Resources OP, PO 1 Education, two demand-oriented challenges were launched in 2018.</p> <p>The national project of IT Academy – Education for the 21st Century focuses on improving the quality of, among others, informatic education at primary schools, schools and universities with a focus on ICT.</p> <p>Project IKATIKA – the aim is to verify the possibilities of applying innovative forms of minority</p>
		Making conditions of employment of information specialists more attractive in the state and public administration	In order to attract selected groups of experts to the state administration, it is necessary to make employment conditions more attractive, in particular in terms of their financial valuation.	The concept of remuneration in the civil service		<p>Deadline: 31.12.2021</p> <p>According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has already started.</p>
		Setting up an expert group for coordination	The aim is to create a coordination group, e.g. as part of a national platform	Setting up an expert group		Deadline: 31. 12. 2020

		educational activities in Artificial Intelligence	<p>for artificial intelligence, which will:</p> <ul style="list-style-type: none"> - map and analyse relevant educational programmes abroad and in Slovakia; - follow the Worldwide trends in research and application, but also in the safe and appropriate use of AI; - develop recommendations for education in the field of artificial intelligence in Slovakia for different target groups; - provide consultative services <p>AI education services for schools, public sector bodies and businesses.</p>			The measure is being implemented on an ongoing basis.
		Introduction of joint training of experts on selected aspects of AI	<p>E.g. Create a shared learning platform for selected aspects of AI in the form of “blended learning”. Get foreign students for studying a comprehensive study program of the 2nd degree or individual courses. Create a database of research activities and projects in the field of artificial intelligence in Slovakia, launching a grant call for the creation and development of joint learning in English.</p>	Increasing the number of students in Artificial Intelligence programmes		<p>Deadline: 31.12.2020, on an ongoing basis.</p> <p>In the field of artificial intelligence, the MŠVVaŠ SR nominated its representative to the expert group for the coordination of educational activities through the Higher Education Section.</p>

			<p>Improving the end-of-end communication and information infrastructure for blended learning needs. Development of courses in English and their remote teaching for foreign students.</p> <p>Funding is within the existing budget of HEIs and Slovak grant schemes.</p>			<p>in artificial intelligence. Part of the call for development projects is the possibility to submit a project Preparation and development of courses in English with a focus on artificial intelligence and cybernetics in the form of “blended learning”. The aim is to create practical courses that can be used in teaching and/or provided as stand-alone courses provided for upskilling or upskilling staff in the field of AI and cybernetics.</p>
	<p>D4 Integration of digital technologies in enterprises (20 %)</p>	<p>Initiating, supporting the creation and interconnection of Digital Innovation Hubs in Slovakia (DIH/CDI)</p>	<p>Create, support and connect DIH (CDI), which will be the only point of contact for services to provide industry with access to state-of-the-art digital solutions, the most advanced industrial experiments, and a set of human and industrial competences.</p>	<p>Creation of a network of Digital Innovation Hubs</p>		<p>Deadline: 31.12.2020</p> <p>In cooperation with the Ministry of Economic Affairs of the Slovak Republic, MIRRI organised a national competition in the second half of 2020 with the aim of selecting entities that could become</p>

					<p>innovation and would fulfil all functions as defined by the European Commission in the Digital Europe Programme and other working documents on this topic.</p> <p>The 4 most successful choices will be selected and will apply for Digital Europe grant support in the first quarter of 2021.</p>
		Introduction of systematic assessment of the impacts of regulations on innovation and the digital economy	Regulatory impact assessment processes will be supported by an information system within which it will be possible to model the impacts of regulation while monitoring their actual impacts after the change has been put into practice	Modified methodologies for assessing impacts on the informatisation of society and the business environment and on citizens.	<p>Deadline: 31.12.2021</p> <p>The role is ongoing in the implementation of the priorities of the Better Regulation Strategy – RIA 2020.</p>
		Supporting new business models in the digital economy, identifying segments for the platform economy and expanding the portfolio of activities of the Slovak Investment Holding	<p>As part of this task, it will be necessary to examine the role played by online platforms in the Slovak market.</p> <p>In a comprehensive evaluation of the role of online platforms, it will be essential to find answers to: > transparency of search results (including paid links and advertising), > how the Platforms use the collected information;</p>	Setting up state aid to support the growth of the data economy	<p>Deadline: 31.12.2021</p> <p>According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has not yet started.</p>

			<ul style="list-style-type: none"> > relations between platforms and suppliers; > limitations of option individuals and businesses to change the platform; > how to best deal with illegal content on the internet; > what is the impact of the platforms on competition through network effects and the use of data and personal data on a huge scale, which is much more prone to digital platforms than traditional businesses; > as a platform in transforming the labour market and social insurance for the collaborative economy; > as a platform in changing resource use and responsibility for the collaborative economy; > how platforms support transition to a circular economy. 			
		Development of a manual for companies to implement artificial intelligence	Create a universal map and task checklist for companies that want to modernise their business using artificial intelligence.	Manual		<p>Deadline: 31.12.2020</p> <p>The manual was drawn up at the end of 2019 and presented to the public in March 2020.</p>
		Support to increase investment of foreign and Slovak companies in research activities	It is necessary to improve the conditions for the establishment of research centres of Slovak and foreign companies in Slovakia. Hereby	Increasing investment in AI research activities		<p>Deadline: 30.06.2020</p> <p>Mirri SR in cooperation with other bodies</p>

			support the development of higher value-added industries.			public authorities, in particular the Ministry of Education of the Slovak Republic and the Ministry of Economy of the Slovak Republic, as well as representatives of the business sector in linking to cooperation with academia, will actively participate in the search for incentive mechanisms to increase private companies' investments in research infrastructure, technologies and
	D5 Public digital services (15 %)	Establishment of a Trusted Data Disclosure Institute	Create processes for such publication of government data, which can then be used by third parties to create applications, and at the same time, if necessary and disputes, it will be possible to demonstrate what data was published at what time.	The creation of a public data trust.		Deadline: 31.12.2020 The aim is to create a new, non-separate organisational unit within the existing Unit of the Data Office, and its launch has been capacity-linked to 2 national projects in which the Data Office Unit is the factual (content) responsible for: NP "Public"

						open and Trusted Data Management” funded by OP EVS and NP “Open Data 2.0 – Development of central components for quality open data security” funded by OPII. The first NP is unlikely to be implemented and the second NP will be launched provisionally in 1Q/2021.
		Deployment of a pilot solution for personal data management	The system will allow citizens and entrepreneurs to check from one place all the data that are recorded in individual public administration systems.	National Concept of Informatisation of Public Administration		Deadline: 31.12.2022 According to information from Slovakia’s Digital Transformation Action Plan 2019-2022, the action is being implemented on an ongoing basis.
		Modernising and simplifying the data legal framework – preparing a new data law	E.g. Put in place a modern legal framework for the use of data in line with the GDPR.	Data Act		Deadline: 31.12.2022 The measure has already started to be implemented
		Building a consolidated analytical layer and making available important analytical tools for public administration institutions to design	E.g. Creating a single space for the needs of all public administrations, where analytical tasks can be addressed.	Transmission of data to the analytical services of the SMP		Deadline: 30.06.2022 The measure has already started to be implemented

		public policies based on data	The intention is to relieve end-users of technical aspects of data collection as much as possible so that they can concentrate on experimentation and analysis.			
		Create a system for sharing spatial information.	E.g. Increase the range of available spatial data and related services that are easier to find and work with. A significant increase in government institutions that work properly with spatial data.	A single platform for sharing harmonised spatial data and services.		Deadline: 31.12.2022 The measure has already started to be implemented.
		Testing the use of blockchain in public administration in pilot projects	In addition to institutional innovation, decentralised architecture can contribute to creating a fairer internet that is more in line with European values than the current model.	Testing blockchain technology in the form of pilot projects.		Deadline: 31.12.2021. According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has not started.
		Establishment of a laboratory for better services and digital innovation	Support targeted experimentation and testing of different innovative models before they can be put into practice in both the public, private and third sectors.	Establishment of a laboratory for better services and digital innovation		Deadline: 31.12.2019 The project has been suspended, but its preparations are ongoing, with a time lag based on the decision of the managing authority of the OP EVS.
		Implementation of laboratory activities	Application of Behavior Interventions to the Environment	Implementation of the activities of the organisational unit		Deadline: 31.12.2022.

		behavioural Innovation (BRISK)	electronic services of public administration, looking at the communication of services of the state through the eyes of a citizen and businessman, trying to live in his or her skin, trying to understand, understand his feelings and decisions so that the digital services of the state are of user-quality, so that the citizen not only knows about the services but also uses			According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has been launched.
		Setting up a Digital Innovation Office in self-government	The creation of a unit that would address the specific problems of self-government in terms of smart solutions and digital innovation and the deployment of new digital technologies into practice. Focusing on identifying the needs of residents and self-government bodies for proper functioning in the digital age, participating in the design of the policies concerned, participating in testing pilot smart solutions, innovative public services and digital innovation in individual municipalities and evaluating the most effective ways of implementing them also from the point of view of the "value for money" principle and their scalability and usability for other municipalities.		Setting up a Digital Innovation Office in self-government.	Deadline: 31.12.2022 According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has not started.
		Creating a platform to find innovative solutions	Create a platform for involving students, scientific teams, non-profit organisations, entrepreneurs – in short, anyone who has the space to engage and who can come up with interesting ideas for problem solving.	A platform to bring creative solutions to public administration problems.		Deadline: 31.12.2022 The measure is implemented thanks to the newly established platform of innovative solutions

						www.challenge.gov en.
		Enabling new opportunities for entrepreneurship and innovation of public services using an open API	Provide the professional public with a technical interface to further develop the technical means using the electronic services of the State.	Open API GW, new API accesses		Deadline: 31.12.2023. According to information from Slovakia's Digital Transformation Action Plan 2019-2022, the action has not started.
Smart Industry Action Plan of the Slovak Republic	D2 Human capital (25 %)	Identification of the current offer of education and training and training programmes relevant to the field of smart industry	Precise identification and targeting capacity of available tertiary education and study programmes relevant to smart industry	initial workshops and teleconferences (or other forms of interactive communication) with future respondents to clarify the objectives and methodology, summarising the survey results and analysing them by experts and subsequent verification of key findings using sectoral councils and experts (including foreign).		Deadline: 30.06.2019
		Systemic change of the education system that prepares workers for the needs of practice and in particular smart industry	Develop proposals to improve the education system to prepare for the graduates it needs, focusing on key economic sectors and, consequently, on the national priorities stemming from the 2030 Agenda	system reform of education – introducing more flexible and shorter forms of tertiary education, ensuring the participation of employers in the development of study programmes and graduate profiles, adjusting the system of university management to meet the requirements of the labour market in strategic decision-making. the Competence Centres. University technology incubators – creating a common environment with practice. a new education, training and expert development system for an intelligent industry based on integration		Deadline: 31.12.2020

				<p>theoretical education and on-job training with the acquisition of practical skills with advanced technologies (professional bachelor study programmes).</p> <p>creation and application of more widely applicable (through sectors and qualifications) competency profiles of graduates (with the potential to adapt to changes in the smart industry and the digital economy). Expanding the competences of sectoral councils as platforms for cooperation between academia, state, industry and crafts, services and trade enterprises for the creation and updating of curricula in the areas of smart industry.</p> <p>promotion of the study of informatics, mathematics and generally technical disciplines.</p> <p>prepare a proposal to adapt the system of management, funding or forms of education so that the education system meets the needs of a smart labour market industry.</p>		
		Update of the Education Department Informatisation Programme up to 2020 with a view to 2030	Update and complete the Program of Informatisation of the Education Department, which contains an overview of the plans for the implementation of the concept of digitalisation of the Ministry of Education.	Translate the Programme into action plans in individual activities, including but not limited to action plans: <ul style="list-style-type: none"> > the development of digital competence; and skills > development of digital infrastructure > digitisation of educational content 		Deadline: 31.12.2018
		The need to increase the knowledge and skills of young people for	Enhancing Mathematical, Technical and Digital Literacy at Primary Schools and Schools	to strengthen the teaching of mathematics as a basis for mathematical and digital literacy.		Deadline: 31.12.2019 – Continuous

		digital Age in Formal Education		<p>to strengthen the teaching of mathematics as a basis for mathematical and digital literacy and to reinstate compulsory math graduation in grammar schools in two steps: in the first step for those interested in studying at technical universities, in the second step for all graduates of the grammar school, as well as all neighbouring countries.</p> <p>ensure the development of digital skills for teachers to make full use of digital learning and thereby motivate pupils to actively use it and thereby acquire digital competences; develop more appropriate, anticipatory and interdisciplinary curricula at all levels of education (including lifelong learning programmes) with a better financial support programme.</p> <p>provide more new, highly specialised skills: 24 skills for IoT, informatics, coding, digital skills, STEM subjects (science, technology, technology and mathematics), creative design and business subjects, but also in the fields of standardisation, metrology, testing, certification and accreditation, applied in the field of intelligent industry.</p>		
		Experience as part of the study of technical disciplines in middle school how also the universities.	Increase the motivation of school students for studying higher education technical unions by reintroducing corporate scholarships.	Promote the introduction of compulsory practice in the teaching of technical disciplines and support the introduction of new study programmes taking into account this direction (professionally oriented bachelor, dual university education).		Deadline: 31.12.2019

			Graduates of technical disciplines prepared for practice without the need for retraining.	Support pilot verification of new fields of higher vocational education and professionally oriented bachelors with an essential component of practice.		
		Creation functional system lifelong education s multi-source funding aimed at supporting people's educational and labour market needs.	Creating a functional lifelong learning system with multi-source funding aimed at supporting people's educational and labour market needs.	taking into account new labour market requirements linked to the development of digital technologies in the National Occupational System and its development for future occupations. launch targeted retraining courses to develop digital literacy in relation to the needs of smart industry for people who are employed, at risk of loss of employment and the unemployed.		Deadline: 31.12.2018
		Programmes and projects to adapt the skills of the workforce, including jobseekers (UoZ), to the key requirements of a smart industry for soft skills development, sectoral (hard) skills and digital skills development programmes involving employers	Improving access to the labour market by applying effective employment support instruments. Education, training and knowledge transfer – development of practical and new highly specialised skills of graduates and workers mainly from industrial practice.	Prepare and implement, in cooperation with universities and the Centre for Labour, Social Affairs and Family, a systemic measure through new national projects "Education of jobseekers" and "Education of young jobseekers" ensuring the development of human resources, their competences for the needs of the labour market, taking better account of the individual needs of individuals responding to educational market offers linked to labour market demand. This involves, in particular, encouraging incentives to learn and develop their knowledge and skills and, if necessary, the willingness to change the initial qualifications acquired in the course of vocational training in the school system, i.e. the willingness to 'reskill' if the situation in the labour market so requires.		Deadline: 2018-2020

		Support for action The Digital Coalition	The aim is that education in the field of digital technologies is up-to-date, efficient and provides every citizen of the Slovak Republic with the opportunity to develop their own digital skills throughout their life in order to be successful in the labour market and to be able to use digital technologies for the performance of their work and to ensure a happy life.	<p>promoting learning through new methods and learning pathways through digital technologies;</p> <p>improving the skills of pupils and students in working with information and digital technologies, – developing pupils’ informatic and investigatory thinking;</p> <p>raising the level of digital literacy of both employed and unemployed persons, as well as entrepreneurs, to the level necessary for the efficient use of digital technologies, 29 to the level applied in the labour market and to the level needed to increase the competitiveness of the economy, to increase the digital literacy of people at risk of social and digital exclusion through the use of digital technologies to improve their position in society, to increase the ability of families to take advantage of opportunities and to eliminate the risks associated with the entry of digital technologies.</p>		Deadline: Continuously
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Annex 4: PESTLE analysis of states with the best DESI score

		Slovakia	Denmark	Sweden	Finland
	Location of the country in DESI (2020)	22.	3.	2.	1.
P	Political situation in the country (stability, democracy, corruption, bureaucracy, freedom of expression, trade unions, territorial and administrative division of the state,...)	<p>Slovakia ranked 47th in Democracy Index 2020.75 The country is referred to as 'Flawed Democracy'.</p> <p>In Corruption Perception Index 2020,76 Slovakia ranked 60th.</p> <p>Slovakia is divided into 8 counties and 79 districts. The regions are responsible for public transport, health, education, social services and culture.</p>	<p>Denmark ranked 7th in Democracy Index 2020. The country is referred to as "full democracy".</p> <p>Denmark ranked 1st in Corruption Perception Index 2020.</p> <p>Denmark is administratively divided into municipalities and 5 regions. Each region is headed by a regional council with 41 members. The main job for each region is health care. This is followed by public transport, the environment and secondary education.</p>	<p>Sweden ranked third in Democracy Index 2020. The country is referred to as "full democracy".</p> <p>Sweden ranked 3 rd in Corruption Perception Index 2020.</p> <p>Sweden is administratively divided into 21 counties. Each county is run by a county administrative council headed by a governor. Topics addressed at regional level are health, public transport and culture.</p>	<p>Finland ranked 6th in Democracy Index 2020. The country is referred to as "full democracy".</p> <p>Finland ranked 3 rd in Corruption Perception Index 2020.</p> <p>Finland is administratively divided into 19 regions, 70 sub-regions and 311 municipalities. Regions decide on health, regional planning, business and education issues.</p>
	Main objectives of the country's policies	<p>Fight against corruption, security of the population, improvement of health, effective use of public funds and EU funds, informatisation of Slovakia, education as a pillar of the country's future, environment and clean transport.77</p>	<p>Climate change, investment in technology, digitalisation, online education, online teaching, social justice, crime, gender equality, green transport, bio fuel and plastic-free initiatives.78</p>	<p>Health, social services, environment, adult education initiative for adult education, research, digital infrastructure expansion, investment in housing and infrastructure to make regions attractive, taxation of environmentally harmful activities and circular activities</p>	<p>Carbon neutrality by 2035, biodiversity protection, circular economy, recycling, environmentally friendly food policy, improved animal behaviour, low emission transport, bio fuels, gender equality, science research</p>

75 Democracy Index is a world ranking where the level of democracy of countries is assessed on the basis of their results in five categories: electoral process and pluralism; the functioning of the government; political participation; political culture and civil rights. Source: <https://www.eiu.com/topic/democracy-index>

The76 Corruption Perception Index is a ranking compiled by Transparency International, which assesses the global level of corruption: <https://www.transparency.org/en/cpi/2020/index/nzl>

77 Source: Programme Statement of the Government of the Slovak Republic for the period 2020-2024 (<https://rokovania.gov.sk/RVL/Material/24756/1>)

78 Source: Speech by the Danish Prime Minister of 6 October 2020 (<https://www.regeringen.dk/statsministerens-aabningstale/>)

				economy. ⁷⁹	and education. ⁸⁰
E	Macroeconomic state of the country (GDP, structure and growth of the economy/industry, inflation, interest, purchasing power, net household income (median)...)	Slovakia's GDP for 2019 was USD 105,42 billion. ⁸¹ Inflation in Slovakia stood at 1.06 % in 2020. ⁸² Slovak purchasing power parity was 0.533 in 2020. ⁸³ The average net income of households in Slovakia is \$20474 per year. ⁸⁴ Industry in Slovakia: automotive, mechanical engineering, chemical industry, mining, food industry industry... ⁸⁵	Denmark's GDP for 2019 was \$348,08 billion. ⁸⁶ Inflation in Denmark stood at 0.7 % in 2020. ⁸⁷ Denmark's purchasing power parity was 6.660 in 2020. The average net income of households in Denmark is \$29606 per year. ^{88 89} Industry in Denmark: manufacturing industry (wind turbines, dairy products, toys...), agriculture, fishing, transport,	Sweden's GDP for 2019 was \$530,83 billion. ⁹⁰ Inflation in Sweden stood at 0.46 % in 2020. ⁹¹ Sweden's purchasing power parity was 8.903 in 2020. The average net income of households in Sweden is \$31287 per year. ^{92 93} Industry in Sweden: automotive, forestry, telecommunications, pharmaceuticals, industrial machinery, chemical industry, iron	Finland's GDP for 2019 was \$268,76 billion. ⁹⁴ Inflation in Finland stood at 0.94 % in 2020. Finland's purchasing power parity was 0.855 in 2020. The average net income of households in Finland is \$29943 per year. ⁹⁶ Industry in Finland: forestry, paper, shipbuilding, chemical industry, oil platforms, food industry

⁷⁹ Source: programme Statement of the Swedish Government of 8 September 2020 (<https://www.government.se/4a54f0/contentassets/990e39c5c11e45fe9744afb9409f2353/statement-of-government-policy-08-September-2020.pdf>)

⁸⁰ Source: Finnish Government Programme of 10 December 2019 (<https://valtioneuvosto.fi/en/marin/government-programme>)

⁸¹ Source: <https://tradingeconomics.com/slovakia/gdp>

⁸² Source: <https://www.statista.com/statistics/375275/inflation-rate-in-slovakia/>

⁸³ Source for all PPP data: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

⁸⁴ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/slovak-republic/>)

⁸⁵ Source: <https://sario.sk/en/trade/buyers/slovak-industry/industrial-sectors>

⁸⁶ Source: <https://tradingeconomics.com/denmark/gdp>

⁸⁷ Source: <https://www.statista.com/statistics/318356/inflation-rate-in-denmark/>

⁸⁸ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/denmark/>)

⁹⁰ Sources: <https://tradingeconomics.com/sweden/gdp>

⁹¹ Source: <https://www.statista.com/statistics/375283/inflation-rate-in-sweden/>

⁹² Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/sweden/>)

⁹⁴ Source: <https://tradingeconomics.com/finland/gdp>

⁹⁵ Source: <https://www.statista.com/statistics/328324/inflation-rate-in-finland/>

⁹⁶ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/finland/>)

			distribution, tourism... ⁸⁹	and steel... ⁹³	industry... ^{95 96 97}
	Unemployment	In 2020, unemployment in Slovakia ranged between 5 and 7.7 %. ⁹⁸	For 2020, unemployment in Denmark ranged between 3.7 and 5.6 %. ⁹⁹	In 2020, unemployment in Sweden ranged from 7.1 to 9.8 %. ¹⁰⁰	For 2020, unemployment in Finland ranged from 6.9 to 10.6 %. ¹⁰¹
S	Demographics (aging population, population growth...)	Slovakia has a population of 5.46 million. ¹⁰² In 2020, the Slovak population grew by 0.05 % (compared to 2019). ¹⁰³ The population over 65 increased by 3.8 % between 2009 and 2019. ¹⁰⁴ 105 106	Denmark has a population of 5.79 million. In 2020, the Danish population grew by 0.35 % (compared to 2019). The population over 65 increased by 3.7 % between 2009 and 2019.	Sweden has a population of 10.1 million. In 2020, the Swedish population grew by 0.63 % (compared to 2019). The population over 65 increased by 2.1 % between 2009 and 2019.	Finland has a population of 5.54 million. In 2020, the Finnish population grew by 0.15 % (from 2019). The population aged over 65 increased by 5.1 % between 2009 and 2019.
	Education	91 % of people aged 25-64 in Slovakia completed secondary education. Under the Programme for International Student Assessment (PISA), the average Slovak student scored 463, i.e.	74 % of people aged 25-64 in Denmark completed secondary education. Under the Programme for International Student Assessment (PISA), the average Danish student scored 504. ¹⁰⁷	83 % of people aged 25-64 in Sweden completed secondary education. Under the Programme for International Student Assessment (PISA), the average Swedish student scored 496. ¹⁰⁸	88 % of people aged 25-64 in Finland completed secondary education. Under the Programme for International Student Assessment (PISA), the average Finnish student scored 523. ¹⁰⁹

⁸⁹ Source: <https://www.dst.dk/en/Statistik/emner/erhvervslivets-sektorer>

⁹³ Source: <https://www.ekonomifakta.se/fakta/ekonomi/produktion-och-investeringar/industriproduktionens-sammansattning/>

⁹⁷ Source: <https://finland.fi/business-innovation/finnish-industry-constantly-adapting-to-a-changing-world/>

⁹⁸ Source: <https://tradingeconomics.com/slovakia/unemployment-rate>

⁹⁹ Source: <https://tradingeconomics.com/denmark/unemployment-rate>

¹⁰⁰ Source: <https://tradingeconomics.com/sweden/unemployment-rate>

¹⁰¹ Source: <https://tradingeconomics.com/finland/unemployment-rate>

¹⁰² Source for all population data: <https://www.statista.com/statistics/685846/population-of-selected-european-countries/>

¹⁰³ Source for all population growth data: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁰⁴ Source for all ageing population data: https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing

¹⁰⁷ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/denmark/>)

¹⁰⁸ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/sweden/>)

¹⁰⁹ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/finland/>)

		below the OECD average, which is 486. ¹⁰⁵ Comenius University ranks 601.-700th place in Shanghai 2020 academic ranking. ¹⁰⁶	The University of Copenhagen ranked 33 rd in Shanghai, the University of Aarhus ranked 69th, and the other 3 Danish universities ranked 400th.	Three Swedish universities – the Karolinska Institute, Stockholm University and Uppsala University – ranked the top 100 in the Shanghai rankings.	In Shanghai, the University of Helsinki ranked 74th. The other two universities are located in the first five hundred.
	Health	Slovakia has health care based on compulsory contributions to the insurance company. ^{108 109 110} In Slovakia, population coverage is 94.5 %. ¹¹¹ The country's annual expenditure on health care per head in the Slovak Republic amounts to EUR 1,625. ¹¹²	Denmark has universal health care based primarily on citizens' general taxes. ¹¹³ In Denmark, the population coverage of basic health care is 100 %. The country's annual expenditure on health care per head in Denmark amounts to EUR 3831.	Sweden has government-funded universal health care. ¹¹⁴ In Sweden, the population coverage of basic health care is 100 %. The country's annual expenditure on health care per head in Sweden amounts to EUR 4019.	Finland has government-funded universal health care. ¹¹⁵ In Finland, the population coverage of basic health care is 100 %. The country's annual expenditure on health care per head in Finland amounts to EUR 3013.
	Consumption habits	In the DESI Index 2020, Slovakia ranked 20th in the Internet service use dimension, with 53.4 points. 12 % of the population never used the internet, 71 % used the internet for shopping, and only 21 % sold online that year. ¹¹⁶	In the DESI Index 2020, Denmark ranked 4th in the Internet usage dimension, with 75.2 points. 2 % of the population have never used the internet, 86 % use the internet for shopping, and 29 % in a given year	In the DESI Index 2020, Sweden ranked 2nd in the Internet usage dimension, with 76 points. 2 % of the population never used the internet, 84 % used the internet for shopping, data on internet sales were not for a given year	In the DESI Index 2020, Finland ranked 1st in the Internet use dimension, with 76.3 points. 3 % of the population have never used the internet, 77 % use the internet for shopping, and 33 % use the internet for that purpose.

¹⁰⁵ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/slovak-republic/>)

¹⁰⁶ Source for all data on the Shanghai ranking: <http://www.shanghairanking.com/ARWU2020.html>

¹¹⁰ Source: <https://www.slovensko.sk/en/life-situation/life-situation/ social-and-health-insurance-fo/>

¹¹¹Source for all population coverage data by primary care: Health at a Glance: Europe 2020

https://ec.europa.eu/health/sites/health/files/state/docs/2020_healthatglance_rep_en.pdf

¹¹² Source for all data on annual health expenditure per capita: Health at a Glance:

Europe 2020 https://ec.europa.eu/health/sites/health/files/state/docs/2020_healthatglance_rep_en.pdf

¹¹³ Source: <https://www.sum.dk/~media/Filer%20-%20Publikationer i pdf/2016/Healthcare-in-dk-16-dec/Healthcare-english-V16-dec.ashx>

¹¹⁴ Source: <https://sweden.se/society/health-care-in-sweden/>

¹¹⁵ Source: <https://www.eu-healthcare.fi/healthcare-in-finland/healthcare-system-in-finland/>

¹¹⁶ Source: Desi 2020 Slovakia (<https://ec.europa.eu/digital-single-market/en/scoreboard/slovakia>)

			it sold over the internet.117	available.118	it sold over the internet for a year.119
T	Technological and electronic communications infrastructure	Within the electronic communications infrastructure, based on the DESI Index 2020, Slovakia is 86 % covered by the 4G network and has 33 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 72 %. A connection of at least 100 Mbit/s is used by 15 % of the population.120	Within the electronic communications infrastructure, based on the DESI Index 2020, Denmark is 100 % covered by the 4G network and has 33 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 85 %. A connection of at least 100 Mbit/s is used by 34 % of the population.	Within the electronic communications infrastructure, based on the DESI Index 2020, Sweden is 97 % covered by the 4G network and has 22 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 86 %. A connection of at least 100 Mbit/s is used by 66 % of the population.	Within the electronic communications infrastructure, based on the DESI Index 2020, Finland is 99 % covered by the 4G network and has 67 % of the 5G spectrum allocated. Overall utilisation rate of fixed broadband is 57 %. A connection of at least 100 Mbit/s is used by 23 % of the population.
	Research and innovation	According to UNESCO, Slovakia invests 0.9 % of its GDP in R & D.121	According to UNESCO, Denmark invests 2.9 % of its GDP in R & D.	According to UNESCO, Sweden invests 3.1 % of its GDP in R & D.	According to UNESCO, Finland invests 3.2 % of its GDP in R & D.
	Automation	Based on a 2020 report from the International Robotics Federation (IRF), Slovakia ranked 17th in the ranking of the 20 most automated countries (robots in manufacture)122	Based on a 2020 report by the International Robotics Federation (IRF), Denmark ranked 6th in the ranking of the 20 most automated countries.	According to a 2020 report by the International Robotics Federation (IRF), Sweden ranked 5th in the ranking of the 20 most automated countries.	According to a 2020 report by the International Robotics Federation (IRF), Finland did not rank among the 20 most automated countries.

117 Source: Desi 2020 Denmark (<https://ec.europa.eu/digital-single-market/en/scoreboard/denmark>)

118 Source: Desi 2020 Sweden (<https://ec.europa.eu/digital-single-market/en/scoreboard/sweden>)

119 Source: Desi 2020 Finland (<https://ec.europa.eu/digital-single-market/en/scoreboard/finland>)

120 Source: Desi 2020 Slovakia (<https://ec.europa.eu/digital-single-market/en/scoreboard/slovakia>)

121 Source for all R & D investment data: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

122 Source for all data on the International Robotics Federation rankings: https://ifr.org/downloads/press2018/Robot_Density_by_country_WorldRobotics2020_graph.jpg

L	EU and international policies	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future¹²³ • Europe’s Digital Decade: digital targets for 2030¹²⁴ • European eGovernment Action Plan 2016-2020¹²⁵ • EU Digital Education Action Plan 2021-2027 • OECD Digital Government¹²⁶ 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020 • Digital Education Action Plan 2021-2027 • OECD Digital Government 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020 • Digital Education Action Plan 2021-2027 • OECD Digital Government 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020 • Digital Education Action Plan 2021-2027 • OECD Digital Government
	Current national legislation, policies and strategy papers	<ul style="list-style-type: none"> • Strategy digital Transformation of the Slovak Republic 2030 • Digital Action Plan transformations of the Slovak Republic for 2019-2022 • National concept computerisation of the Public Report 2013-2020 • National plan broadband • Supporting the development of 5G networks 	<ul style="list-style-type: none"> • Digital Strategy 2016 2024 • Digital Strategy 2016 2020 “A Stronger And More Secure Digital Denmark” • Digital Growth Strategy (to enhance the connection with Industry 4.0) • national Initiative Made (Manufacturing Academy Denmark)¹²⁷ 	<ul style="list-style-type: none"> • For sustainable digital transformation in Sweden – a Digital Strategy ¹²⁸ • National Cyber Security strategy¹²⁹ • A Completely Connected Sweden by 2025 – a Broadband Strategy¹³⁰ 	<ul style="list-style-type: none"> • Digital Security in the Public Sector¹³¹ • Act on the Provision of Digital Services • The Act on Information Management in Public Administration • Act on the Provision of Shared Government Information and Communications Technology Services • Act on the Operation of the Government Security

123 Source: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en

124 Source: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

125 Source: <https://ec.europa.eu/digital-single-market/en/european-egovernment-action-plan-2016-2020>

126 Source: <http://www.oecd.org/governance/digital-government/>

127 Source: https://ec.europa.eu/futurium/en/system/files/ged/dk_country_analysis.pdf

128 Source: <https://www.government.se/information-material/2017/06/fact-sheet-for-sustainable-digital-transformation-in-sweden--a-digital-strategy/>

129 Source: <https://www.government.se/legal-documents/2017/11/skr.-201617213/>

130 Source: <https://www.government.se/information-material/2017/03/a-completely-connected-sweden-by-2025--a-broadband-strategy/>

131 Source: <https://julkaisut.valtioneuvosto.fi/handle/10024/162265>

		<ul style="list-style-type: none"> — 2025 • The concept of computerisation; and digitalisation of the Education Sector with a 			Networks132
E	Global warming, climate and environmental pollution	<p>Slovakia, like all other countries in the world, is at risk of climate change.</p> <p>Slovakia is a signatory to various international and regional instruments on climate change. There are also different strategies at national level to address climate change.¹³³</p> <p>Based on the Slovak Low Carbon Development Strategy By 2030, with a view to 2050, Slovakia would achieve carbon neutrality by 2050.¹³⁴</p> <p>In Environmental Performance The 2020 Index ranked 26th in Slovakia.¹³⁵</p>	<p>Denmark, like Slovakia, has a number of international and regional climate commitments.¹³⁶</p> <p>The Danish parliament also made a commitment last year to cut its emissions by 70 % by 2030 and become a fully carbon neutral country by 2050.¹³⁷</p> <p>Denmark ranked 1st in the Environmental Performance Index 2020.</p>	<p>In addition to fulfilling its international and EU commitments, Sweden can be considered a world leader in the fight against global warming. Stockholm is a hub for environmental research and is home to the Stockholm Environment Institute, the Stockholm Resilience Centre and the Environmental Humanities Laboratory at the KTH Royal Institute of Technology.¹³⁸</p> <p>Sweden plans to become carbon neutral by 2045.¹³⁹</p> <p>Sweden ranked 8th in the Environmental Performance Index 2020.</p>	<p>Finland also plays an active role in climate change. At national level, the country periodically publishes/updates its strategies to combat global warming and focuses mainly on transport and fuels. The country has plans to become CO2 neutral by 2035.¹⁴⁰</p> <p>Finland ranked 7th in the Environmental Performance Index 2020.</p>
	Geography of the country	Slovakia is a landlocked country with an area of 49 035 km ² Surface	Denmark is a coastal state with a coastline of 7,300 kilometers.	Sweden is a country with a long coastline, large forested	Finland is a 338.440 km ² country with 179,584 islands.

132 Source: <https://vm.fi/en/information-security-and-cybersecurity>

133 Source: <https://www.minzp.sk/klima/politika-zmeny-klimy/adaptacia-zmenu-klimy/>

134 Source: <https://euractiv.sk/section/klima/news/ako-slovensko-dosiahne-uhlikovu-neutralitu-nova-strategia-ma-navrhy-ale-stare-cisla/>

135 Source for all data on the Environmental Performance Index: <https://epi.yale.edu/epi-results/2020/component/epi>

136 Source: <https://ens.dk/en/our-responsibilities/energy-climate-politics/danish-climate-policies>

137 Source: <https://www.eceee.org/all-news/news/denmark-adopts-climate-law-to-cut-emissions-70-by-2030/>

138 Source: <https://sweden.se/climate/#from-resource-economy-to-bioeconomy>

139 Source: <https://www.eceee.org/all-news/news/denmark-adopts-climate-law-to-cut-emissions-70-by-2030/>

140 Source: https://www.ymparisto.fi/download/Infographics_on_Finnish_climate_policy/a725b1d9-d872-4117-b2fe-e85d32020810/110013

		Slovakia consists of lowlands, basins, hills, hills, rocks and mountains. Forests make up two-fifths of the country's territory. ¹⁴¹	The area of Denmark is 42.933 km ² . The country is made up of most lowlands. ¹⁴²	areas and numerous lakes. With an area of 450.295 km ² , the country is very sparsely populated. ¹⁴³	The country is characterised by its lakes, forests, and northern Lapland wilderness. ¹⁴⁴
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141 Source: <http://www.slovakiasite.com/sk/geografia.php>

142 Source: <https://denmark.net/denmark-guide/geography-denmark/>

143 Source: <https://sweden.se/society/sweden-an-overview/>

144 Source: <https://finland.fi/life-society/take-a-tour-of-finland-region-by-region/#etelasavo>

Annex 5: PESTLE analysis of V4 states

		Slovakia	Poland	Czech Republic	Hungary
	Location of the country in DESI (2020)	22.	23.	17.	21.
P	Political situation in the country (stability, democracy, corruption, bureaucracy, freedom of expression, territorial and administrative division of the state, trade unions...)	<p>Slovakia ranked 47th in Democracy Index 2020.¹⁴⁵ The country is referred to as 'Flawed Democracy'.</p> <p>In Corruption Perception Index 2020,¹⁴⁶ Slovakia ranked 60th.</p> <p>Slovakia is divided into 8 counties and 79 districts. The regions are responsible for public transport, health, education, social services and culture.</p>	<p>Poland ranked 50th in Democracy Index 2020. The country is referred to as 'Flawed Democracy'.</p> <p>Poland ranked 45th in Corruption Perception Index 2020.</p> <p>Poland is divided into 16 provinces, 380 districts and 2,478 municipalities.</p>	<p>Czech Republic ranked 31st in Democracy Index 2020. The country is referred to as 'Flawed Democracy'.</p> <p>In the Corruption Perception Index 2020, Czechia ranked 49th.</p> <p>The region is the highest self-governing unit in the Czech Republic. There are currently 14 self-governing regions in the Czech Republic.</p>	<p>Hungary ranked 55th in Democracy Index 2020. The country is referred to as 'Flawed Democracy'.</p> <p>Hungary ranked 69th in Corruption Perception Index 2020.</p> <p>Hungary is divided into 42 regions. Of these, there are 19 counties and 23 towns with county law (including the capital city of Budapest).</p>
	Main objectives of the country's policies	<p>Fight against corruption, security of the population, improvement of health, effective use of public funds and EU funds, informatisation of Slovakia, education as a pillar of the country's future, environment and clean transport.¹⁴⁷</p>	<p>In the field of digitalisation, Poland's main priorities are the development of broadband infrastructure and e-services. Last but not least, increasing digital skills among the population is a priority.</p>	<p>The current state of eGovernment, which is not satisfactory, is problematic in relation to digitalisation issues. Most Member States are progressing significantly faster in this section.</p> <p>The main objective for the coming years should be full coverage of affordable high-speed internet, interconnection of all national databases and the creation of</p>	<p>Based on government strategies, Hungary has six main objectives:</p> <ul style="list-style-type: none"> strengthen productivity and the innovation capacity of Hungarian SMEs to become key players in international competition; increase the rate employment and improve productivity and working conditions;

¹⁴⁵ Democracy Index is a world ranking where the level of democracy of countries is assessed on the basis of their results in five categories: electoral process and pluralism; the functioning of the government; political participation; political culture and civil rights. Source: <https://www.eiu.com/topic/democracy-index>

¹⁴⁶ The Corruption Perception Index is a ranking compiled by Transparency International, which assesses the global level of corruption: <https://www.transparency.org/en/cpi/2020/index/nz>

¹⁴⁷ Source: Programme Statement of the Government of the Slovak Republic for the period 2020-2024 (<https://rokovania.gov.sk/RVL/Material/24756/1>)

				<p>electronic identity for every citizen.</p> <p>The country will also strive to create an environment that promotes digital transformation, the so-called company 4.0.</p> <p>The main strategic directions of the current government include:</p> <ul style="list-style-type: none"> • pension reform; • digital Czech Republic, • stronger defense interests within the EU structures; • setting up a strategic the investment programme, • reform of the state with emphasis on the state budget and new legal rules in the field of tax administration (in particular income tax); • strengthening security increase in defence 	<ul style="list-style-type: none"> • invest in infrastructure that contributes in particular to strengthening our competitiveness; • increase cross-border cooperation with neighbouring regions; • assign a central role research, development and innovation; • facilitate wide use renewable energy and stimulate the transition to a greener, low-carbon industry leading to a circular economy to fight climate change.¹⁴⁹
E	Macroeconomic state of the country (structure and growth of the economy/flow)	Slovakia's GDP for 2019 was USD 105,42 billion. ¹⁵⁰ 151 152 153 Inflation in Slovakia was in 2020	Poland's GDP for 2019 was USD 592,16 billion. ¹⁵⁵	The GDP of Czechia for 2019 was \$246 billion. ¹⁵⁸	Hungary's GDP for 2019 was USD 160,97 billion. ¹⁶³

¹⁴⁸ Source: Programme Proclamations of the Government of the Czech Republic of 28 June 2018. Available at: <https://www.vlada.cz/cz/jednani-vlady/programove-prohlaseni/programove-prohlaseni-vlady-165960/#Preamble>

¹⁴⁹ Source: https://ec.europa.eu/regional_policy/sk/newsroom/news/2020/05/25-05-2020-solid-foundations-support-hungary-s-ambitious-plans

¹⁵⁰ Source: <https://tradingeconomics.com/slovakia/gdp>

¹⁵⁵ Source: <https://tradingeconomics.com/poland/gdp>

¹⁵⁸ Source: <https://tradingeconomics.com/czech-republic/indicators>

¹⁶³ Source: <https://tradingeconomics.com/hungary/gdp>

	mind, inflation, interest, purchasing power, net household income (median)...	<p>at 1.06 %.¹⁵¹</p> <p>Slovak purchasing power parity in 2020 was 0.533.¹⁵²</p> <p>Average net income of households in Slovakia is \$20474 per year. ¹⁵³</p> <p>Industry in Slovakia: automotive, mechanical engineering, chemical industry, mining, food industry...^{154 155}</p>	<p>Poland's purchasing power parity was 1.811 in 2020.¹⁵⁶</p> <p>The average net income of households in Poland is \$19814 per year.^{157 158}</p> <p>Industry in Poland: energy, pharmaceuticals, agriculture, tourism, transport, financial sector, food...</p>	<p>Inflation in Czechia stood at 3.2 % in 2020.¹⁵⁹</p> <p>The purchasing power parity in Czechia was 12.843 in 2020.¹⁶⁰</p> <p>The average net income of households in the Czech Republic is \$21453 per year.¹⁶¹</p> <p>Industry in the Czech Republic: A key sector is the automotive industry.^{162 163}</p>	<p>Inflation in Hungary stood at 3.4 % in 2020.¹⁶⁴</p> <p>The purchasing power parity in Hungary was 145.659 in 2020.¹⁶⁵</p> <p>The average net income of households in Hungary is \$33064 per year.¹⁶⁶</p> <p>Industry in Hungary: automotive, mechanical, chemical and textile industries; the export of meat, poultry, cereals and wine plays an important role.^{167 168 169}</p>
	Unemployment	<p>In 2020, the unemployment rate was between 5 and 7.7 %^{168%}.</p>	<p>For 2020, unemployment in Poland ranged from 5.4 to 6.1 %^{169%}.</p>	<p>In 2020, unemployment in the Czech Republic stood at around 3.7 %.¹⁷⁰</p>	<p>In 2020, unemployment in Hungary stood at around 4.6 %</p>

¹⁵¹ Source: <https://www.statista.com/statistics/375275/inflation-rate-in-slovakia/>

¹⁵² Source for all PPP data: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

¹⁵³ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/slovak-republic/>)

¹⁵⁴ Source: <https://sario.sk/en/trade/buyers/slovak-industry/industrial-sectors>

¹⁵⁶ Source for all PPP data: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

¹⁵⁷ Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/poland/>)

¹⁵⁹ Source: <https://tradingeconomics.com/czech-republic/indicators>

¹⁶⁰ Source: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

¹⁶¹ Source: <http://www.oecdbetterlifeindex.org/countries/czech-republic/>

¹⁶² Source: <https://eur-lex.europa.eu/legal-content/CS/TXT/HTML/?uri=CELEX:52020SC0502&from=EN>

¹⁶⁴ Source: <https://tradingeconomics.com/hungary/inflation-cpi>

¹⁶⁵ Source: <https://data.oecd.org/conversion/purchasing-power-parities-ppp.htm>

¹⁶⁶ Source: <http://www.oecdbetterlifeindex.org/countries/hungary/>

¹⁶⁷ Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020SC0516&from=EN>

¹⁶⁸ Source: <https://tradingeconomics.com/slovakia/unemployment-rate>

¹⁶⁹ Source: <https://tradingeconomics.com/poland/unemployment-rate>

¹⁷⁰ Source: <https://tradingeconomics.com/czech-republic/unemployment-rate>

S	Demographics (aging population, population growth...)	<p>Slovakia has a population of 5.46 million.¹⁷¹</p> <p>In 2020, the Slovak population grew by 0.05 % (compared to 2019).^{172 173}</p> <p>The population aged 65 and over increased by 3.8 % between 2009 and 2019.</p>	<p>Poland has a population of 38 million.</p> <p>There is also a slow decline in the birth rate. The middle and productive generation has the highest percentage.</p> <p>In 2020, the population of Poland decreased by 0.11 % compared to 2019.¹⁷⁴</p> <p>The population over 65 increased by 4.2 % between 2009 and 2019.¹⁷⁵</p>	<p>The Czech Republic has a population of 10.7 million.¹⁷⁶</p> <p>In 2020, the Czech population grew by 0.19 % (compared to 2019).¹⁷⁷</p> <p>The population of the Czech Republic over 65 increased by 4.7 % between 2009 and 2019.¹⁷⁸</p>	<p>Hungary has a population of 9.7 million.¹⁷⁹</p> <p>In 2020, the Hungarian population decreased by 0.25 % (from 2019).¹⁸⁰</p> <p>Hungary's population over 65 increased by 2.9 % between 2009 and 2019.^{181 182 183}</p>
	Education	<p>91 % of people aged 25-64 in Slovakia completed secondary education.</p> <p>Programme for International Student Assessment (PISA), average</p>	<p>92 % of people aged 25-64 in Poland completed secondary education.</p> <p>Programme for International Student Assessment (PISA);</p>	<p>94 % of people aged 25-64 in the Czech Republic completed secondary education.¹⁸⁶</p> <p>Programme for International Student Assessment</p>	<p>84 % of people aged 25-64 in Hungary completed secondary education.¹⁸⁹</p> <p>Programme for International Student Assessment</p>

¹⁷¹ Source for all population data: <https://www.statista.com/statistics/685846/population-of-selected-european-countries/>

¹⁷² Source for all population growth data: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁷³ Source for all ageing population data: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Population structure and ageing](https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing)

¹⁷⁴ Source: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁷⁵ Source: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Population structure and ageing](https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing)

¹⁷⁶ Source: <http://www.oecdbetterlifeindex.org/countries/czech-republic/>

¹⁷⁷ Source: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁷⁸ Source: [https://ec.europa.eu/eurostat/statistics-explained/index.php/Population structure and ageing](https://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing)

¹⁷⁹ Source: <http://www.oecdbetterlifeindex.org/countries/hungary/>

¹⁸⁰ Source: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁸¹ Source: <http://www.oecdbetterlifeindex.org/countries/hungary/>

¹⁸⁶ Source: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

¹⁸⁹ Source: <https://www.worldometers.info/population/countries-in-the-eu-by-population/>

		the Slovak student scored 463, i.e. below the OECD average, which is 486. ¹⁸² Comenius University ranks 601.-700th place in Shanghai 2020 academic ranking. ¹⁸³	the average Polish student scored 504, above the OECD average, which is 486.184 Warsaw University ranks 301-400th in Shanghai the ranking of colleges. ^{185 186}	(Pisa), the average Czech student scored 491.187 No Czech university has reached the top 1,000 in the Shanghai ranking. ^{188 189}	The average Hungarian student scored 474.190 Within the Shanghai ranking, five Hungarian universities were ranked in the top 1,000. ¹⁹¹
	Health	In Slovakia, population coverage is 94.5 %. ¹⁹² The country's annual expenditure on health care per head in the Slovak Republic amounts to EUR 1,625. ¹⁹³	In Poland, population coverage is 91.5 %. The country's annual expenditure on health care per head in Poland amounts to EUR 1,409. ¹⁹⁴	In the Czech Republic, the population coverage of basic health care is 100 %. The country's annual expenditure on health care per head in the Czech Republic amounts to EUR 1873.	In Hungary, the population coverage of basic health care is 95 %. The country's annual expenditure on health care per head in Hungary amounts to EUR 1,473.
	Consumer habits, values, religion, lifestyle	In the DESI Index 2020, Slovakia ranked 20th in the Internet service use dimension, with 53.4 points. 12 % of the population have never used the internet, 71 % use the internet for shopping, and only 21 % in a given year	In the DESI Index 2020, Poland ranked 23 rd in the Internet use dimension, with 49.6 points. 15 % of the population never used the internet, 66 % used the internet for shopping, and 17 % sold online that year.	In the DESI Index 2020, Czechia ranked 17th in the Internet use dimension, with 54.1 points. 9 % of the population have never used the internet, 73 % use the internet to	In the DESI Index 2020, Hungary ranked 14th in the Internet usage dimension, with 55.9 points. 14 % of the population have never used the internet, 59 % use the internet to

¹⁸² Source: OECD Better Life Index (<http://www.oecdbetterlifeindex.org/countries/slovak-republic/>)

¹⁸³ Source for all data on the Shanghai ranking: <http://www.shanghairanking.com/ARWU2020.html>

¹⁸⁴ Source: <http://www.oecdbetterlifeindex.org/countries/poland/>

¹⁸⁵ Source: <http://www.shanghairanking.com/ARWU2020.html>

¹⁸⁷ Source: <http://www.oecdbetterlifeindex.org/countries/czech-republic/>

¹⁸⁸ Source: <http://www.shanghairanking.com/ARWU2020.html>

¹⁹⁰ Source: <http://www.oecdbetterlifeindex.org/countries/hungary/>

¹⁹¹ Source: <http://www.shanghairanking.com/ARWU2020.html>

¹⁹² Source for all data on population coverage by primary care: Health at a Glance: Europe 2020

https://ec.europa.eu/health/sites/health/files/state/docs/2020_healthatglance_rep_en.pdf

¹⁹³ Source for all data on annual health expenditure per capita: Health at a Glance: Europe 2020

https://ec.europa.eu/health/sites/health/files/state/docs/2020_healthatglance_rep_en.pdf

¹⁹⁴ Source: https://ec.europa.eu/health/sites/health/files/state/docs/2018_healthatglance_rep_en.pdf

		it sold over the internet. ¹⁹⁵		shopping, and 14 % in a given year, sold online. ¹⁹⁶	16 % of them sold online in a given year. ¹⁹⁷
T	Technological and electronic communications infrastructure (main and complementary technologies)	Within the electronic communications infrastructure, based on the DESI Index 2020, Slovakia is 89 % covered by the 4G network and has 33 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 72 %. A connection of at least 100 Mbit/s is used by 15 % of the population. ¹⁹⁸	Within the communication infrastructure, based on the DESI Index 2020, Poland is 99 % covered by a 4G network and allocated 0 % of the 5G spectrum. The overall fixed broadband take-up rate is 62 %. A connection of at least 100 Mbit/s is used by 28 % of the population. ¹⁹⁹	Within the electronic communications infrastructure, based on the DESI Index 2020, Czechia is 100 % covered by a 4G network and has 17 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 74 %. A connection of at least 100 Mbit/s is used by 20 % of the population. ²⁰⁰	Within the electronic communications infrastructure, based on the DESI Index 2020, Hungary is 97 % covered by the 4G network and has 61 % of the 5G spectrum allocated. The overall fixed broadband take-up rate is 82 %. A connection of at least 100 Mbit/s is used by 51 % of the population. ²⁰¹
	Research and innovation	According to UNESCO, Slovakia invests 0.9 % of its GDP in R & D. ²⁰²	According to UNESCO, Poland invests 0.9 % of its GDP in R & D. ²⁰³	According to UNESCO, the Czech Republic invests 2 % of its GDP in R & D. ²⁰⁴	According to UNESCO, Hungary invests 1.4 % of its GDP in R & D. ²⁰⁵
	Automation	Based on a 2020 report from the International Robotics Federation (IRF), Slovakia ranked 17th in the ranking of the 20 most automated countries (installed robots per 10000 employees). ²⁰⁶	According to a 2020 report by the International Robotics Federation (IRF), Poland did not rank among the 20 most automated countries (installed robots per 10000 employees). ²⁰⁷	According to a 2020 report by the International Robotics Federation (IRF), Czechia did not rank among the 20 most automated countries.	According to a 2020 report by the International Robotics Federation (IRF), Hungary did not rank among the 20 most automated countries.

195 Source: Desi 2020 Slovakia (<https://ec.europa.eu/digital-single-market/en/scoreboard/slovakia>)

196 Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/czech-republic>

197 Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/hungary>

198 Source: Desi 2020 Slovakia (<https://ec.europa.eu/digital-single-market/en/scoreboard/slovakia>)

199 Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/poland>

200 Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/czech-republic>

201 Source: <https://ec.europa.eu/digital-single-market/en/scoreboard/hungary>

202 Source for all R & D investment data: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

203 Source: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

204 Source: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

205 Source: <http://uis.unesco.org/apps/visualisations/research-and-development-spending/>

206 Source for all data on the International Robotics Federation rankings: https://ifr.org/downloads/press2018/Robot_Density_by_country_WorldRobotics2020_graph.jpg

207 Source: https://ifr.org/downloads/press2018/Robot_Density_by_country_WorldRobotics2020_graph.jpg

				(installed robots at 10000 employees).208	(installed robots at 10000 employees).209
L	Strategy papers at national, European and global level	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future²¹⁰ • Europe’s Digital Decade: digital targets for 2030²¹¹ • European eGovernment Action Plan 2016-2020²¹² • EU Digital Education Action Plan 2021-2027 • OECD Digital Government²¹³ 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020²¹⁴ • EU Digital Education Action Plan 2021-2027 • OECD Digital 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020 • Digital Education Action Plan 2021-2027 • OECD Digital Government 	<ul style="list-style-type: none"> • Shaping Europe’s Digital Future • Europe’s Digital Decade: digital targets for 2030 • European eGovernment Action Plan 2016-2020 • Digital Education Action Plan 2021-2027 • OECD Digital
	Current policies and strategies	<ul style="list-style-type: none"> • Strategy digital Transformation of the Slovak Republic 2030 • Digital Action Plan transformations of the Slovak Republic for 2019-2022 • National concept computerisation of the Public Report 2013-2020 • National plan broadband 	<ul style="list-style-type: none"> • Deployment strategy The Gigabit Society by 2025 • Objectives of the Support development of broadband connections • Goals of 5G Networking • National strategy Industry 4.0 	<ul style="list-style-type: none"> • Law 12/2020 Sb. about the right to digital services and about the change of některé laws • Permanent politics in Electronic Communications – Digital Czech Republic v. 2.0 • Digital Czech Republic: economics and Societies; validity period 2018-2030 	<ul style="list-style-type: none"> • The Digital Startup Strategy of Hungary • The Digital Education Strategy of Hungary • The Digital Export Development Strategy of Hungary • The Digital Child Protection Strategy of Hungary • Digital Success

208 Source: https://ifr.org/downloads/press2018/Robot_Density_by_country_WorldRobotics2020_graph.jpg

209 Source: https://ifr.org/downloads/press2018/Robot_Density_by_country_WorldRobotics2020_graph.jpg

210 Source: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en

211 Source: https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en

212 Source: <https://ec.europa.eu/digital-single-market/en/european-egovernment-action-plan-2016-2020>

213 Source: <http://www.oecd.org/governance/digital-government/>

214 Source: <https://ec.europa.eu/digital-single-market/en/european-egovernment-action-plan-2016-2020>

215 Source: <http://www.oecd.org/governance/digital-government/>

216 Source: <http://www.oecd.org/governance/digital-government/>

		<ul style="list-style-type: none"> Support the development of 5G networks to Slovakia for 2020-2025 The concept of computerisation; and digitalisation of the Education Sector with a view to 2020 		<ul style="list-style-type: none"> National Strategies Artificial intelligence in Czech republic 2019-2035 National plan for the development of networks new Generation²¹⁷ 	
E	Global warming, climate and environmental pollution	<p>Slovakia, like all other countries in the world, is at risk of climate change.</p> <p>Slovakia is a signatory to various international and regional instruments on climate change:</p> <ul style="list-style-type: none"> UN Framework Convention on climate change, The Kyoto Protocol, The Paris Agreement, A Green Deal for Europe; EU Biodiversity Strategy. <p>There are also different strategies at national level to address climate change.²¹⁷</p> <p>Based on the Slovak Low Carbon Development Strategy for 2030 with a view to 2050, Slovakia would achieve carbon neutrality by 2050.^{218 219}</p> <p>Environmental Performance Index</p>	<p>Overall, Poland has made significant progress towards the UN Sustainable Development Goals. As regards the environmental dimension, the Polish energy-intensive economy faces various challenges to move towards climate neutrality. Poland is the only EU country that has not promised carbon neutrality by 2050.</p> <p>Poland is a signatory to various climate instruments:</p> <ul style="list-style-type: none"> UN Framework Convention on climate change, The Kyoto Protocol, The Paris Agreement, EU strategy for biodiversity. <p>Poland ranked 37th in the Environmental Performance Index 2020.²²⁰</p>	<p>Czechia has a number of international and regional climate commitments, such as:</p> <ul style="list-style-type: none"> UN Framework Convention on climate change, The Kyoto Protocol, The Paris Agreement, A Green Deal for Europe; EU strategy for biodiversity. <p>In the Environmental Performance Index 2020, the Czech Republic ranked 20th.²²¹</p>	<p>Hungary has a number of international and regional climate commitments, such as:</p> <ul style="list-style-type: none"> Framework Convention UN on climate change, The Kyoto Protocol, The Paris Agreement, Green Deal for Europe. EU strategy for biodiversity. <p>Hungary ranked 33 rd in the Environmental Performance Index 2020.²²²</p>

²¹⁷ Source: <https://www.databaze-strategie.cz/cz/>

²¹⁸ Source: <https://www.minzp.sk/klima/politika-zmeny-klimy/adaptacia-zmenu-klimy/>

²¹⁹ Source: <https://euractiv.sk/section/klima/news/ako-slovensko-dosiahne-uhlikovu-neutralitu-nova-strategia-ma-navrhy-ale-stare-cisla/>

²²⁰ Source: <https://epi.yale.edu/epi-results/2020/component/epi>

²²¹ Source: <https://epi.yale.edu/epi-results/2020/component/epi>

²²² Source: <https://epi.yale.edu/epi-results/2020/component/epi>

²²⁰ Source for all data on the Environmental Performance Index: <https://epi.yale.edu/epi-results/2020/component/epi>

		2020 Slovakia ranked 26th. ²²⁰			
	Geography of the country	Slovakia is a landlocked country with an area of 49 035 km ² . The surface of Slovakia consists of lowlands, basins, hills, hills, rocks and mountains. Forests make up two-fifths of the country's territory. ²²³	Most of the country slightly wavy, lowlands (below 200 m above sea level) occupy up to 75 % of the country, so the average _HYPERLINK "https://sk.wikipedia.org/wiki/Nadmorsk%C3%A1_v%C3%BD%C5%A1ka" altitude is 173 m.	The area of the Czech Republic is 78 866 km ² . The Czech Republic ranks 21st in Europe and 113rd in the world. The surface of the Czech Republic has the predominant character of hills and hills. 67 % of the area lies at an altitude of up to 500 m, 32 % between 500 and 1 000 m and 1 %	Hungary is a landlocked country spreading on the lowlands of the Pannonian basin of 93 030 km ² .

²²³ Source: <http://www.slovakiasite.com/sk/geografia.php>