



Digital Economy and Society Index (DESI) 2021

Slovakia

About the DESI

The European Commission has monitored Member States' progress on digital and published annual Digital Economy and Society Index (DESI) reports since 2014. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing an EU-level analysis in the key digital policy areas.

In 2021, the Commission adjusted DESI to reflect the two major policy initiatives that will have an impact on digital transformation in the EU over the coming years: the Recovery and Resilience Facility and the Digital Decade Compass.

To align DESI with the four cardinal points and the targets under the Digital Compass, to improve the methodology and take account of the latest technological and policy developments, the Commission made a number of changes to the 2021 edition of the DESI. The indicators are now structured around the four main areas in the Digital Compass, replacing the previous five-dimension structure. 11 of the DESI 2021 indicators measure targets set in the Digital Compass. In future, the DESI will be aligned even more closely with the Digital Compass to ensure that all targets are discussed in the reports.

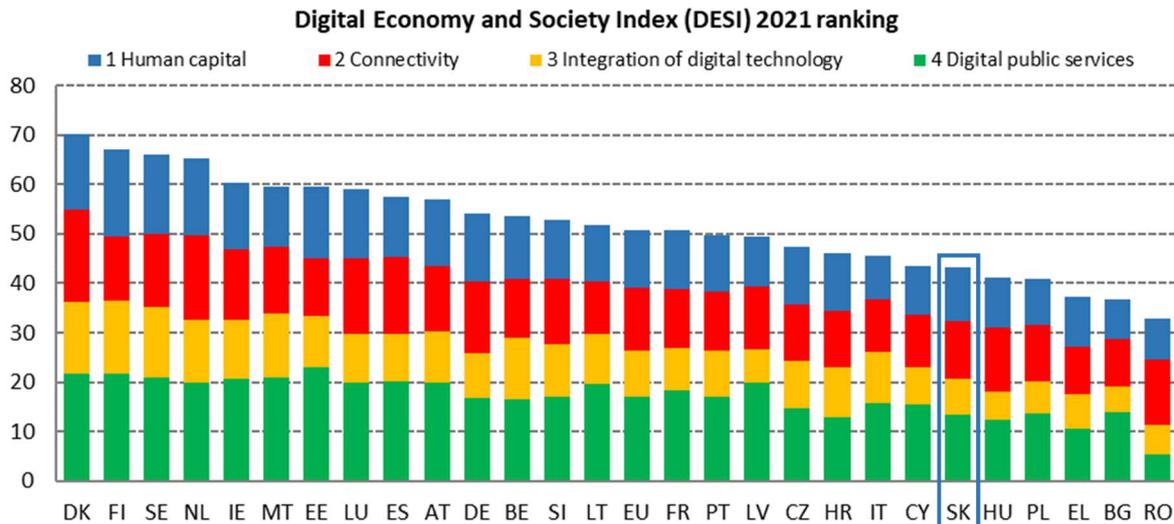
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training and using e-invoicing.

The DESI scores and rankings of previous years were re-calculated for all countries to reflect the changes in the choice of indicators and corrections made to the underlying data.

For further information, see the DESI website: <https://digital-strategy.ec.europa.eu/en/policies/desi>.

Overview

DESI 2021	Slovakia		EU
	rank	score	score
	22	43.2	50.7



Slovakia ranks 22ND of 27 EU Member States in the 2021 edition of the Digital Economy and Society Index (DESI). The country stays at the same position as in 2020.

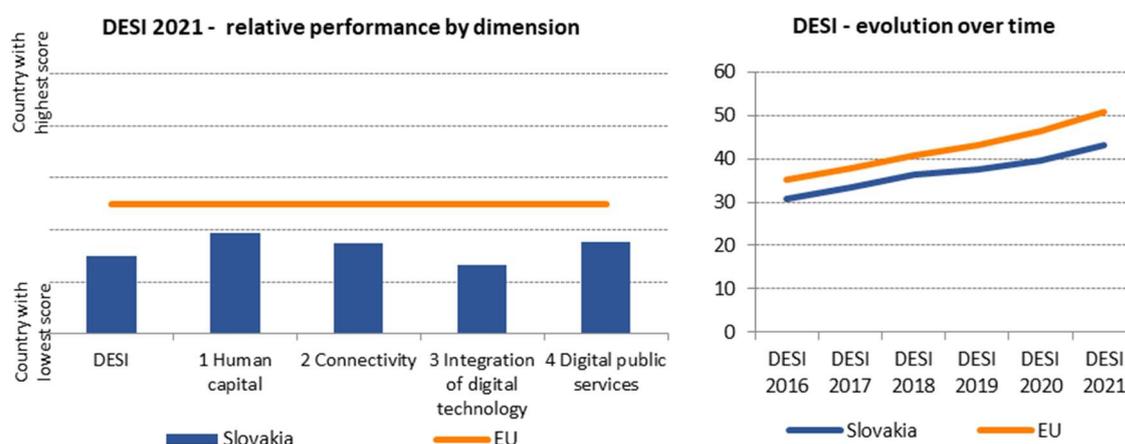
Slovakia is just below or around the EU average across the human capital dimension indicators. 54% of Slovaks have at least basic digital skills and 27% have above-basic digital skills in comparison to 56% and 31% for the EU average. The number of enterprises providing ICT training was 16% in 2020, which is 4 percentage points lower than the EU average of 20%. The share of ICT specialists in total employment has also grown and almost reached the EU average. Overall fixed broadband take-up in Slovakia increased steadily from 72% in 2019 to 78% in 2020. Slovakia has significantly improved the take-up of super-fast internet and progressed in VHCN coverage, and the completed 5G auction improved the score in 5G readiness. 52% of SMEs have at least a basic level of digital intensity, which is below the EU average of 60%. 15% of enterprises used at least two artificial intelligence (AI) technologies in 2020, in comparison to 25% in the EU. The percentage of enterprises using e-invoices is 16%, significantly below the EU average of 32%. Most indicators for the Digital public services dimension are lower than the EU average, except for the 68% share of e-government users in 2020, compared to 64% for the EU.

Overall, Slovakia's progress in the areas monitored is limited. Public funds spent so far to stimulate digital transformation have not always achieved the desired effect. There has been some progress in the integration of digital technology; for example, the percentage of enterprises using cloud computing services is steadily increasing. However, there continues to be a need for enterprises to utilise the potential of big data, AI and electronic information sharing systems. Average performance in e-commerce is a missed opportunity. Digitalisation of education is below its potential, as schools, teachers and pupils lack skills and tools. Fast broadband and very high-capacity network coverage needs to be improved creates a barrier for a wider use of digital technologies and services by households and enterprises. Administrative barriers often slow down network deployment, and Slovakia has not yet transposed the provisions of the European Electronic Communication Code.

Slovakia is rolling out new digital public services, but more can be done to improve their quality and interoperability. People and businesses would benefit from an increased availability, efficiency and user-friendliness of digital public services. Digital transformation is one of the main pillars of the Slovak Recovery and Resilience Plan (RRP) with the main focus on public services, skills and digitalisation of businesses. Slovakia is well connected to the main European initiatives in the digital domain, and the RRP will further support several multi-country projects.

The COVID-19 pandemic made existing weaknesses in Slovakia's digital economy and Slovak society even more visible, including in connectivity, digital skills attainment and digitalisation of schools, households, enterprises and in public services. IT systems in hospitals, schools and public institutions were not ready for the sudden switch to online and remote functioning.

Slovakia has committed to improving its score and position in DESI. The Ministry of Investments, Regional Development and Informatisation unveiled a detailed strategy and action plan¹ with concrete measures to address shortcomings identified by DESI indicators. This document mirrors the main DESI dimensions and aims to deliver significant improvements by 2025. This initiative builds upon the *2030 Strategy for the Digital Transformation of Slovakia*² and the related action plan³.



¹ <https://www.mirri.gov.sk/aktuality/digitalna-agenda/ministerka-remisova-predstavila-plan-ako-slovensko-dostat-v-digitalizacii-na-europsku-uroven/index.html>

² <https://www.mirri.gov.sk/wp-content/uploads/2019/06/Strategia-digitalnej-transformacie-Slovenska-2030.pdf>

³ https://www.mirri.gov.sk/wp-content/uploads/2019/07/Akcny-plan-DTS_2019-2022.pdf

Digital in Slovakia's Recovery and Resilience Plan (RRP)

The digital transformation of the economy and the society is at the heart of Slovakia's Recovery and Resilience Plan. Digital reforms and investments included in the plan should help to modernise Slovakia, focusing on areas which show significant investment needs. The Slovak plan's contribution to the digital transition amounts to EUR 1.33 billion or 21% of its total allocation of EUR 6.33 billion.

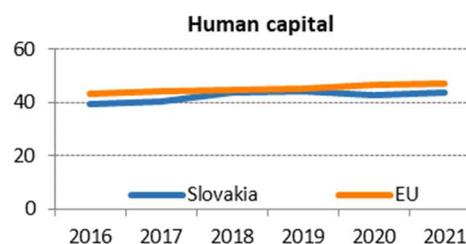
The plan places a strong emphasis on the digitalisation of the public sector, both as part of sectoral reforms (justice, police, healthcare) and cross-cutting measures aimed at increasing the quality and accessibility of e-government solutions. A reform of the governance model for the digital economy, together with investments in digital technologies and the digital capacity of enterprises, in particular SMEs, should help in developing the digital ecosystem. Developing digital skills is one of the objectives of the proposed educational reforms and of the investment in the skills of teachers, seniors and disadvantaged groups.

The Slovak authorities plan to finance connectivity investments from other sources; however, the recovery and resilience plan will help to achieve national targets in the broadband strategy by strengthening the coordination role of the Broadband Competence Office.

The plan will support participation in several cross-border projects to enable the digital transition. This includes participation in a network of digital innovation hubs and European digital innovation hubs to support Slovak SMEs with digitalisation. It also includes investment in high performance computing (HPC) with the aim to participate in the EuroHPC joint undertaking. The Recovery and Resilience Facility will also support two other multi-country projects to be determined at a later stage. Potential projects include participation in the European blockchain and quantum communication infrastructure.

1 Human capital

1 Human capital	Slovakia		EU
	rank	score	score
DESI 2021	19	43.8	47.1



	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills	59%	54%	54%	56%
% individuals	2017	2019	2019	2019
1a2 Above basic digital skills	33%	27%	27%	31%
% individuals	2017	2019	2019	2019
1a3 At least basic software skills	63%	56%	56%	58%
% individuals	2017	2019	2019	2019
1b1 ICT specialists	3.2%	3.7%	4.2%	4.3%
% individuals in employment aged 15-74	2018	2019	2020	2020
1b2 Female ICT specialists	13%	14%	16%	19%
% ICT specialists	2018	2019	2020	2020
1b3 Enterprises providing ICT training	18%	18%	16%	20%
% enterprises	2018	2019	2020	2020
1b4 ICT graduates	3.3%	3.9%	3.9%	3.9%
% graduates	2017	2018	2019	2019

In the Human capital dimension, Slovakia ranks 19th out of 27 EU countries and is thus below the EU average. 54% of Slovaks have basic digital skills and 27% have advanced digital skills. Both indicators are below the EU average of 56% and 31% respectively. The share of enterprises that provide ICT training to their employees decreased to 16%. The proportion of ICT specialists in total employment grew to 4.2%, although it is still slightly below the EU average (4.3%). 16% of ICT specialists are women.

Improving digital skills continues to be one of the government's priorities. Slovakia's newly adopted Strategy and action plan to improve its position in the DESI Index by 2025⁴ also covers measures in the human capital dimension, such as measures to improve the conditions for keeping graduates in ICT, support the study of technical disciplines at all levels of education or increase the performance of Slovak universities. Furthermore, the *2030 Strategy for the Digital Transformation of Slovakia*⁵ and the related action plan for 2019-2022⁶ are being implemented, but many key measures have been delayed. The aim is to adapt the education system and focus on skills for jobs. The strategy also mentions the need to develop soft skills and competences for taking part in digital society (digital citizenship). The government is working on a programme for education's digital transformation, but Slovakia is far from having all schools connected to very high capacity broadband.

The education sector records the biggest digital skills mismatches and needs for ICT specialisation, with approximately 10,000 ICT experts needed. Due to the lack of digital skills and infrastructure, some schools, especially at the beginning of the pandemic, struggled to organise and deliver distance

⁴ <https://rokovania.gov.sk/RVL/Material/25949/1>

⁵ <https://www.mirri.gov.sk/wp-content/uploads/2019/10/SDT-English-Version-FINAL.pdf>

⁶ <https://www.mirri.gov.sk/wp-content/uploads/2019/10/AP-DT-English-Version-FINAL.pdf>

learning. The upskilling of teachers and other workers within lower levels of the education system has become a priority. According to the Slovak School Inspectorate, 45% of schools do not have a single qualified IT teacher. In 2020, webinars were held on a regular basis as part of the national 'Teachers' programme ⁽⁷⁾, the aim being to provide online methodological assistance to teachers during the pandemic. In 2020, the Ministry of Education, Science, Research and Sport granted EUR 6 million to schools for the purchase of necessary digital equipment and in January 2021 granted an additional EUR 3 million for this same purpose. Altogether, 2,265 schools received a grant.

Slovakia has several initiatives and projects such as the IT Fitness test⁸ or IT Akademia⁹ to improve students' and teachers' digital skills. The country also follows the national education programme, which highlights the need to increase the use of digital technologies in classrooms and improve the digital skills of both students and teachers. The Ministry of Education, Science, Research and Sport has adopted the outcomes from the IT Akademia project and is preparing to implement the concept of digital coordinators, i.e. trained teachers who will advise and manage schools' digital transformation programmes. The goal is to help teachers improve their digital skills so they are better equipped and empowered to use digital educational content and better prepared for online or hybrid teaching.

Since 2017, Slovakia has an active National Digital Coalition¹⁰ that works closely with the government. Its 83 members have submitted 219 pledges that range from bringing more IT classes to schools and training teachers to helping workers get their skill-sets ready for industry 4.0.

The IT Fitness test run by the National Digital Coalition has helped to significantly improve the reach of the testing and has doubled the number of both student and teacher participants. However, the results of the testing were below expectations, particularly when it came to security and the use of office software.

Slovakia regularly participates in EU Code Week. In 2020, the number of activities increased by 8% to 165 and the organisers reported over 9,100 participants.

Slovakia continues to implement reforms to improve its performance in the Human capital dimension. However, the country remains below the EU average. The strategy focuses on reforming education, adapting it to technological developments, and on equipping teachers and students with skills and competences for living and working in a digital economy. Translating the strategies into concrete actions, ensuring proper funding and using current successful initiatives such as the IT Fitness test to reach a larger share of the population could improve Slovakia's score in this dimension.

Highlight 2020: IT Academy (IT Akademia)

Since 2016, the IT Akademia has contributed to increasing digital skills of students and teachers in all levels of education. Its goal is to create a model of education and training for young people that better addresses the needs of the society and the labour market with a focus on digital skills. The project is delivered in partnership with five Slovak universities and is co-financed by the European Social Fund. Total financing for the project is EUR 19 million for the period 2016-2021.

The project involves a total of 683 primary and secondary schools, five universities, more than 50 thousand primary and secondary school students, more than 300 primary and secondary school teachers and more than 4,000 university students. During the COVID19 pandemic, IT Akademia has provided professional assistance to help with distance learning.

Some of the main outcomes of the project include:

⁷ <https://www.youtube.com/channel/UCGltBBHjdTeaJ4g0HuT-iAA/videos>

⁸ <https://itfitness.sk/sk/>

⁹ <https://itakademia.sk>

¹⁰ <https://digitalnakoalicia.sk/>

- 1,132 innovative methodologies for teaching informatics, mathematics, biology, physics, chemistry, geography and other subjects at primary and secondary schools
- 60 new and innovated subjects at 5 universities to address the needs of the labour market and digital transformation –in fields such as Data Science, Internet of Things, Computer Networks and Business Information Systems
- Teacher education and professional development (updates, innovation, webinars, consultations) with a focus on the use of created teaching materials and on supporting the digital transformation of education

In 2018, IT Akademia received a special ITAPA award for its contribution to education.

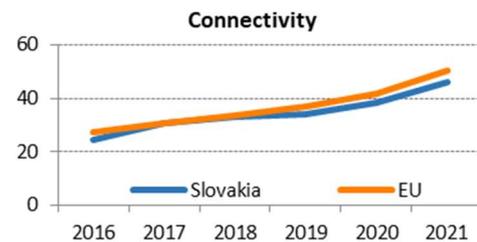
Human capital in Slovakia's Recovery and Resilience Plan

Slovakia considers digital skills a key condition for the digitalisation of its economy and society, with the total contribution of the recovery and resilience plan to this policy area being EUR 298 million. Developing digital skills is one of the main objectives of the educational reform outlined in the plan and the reform builds on previous and existing initiatives to improve digital skills. Concrete measures include revising the curriculum to focus more on digital skills, providing training opportunities for teachers and ensuring investments in the digital equipment of schools and digitalisation in higher education.

The plan includes developing a national digital skills strategy for adults to ensure that all adults are able to participate in a society transformed by digitalisation. Additionally, investments are planned to improve the digital skills of the elderly and vulnerable persons through the combination of training in digital skills and the provision of digital equipment. The plan also focuses on developing the specialised skills of IT and cybersecurity experts in the public sector. Digital innovation hubs will offer services to businesses, in particular SMEs, for developing the digital skills of their employees.

2 Connectivity

2 Connectivity	Slovakia		EU
	rank	score	score
DESI 2021	19	46.3	50.2



	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
2a1 Overall fixed broadband take-up % households	70% 2018	72% 2019	78% 2020	77% 2020
2a2 At least 100 Mbps fixed broadband take-up % households	13% 2018	15% 2019	25% 2020	34% 2020
2a3 At least 1 Gbps take-up % households	NA	<0.01% 2019	0.38% 2020	1.3% 2020
2b1 Fast broadband (NGA) coverage % households	73% 2018	74% 2019	75% 2020	87% 2020
2b2 Fixed Very High Capacity Network (VHCN) coverage % households	43% 2018	45% 2019	50% 2020	59% 2020
2c1 4G coverage % populated areas	97.4% 2018	98.4% 2019	98.4% 2020	99.7% 2020
2c2 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	0% 2019	33% 2020	67% 2021	51% 2021
2c3 5G coverage % populated areas	NA	NA	0% 2020	14% 2020
2c4 Mobile broadband take-up % individuals	59% 2018	67% 2019	67% 2019	71% 2019
2d1 Broadband price index Score (0-100)	NA	60 2019	78 2020	69 2020

Slovakia ranks only 19th in connectivity. In 2020, it observed a slight increase in the percentage of households covered by fixed very high capacity networks provided on FTTP infrastructures – 50% compared to 45% in 2019. The FTTP coverage in rural areas remains at a much lower level – only 18% of rural households were covered by the technology in 2020. It should be noted, however, that this demonstrates an upward trend in comparison with 2019, when 15.3% of rural households had access to the technology.

In terms of fixed broadband take-up, 78% of households subscribed to some form of broadband connection in 2020, a small increase compared to 72% of households in 2019. 25% of households had a fixed broadband connection of at least 100 Mbps in 2020, which is below the EU average of 34% for the same indicator. Although Slovakia is the 7th cheapest broadband market in the EU, consumers tend to choose lower broadband speeds.

Despite the fact that 67% of the total harmonised 5G spectrum has been assigned in Slovakia, 5G coverage is available only in the capital.

While the main objective of the Slovak 2011 national broadband strategy was to guarantee coverage of the entire country with speeds of at least 30 Mbps by 2020, this objective has not yet been achieved – the NGA broadband networks in Slovakia covered 75% of households in 2020. Providing high-speed

broadband coverage for 'white spots' (i.e. municipalities covered by speeds of less than 30 Mbps) remains one of Slovakia's long-term connectivity issues.

The Slovak government adopted the new national broadband plan in March 2021, setting out Slovakia's connectivity vision and targets until 2030. The plan aims for all households, whether urban or rural, to have access to internet connection of at least 100 Mbps, with the possibility of upgrading to gigabit speeds, as well as for major socio-economic drivers to have access to gigabit connectivity. The national broadband plan continues with the preparatory phase for the feasibility study. Calls co-financed with the European Structural and Investment Funds will be used to support the funding for connecting the 'white addresses'¹¹ with a high-speed broadband connection through very high capacity networks.

Regarding public funding for infrastructure deployment (both fixed and wireless), the Slovak government wishes to finance its infrastructure development in the 2021-2027 financial perspective through Connecting Europe Facility 2: this would mainly involve building corridors between Member States (e.g. between Slovakia and Poland as well as between Slovakia and Czechia). Coverage for households and projects focused on 5G for smart communities.

One of the biggest mobile network operators (MNOs) in Slovakia intensified its fixed wireless access deployment in 2020 in line with the memorandum of understanding signed with the government of Slovakia in January 2018. The other three MNOs have also introduced similar programmes.

Slovak operators wishing to deploy networks continue to face administrative obstacles. Permit-granting bodies in Slovakia are legally obliged to insist on an active involvement of sectorial bodies with no direct relevance to the submitted projects, slowing down the process of receiving the necessary approvals. The Slovak government is currently contemplating the possibility of adopting new construction and zoning legislation, which would aim to simplify the construction process. According to the draft, a specialised building authority would be established with branches at the district level. The plans are also reflected in the Slovak roadmap for the implementation of the Connectivity Toolbox¹².

Connectivity objectives are part of the Recovery and Resilience Plan (component digitisation). However, the authorities intend to finance connectivity investments from other sources.

In June 2020, the Slovak government published its strategy for the support of 5G networks in Slovakia for 2020-2025. The objectives of the strategy include ensuring the efficient use of radio spectrum by refarming the 3.6 GHz frequency band, releasing the 26 GHz frequency band based on market demand and preparing an amendment to the relevant legislation on cybersecurity in order to define security-related measures and requirements for the procurement of 5G technologies and networks.

The auction of radio spectrum frequencies in the 700, 900 and 1800 MHz bands ended on 23 November 2020 - the winning bidders were the four MNOs (O2, Orange, Slovak Telekom, SWAN). Slovakia assigned frequencies in the 3.6 GHz band already in 2016, with rights of use extending until 2025: as frequencies were allocated in line with the principle of technological neutrality, MNO holders are already entitled to use them to provide 5G services. The 26 GHz band is currently used for both civilian and military purposes – the existing rights in the band are expected to expire in 2025.

¹¹ The national broadband plan is working with more detailed units on the level of particular addresses rather than 'white spots' understood as whole municipalities in the Memorandum from 2018. Moreover, while the Memorandum focused on NGA coverage, the national broadband plan aims at VHCN coverage.

¹² Pursuant to Commission Recommendation (EU) 2020/1307 of 18 September 2020 on a common Union toolbox for reducing the cost of deploying very high-capacity networks and ensuring timely and investment-friendly access to 5G radio spectrum, to foster connectivity in support of economic recovery from the COVID-19 crisis in the Union, OJ L 305, 21.09.2020, p.33.

O2 Slovakia launched its 5G network in October 2020 in some parts of Bratislava, using its licences in the 1800 MHz and 3.4–3.8 GHz bands. O2 presented it as ‘pilot commercial testing’ using technologies from four vendors.

Overall, 66.7% of harmonised spectrum has been assigned in Slovakia for the purposes of 5G deployment as of August 2021 – this is a major improvement compared to the 33.3% assigned in 2019.

Main market & regulatory developments

The fixed broadband market in Slovakia is characterised by a strong orientation towards deployment of own access infrastructure - wholesale access is used only in cases where there is no other technical or economic solution available. Slovakia therefore observes a significant fragmentation in this segment of the market: there are 738 operators providing fixed broadband services in the country. The mobile broadband market is dominated by the four MNOs (O2, Orange, Slovak Telekom, SWAN).

As a result of a continuous increase in the use of mobile services in general, 2020 saw an increasing use of bundles. The fastest growing and the most popular type of bundles including mobile services is a triple-play bundle (‘mobile service + fixed internet + TV’). The number of subscriptions to this type of bundle observed the most significant increase in 2020.

Some Slovak operators have undertaken voluntary measures to ease the impact of the COVID-19 pandemic. The examples of the measures taken were a change of limits for voice and data packages and a free-of-charge internet service for teachers to support the provision of online education.

Slovakia did not transpose the provisions of the European Electronic Communications Code (EECC) by the deadline of 21 December 2020 – it is one of the 24 Member States currently subject to an infringement procedure due to its failure to transpose the Directive. The delay is understood to be a result of a variety of factors, including the parliamentary elections in March 2020, the election of the new Chairman of the Slovak regulatory authority for electronic communications (RÚ) in September 2020, as well as the COVID-19 pandemic. The provisions transposing the EECC are now expected to enter into force at the end of 2021 at the latest.

According to the information provided by RÚ, the number of consumer complaints in 2020 was stable compared to the previous years. The regulator did not identify any specific end-user issues caused by the COVID-19 pandemic.

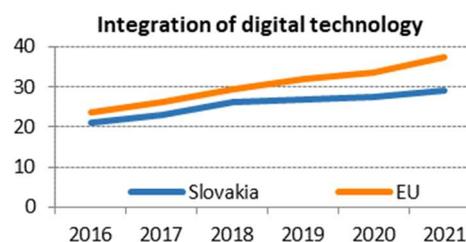
Regarding open-internet issues, RÚ received a few complaints in 2020 concerning a zero-rated service provided as part of a bundled offer by a Slovak internet service provider. The service in question consisted of access to a zero-rated news website. The concerned provider has since stopped the practice.

Concerning emergency communications, location data for the end-user requesting emergency assistance is provided within 15 seconds of receiving an emergency call and of the request from the public-safety answering point (PSAP) with 99.5% availability of location data. The advance mobile location (AML) system has been implemented as such. However, it is not functional due to data protection constraints under the national law.

While Slovakia observed a steady increase in the ‘main coverage’ and ‘take-up connectivity’ indicators, these modest gains could be lost if relevant legislative and strategic reforms are not carried out. Slovakia needs to ensure a swift and full adoption of the measures transposing the EECC.

3 Integration of digital technology

3 Integration of digital technology	Slovakia		EU
	rank	score	score
DESI 2021	21	29.1	37.6



	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity % SMEs	NA	NA	52% 2020	60% 2020
3b1 Electronic information sharing % enterprises	31% 2017	31% 2019	31% 2019	36% 2019
3b2 Social media % enterprises	17% 2017	18% 2019	18% 2019	23% 2019
3b3 Big data % enterprises	9% 2018	9% 2018	6% 2020	14% 2020
3b4 Cloud % enterprises	14% 2018	14% 2018	18% 2020	26% 2020
3b5 AI % enterprises	NA	NA	15% 2020	25% 2020
3b6 ICT for environmental sustainability % enterprises having medium/high intensity of green action through ICT	NA	NA	76% 2021	66% 2021
3b7 e-Invoices % enterprises	15% 2018	15% 2018	16% 2020	32% 2020
3c1 SMEs selling online % SMEs	13% 2018	11% 2019	17% 2020	17% 2020
3c2 e-Commerce turnover % SME turnover	11% 2018	11% 2019	11% 2020	12% 2020
3c3 Selling online cross-border % SMEs	8% 2017	7% 2019	7% 2019	8% 2019

Slovakia ranks 21st in the EU on integration of digital technology by enterprises. Only 52% of Slovak SMEs reach at least the basic level of digital intensity (EU average: 60%). Slovakia falls short of the EU average in the use of AI by enterprises (15% versus 25%) and in the use of cloud services (18% versus 26%). The share of enterprises that use big data analysis dropped from 9% to 6%. The country's e-commerce scores have partially improved: 17% of SMEs sell online which is at the EU average. However, the share of SME turnover from e-commerce stagnates at 11% (EU average: 12%). 16% of Slovak enterprises used e-invoices in 2020, in comparison to 32% in the EU. 76% of Slovak businesses had a medium to high use of ICT technologies for more environmentally friendly actions in 2021, which is 10 percentage points higher than the EU average of 66%.

Slovakia follows its *2030 Strategy for the Digital Transformation of Slovakia*¹³, which supports the integration of innovative technologies in enterprises, including cloud & edge computing, HPC, Blockchain and AI. Concrete measures are described in Slovakia's action plan for digital transformation

¹³ <https://www.mirri.gov.sk/wp-content/uploads/2019/10/SDT-English-Version-FINAL.pdf>

for 2019-2022¹⁴. The plan establishes an Independent Expert Group on AI Ethics, introduces a digital impact assessment that evaluates the effects of regulations on innovation and the digital economy and supports new business models and smart mobility.

Slovakia participates in the EuroHPC joint undertaking, mainly through the National Supercomputing Centre¹⁵ established in 2020 (see details in box below). Slovakia is home to two active digital innovation hubs in Košice and two in preparation in Bratislava. Their focus ranges from robotics and microelectronics to the Internet of things and cybersecurity. They operate in close collaboration with universities and with other European hubs. In 2021, Slovakia pre-selected 7 candidates that are ready to join the European Digital Innovation Hub Network. Slovakia contributes to the European Blockchain Service Infrastructure through Blockchain Slovakia¹⁶. This non-profit organisation brings together researchers, entrepreneurs, public authorities, investors and other actors with the aim of increasing the use of blockchain among businesses and addressing societal issues.

According to a survey by Industry4UM, 74% of Slovak enterprises consider Industry 4.0 essential for the future, but its deployment slowed down in 2020¹⁷. This was in part because of the challenging economic environment, which hampered investments. Also, there is a lack of training and development of employees, as well as a need to strengthen the role of management in the transformation process. The results also show that enterprises with foreign capital are more likely to follow an Industry 4.0 strategy than enterprises fully owned by Slovaks.

Slovak start-ups connect well with neighbouring markets, but the biggest challenge is to expand globally¹⁸. According to the OECD, starting a business is less costly in Slovakia than in most EU Member States, but the administrative burden is relatively heavy due to the numerous requirements and complexity of the rules¹⁹. Slovakia has signed the EU Start-up Nations Standard of Excellence²⁰ and committed to follow good practices, such as innovation in regulation and procurement that would help young innovative enterprises to grow and expand in Europe. In 2020, the government improved the conditions for start-ups through tax simplification, and it plans to support digital archiving and automation in accounting as of 2022.

Slovakia is improving its efforts to scale up its digital economy, although it continues to perform below the EU average. The main barriers are the fast-changing market environment and the slow reaction of market participants, who are mainly dependent on the import of technologies and know-how from other markets. A relatively low level of digital intensity among businesses remains an issue. The administrative and financial burden of existing legislation slows down the spread of innovation. Limited access to and awareness of financing and financial instruments for investments into new technologies remains an issue.

¹⁴ <https://www.mirri.gov.sk/wp-content/uploads/2019/10/AP-DT-English-Version-FINAL.pdf>

¹⁵ <https://eurocc.nsc.sk/en/>

¹⁶ <https://blockchainslovakia.sk>

¹⁷ <https://industry4um.sk/vyhodnotenie-prieskumu-industry-4-0-v-sr-2020/>

¹⁸ <https://ceedtech.eu/an-inside-look-at-the-slovakian-startup-ecosystem/>

¹⁹ <https://www.oecd.org/cfe/smes/Slovak-Republic-IE-2020.pdf>

²⁰ <https://digital-strategy.ec.europa.eu/en/news/24-eu-member-states-commit-digital-day-take-action-support-growth-eu-startups>

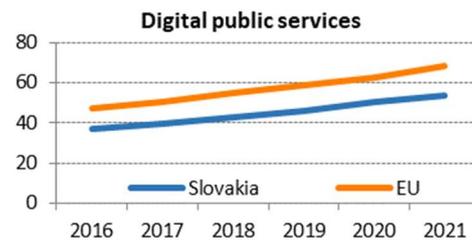
Integration of digital technology in Slovakia's Recovery and Resilience Plan

The plan puts forward an ambitious package for the Slovak economy's digital transformation. The total contribution of the recovery and resilience plan to this policy area is EUR 100 million for advanced technologies, EUR 151 million in digital research and development, and EUR 92 million for digitalisation of enterprises. The plan includes a reform of the governance model for the digital economy, together with investments in digital technologies and the digital capacity of enterprises, in particular SMEs. The investments will support the development and application of advanced digital technologies, such as technology-oriented competence centres and cooperation platforms.

The digitalisation of Slovak enterprises, in particular SMEs, will be fostered by 'voucher' schemes, for example digital and innovation vouchers. Digital innovation will also be supported through a series of hackathons. Digital innovation hubs connected to the European network will provide infrastructure and guidance to enterprises, in particular SMEs. Slovakia will build a new supercomputer that should be part of the EuroHPC joint undertaking. Investments in the digitalisation of transport and energy infrastructure will make them more resilient and reliable.

4 Digital public services

4 Digital public services	Slovakia		EU
	rank	score	score
DESI 2021	23	53.7	68.1



	Slovakia			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	62%	69%	68%	64%
	2018	2019	2020	2020
4a2 Pre-filled forms Score (0 to 100)	NA	NA	36	63
			2020	2020
4a3 Digital public services for citizens Score (0 to 100)	NA	NA	64	75
			2020	2020
4a4 Digital public services for businesses Score (0 to 100)	NA	NA	79	84
			2020	2020
4a5 Open data % maximum score	NA	NA	53%	78%
			2020	2020

With a score of 53.7 in 2021, Slovakia ranks 23rd in the EU for Digital public services. The share of e-government users among internet users has slightly decreased to 68% but is still above the EU average (64%). In all other monitored indicators, Slovakia scores below the EU average. In the category of 'amount of data pre-filled in public service online forms', the country scores 36 in 2020, which is significantly below the EU average of 63. Digital public services for citizens is also below the EU average, being 64 in comparison to 75 at EU level. This gap is less pronounced for digital public services for businesses, where Slovakia scores 79 compared to an EU average of 84.

Slovakia's public administration is underperforming, and the comparatively low level of digitalisation of the public administration and of public services is a key bottleneck for the business environment and economic growth. Important barriers continue to prevent a wider use of digital public services in Slovakia. The main obstacles include the lack of integration between public registers and re-use of available data.

Nevertheless, according to the EU eGovernment Benchmark²¹, Slovakia's overall eGovernment performance has improved by 7 percentage points. User-centricity, or the extent to which governments deliver and design services with the needs of users in mind, has also improved for Slovakia by 7 percentage points. However, Slovakia's score of 61% in the eGovernment Benchmark's Digitalisation Index is below the EU27+UK average of 72%. This index also provides insights into a country's ability to match high levels of digital service usage with a high availability of digital services. Slovakia can be categorised as not yet fully utilising digital tools and where the benefits of digitalising service delivery have not been realised yet.

Investments are needed to improve the efficiency of the country's public administration, reduce the administrative burden and improve the business environment. The focus should continue to be on user-friendliness to make investments effective. Slovakia has taken several steps to improve the user

²¹ <https://digital-strategy.ec.europa.eu/en/library/egovernment-benchmark-2020-egovernment-works-people>

friendliness of its digital public services. In 2021, new legislation will oblige public bodies who are the business owners of respective digital public services to collect user feedback on satisfaction in a standardised manner. Slovakia also has a design manual for digital services, which includes guidelines on how to apply human-centric design in the development and provision of digital services. New projects, in their preliminary phase, also have to conduct a qualitative and quantitative survey of user needs.

The 'State software house', Slovensko IT, was launched in 2020 to create cheaper, more modern and flexible state IT systems. One of its tasks is to develop a new one-stop-shop for the digital public services app, eSlovensko, which will enable people to connect with public institutions through their smart phones²².

In 2020, the Slovak authorities took further steps to implement the 'once-only' principle. They improved the quality of data in the central address register, making it one of the reference registries allowing other databases to consult it in order to verify the accuracy of data. The 'anti-bureaucracy' initiative simplified the sharing of certificates and documents between public institutions and should save EUR 42 million per year overall²³. The 'Consolidated analytical layer' project will enable evidence-based decision-making by public sector bodies through more thorough data analysis and modelling.

The Data Office at the Ministry of Investments, Regional Development and Informatisation is managing projects on data integration, interoperability and quality and working with the opendata community and the concept of MyData. Work is also being undertaken to better enable data sharing between public bodies. These activities are being supported through legislative initiatives such as the Act against bureaucracy²⁴ and the national Data Act²⁵, which is in preparation.

Slovakia is currently updating its *National Concept of Informatization of the Public Administration*. The guiding principles are user-centricity, digital by default, data as an asset, re-use, transparency of public administration and security. The new National Concept will follow two national strategic documents: the *2030 Vision and Strategy for the Development of Slovakia* and the *2030 Strategy for the Digital Transformation of Slovakia*.

Slovakia needs to intensify its efforts to improve and expand digital public services. The country is below the EU average, and the low quality and take up of e-government services makes the society more vulnerable in critical situations such as the pandemic. Focusing on user-friendliness and informing larger groups of the population about the benefits of digital public services would convince more people to consider their use. To reach at least the EU average, it is also necessary to continue the effort in the digitalisation of public administration and the interoperability of systems with increased data sharing between institutions.

Digital public services in Slovakia's Recovery and Resilience Plan

Investments in digital technologies in the country's public administration are a strong focus of the plan, including the roll-out of information systems to increase the quality and efficiency of the judiciary, police, firefighting, and rescue processes. Digital investments are planned to simplify the payment of taxes and levies. A new digital platform for providing more efficient and better-quality public services will be developed as part of the plan in order to improve the quality

²² <https://spectator.sme.sk/c/22545056/new-government-promises-a-new-era-in-state-it.html>

²³ <https://www.mirri.gov.sk/aktuality/informatizacia/ministerka-remisova-nas-novy-zakon-proti-byrokracii-ludom-usestri-100-kil-nervov-a-42-milionov-eur-rocne/index.html>

²⁴ <https://www.slov-lex.sk/pravne-predpisy/SK/ZZ/2018/177/20210101.html>

²⁵ <https://www.slov-lex.sk/legislativne-procesy/SK/LP/2021/55>

and accessibility of e-government solutions. The Slovak authorities will identify 16 priority 'life situations' for citizens and businesses, where simplified and more efficient digital solutions will be proposed. These measures will minimise the required administrative steps for citizens and businesses, reduce the time and costs, and improve the user-friendliness of services. In addition, the plan also envisages measures for a more efficient management of IT resources in the public administration. Slovakia also intends to strengthen and standardise cybersecurity across all sectors of public administration to increase trust in the new e-services, and it intends to invest in the digitalisation of healthcare to make medical and operational processes more efficient. The total contribution of the recovery and resilience plan to this policy area is EUR 686 million.