Digital Economy and Society Index (DESI) 2021

Romania

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.

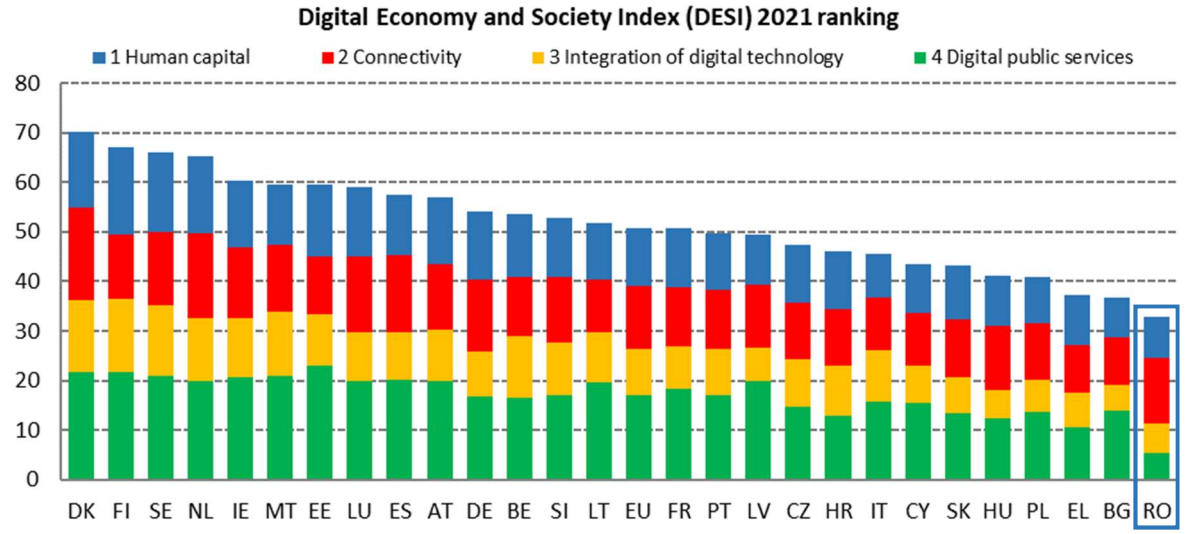
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training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

	Romania		EU
	rank	score	score
DESI 2021	27	32.9	50.7



Romania ranks 27th of 27 EU Member States in the 2021 edition of the Digital Economy and Society Index (DESI). On Human capital, Romania ranks 26th, scoring below average on most of the indicators. Although the country has a high number of ICT graduates (ranked 4th), the shortage in ICT specialists limits the country's capacity to innovate and to reap the benefits of the digital transformation. By contrast, on female ICT specialists Romania ranks 3rd. Regarding Connectivity, while progress continued in 2020 for fixed broadband coverage, take-up of broadband services progressed at a slower pace. Nonetheless, Romania ranks 7th thanks to the high take-up of at least 100Mbps broadband (52%). Connectivity in Romania could be further improved by focusing on lifting the urban-rural digital divide, streamlining permit-granting procedures, updating the broadband strategy to reflect the 2025 gigabit targets, and transposing the regulatory framework in line with EU legislation.

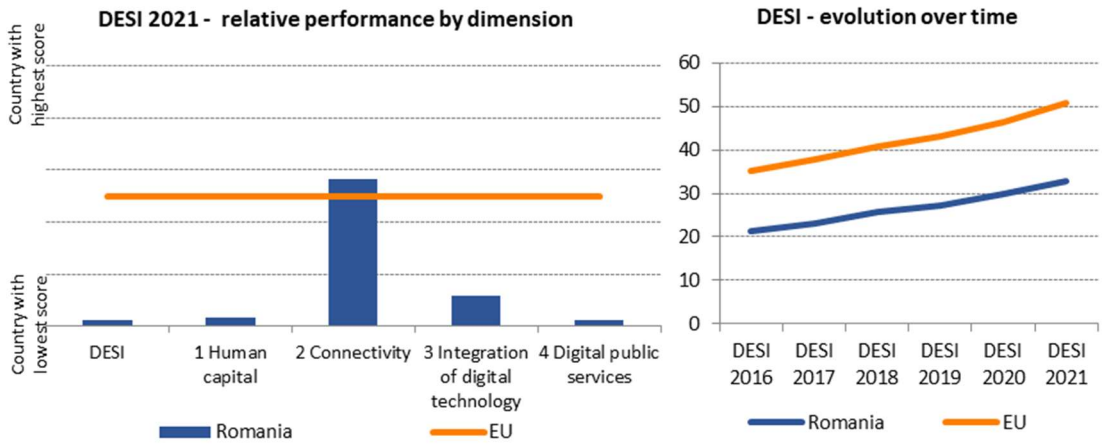
Romanian enterprises do not take full advantage of digital technologies (electronic information sharing, social media, big data and cloud), with the exception of artificial intelligence. As for Digital public services, Romania ranks last for key indicators such as digital public services for citizens and for businesses, e-government users and pre-filled forms. Projects aiming to meet different digital priorities are included in the National investment and economic recovery plan[1] launched by the Romanian Government in July 2020, with a budget allocation of EUR 100 million from EU and national funds, covering the years 2021-2030. Digital projects in the programme include:

- the creation of an interoperability hub, coupled with the identification and connection of the main data registers;

[1] Planul_Național_de_Investiții_și_Relansare_Economică.pdf (gov.ro) https://gov.ro/fisiere/programe_fisiere/Planul_Na%C8%9Bional_de_Investi%C8%9Bii_%C8%99i_Relansare_Economic%C4%83.pdf . In English: https://www.dentons.com/en/insights/articles/2020/july/3/romania-national-plan-for-investment-and-economic-recovery---note

- the use of electronic signatures in public administration;
- the development of a single point of contact;
- the introduction of the electronic identity card;
- the migration of public services to a government cloud;
- the development of open data systems that will allow private-sector access to data assets held by the public administration;
- investments to increase capacity to manage cyber risks and connect electronic fiscal cash registers.

2020 was a challenging year due to the change in government at the end of the year and the COVID-19 pandemic. The pandemic triggered increasing use of, and demand for, digital public services and accelerated the digital transformation of the Ministry of Internal Affairs, which made efforts to develop and deploy various ICT systems in a fast and secure manner. In December 2020, the new government established the Ministry of Research, Innovation and Digitization[2], to which the Authority for the Digitalization of Romania (ADR)[3] is attached. Continuity in the development and implementation of digitalisation measures would contribute to a stable increase in Romania's performance in all DESI dimensions. This will involve addressing the shortage in ICT specialists, boosting business digitalisation and modernising the public administration to offer more and better digital public services that could improve Romania's performance.



Digitalisation in Romania's Recovery and Resilience Plan (RRP)

The Romanian Recovery and Resilience Plan's total allocation is EUR 29.1 billion, with EUR 14.2 billion of non-repayable financial support and EUR 14.9 billion in loans under the Recovery and Resilience Facility. Together, this represents 13.09% of the 2019 Romanian GDP. There are 171 measures in the Plan - 64 reforms and 107 investments, structured around six pillars and fifteen components. Five of the seven digital policy areas identified in the Annex VII of the Recovery and Resilience Facility Regulation are covered by measures in the RRP: connectivity, human capital, e-government, digital public services and local digital ecosystems, digitalisation of businesses,

[2] Government Emergency Ordinance No 212/2020 of 28 December 2020, Official Gazette No 1307 of 29 December 2020
Ministerul Cercetării, Inovării şi Digitalizării: www.research.gov.ro
[3] https://www.adr.gov.ro/.

investment in digital capacities and deployment of advanced technologies. They also cover the four digital flagship initiatives presented in the Annual Sustainable Growth Strategy 2021[4]: Connect, Modernise, Scale-up, Reskill and upskill.

The measures contributing to digital objectives account for 20.5% of the financial allocation, which is above the 20% minimum requirement of the RRF Regulation.

While reforms and investments related to the digital transition can be found throughout the Plan, component 7 'Digital transformation' is focused on digitalisation. The digital allocated amount to this component is EUR 1,817 million and it includes measures in several areas: digital public services, digital connectivity, cybersecurity, and digital skills, human capital and internet use. These measures tackle important digital issues and priorities in Romania, such as government cloud infrastructure, improving the interoperability of digital public services, investments in e-health or the large scale deployment of electronic identity cards.

Equally significant contributions are made by component 15 'Education', which tackles reforms and investments for the digitalisation of the education process, amounting to EUR 1,129.5 million.

Investments in the digitalisation of road and rail transport are also expected to contribute to the digital transition through the EUR 864 million allocated in the sustainable transport component.

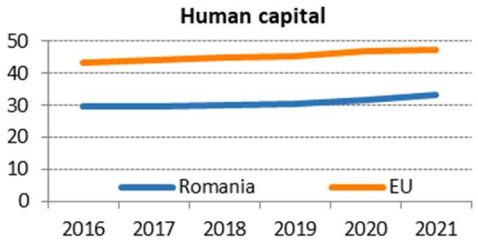
Component 9 'Business support, research, development and innovation', earmarks EUR 1,064 million. The digitalisation of businesses plays a prominent role in the RO RRP and is expected to increase the competitiveness and innovation potential of both SMEs and large companies.

Romania is expected to contribute to the cross border dimension of digital transformation by supporting companies' participation in a multi-country project on microelectronics, allocating EUR 500 million to support this initiative planned to be implemented as an Important Project of Common European Interest (IPCEI) as well as the overall the development of microelectronics in Romania.

[4] COM(2020) 575 - Annual Sustainable Growth Strategy 2021, 17 September 2020

1 Human capital

1 Human capital	Romania		EU
	rank	score	score
DESI 2021	26	33.1	47.1



	Romania			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills % individuals	29% 2017	31% 2019	31% 2019	56% 2019
1a2 Above basic digital skills % individuals	10% 2017	10% 2019	10% 2019	31% 2019
1a3 At least basic software skills % individuals	32% 2017	35% 2019	35% 2019	58% 2019
1b1 ICT specialists % individuals in employment aged 15-74	2.2% 2018	2.3% 2019	2.4% 2020	4.3% 2020
1b2 Female ICT specialists % ICT specialists	24% 2018	24% 2019	26% 2020	19% 2020
1b3 Enterprises providing ICT training % enterprises	5% 2018	6% 2019	6% 2020	20% 2020
1b4 ICT graduates % graduates	5.6% 2017	5.8% 2018	6.3% 2019	3.9% 2019

On Human capital, Romania is well below the EU average. Less than one third of people aged between 16 and 74 have at least basic digital skills (56% in the EU as a whole), while 35% have at least basic software skills (EU average: 58%). Only 10% of individuals have above-basic digital skills. Although there was a slight increase in the percentage of ICT specialists, they represent a much lower proportion of the workforce than in the EU as a whole (2.4% against an EU average of 4.3%). The number of enterprises providing ICT training to their employees is very low, standing at 6% (EU average: 20%). In contrast, Romania performs very well in terms of female ICT specialists, who account for 26% of total ICT specialists, and for ICT graduates, ranking high among EU Member States, with 6.3% of all graduates.

The main institutions in charge of digital skills policies are the Ministry of Education and the Ministry of Labour. In addition, the Authority for the Digitalization of Romania is the national authority coordinating efforts to draft national plans on digital skills, one for citizens and one for the public administration. Under the Human Capital Operational Programme (HCOP) 2014-2020, two dedicated calls for proposal were launched recently to increase employees' digital competences. These are: (i) 'Digital competences for SMEs' employees' (available budget EUR 20,000,000); and (ii) 'Digital competences for big enterprises' employees' (available budget: EUR 10,000,000).

To address the necessary digitalisation of education, in October 2020 the Ministry of Education launched the 2021-2027 SMART.Edu strategy on the digitalisation of education in Romania. The strategy's two main strands are: (i) digital skills relevant to the digital transformation; and (ii) developing a high-performance digital education and training ecosystem.

The draft action plan implementing the 2021-2027 national strategy for inclusion and poverty reduction[5] refers to the development of digital skills at all levels of education. The aim is to reduce digital gaps and increase socio-economic inclusion, by increasing digital skills and internet use among the general population and disadvantaged groups and by organising training sessions adapted to the needs of each community.

In 2017, the Ministry of Labour, together with the Ministry of Education and the National Authority for Qualification, initiated a series of actions, including several legislative amendments to give poorly qualified adults access to training programmes to acquire key competences. In 2019, the number of unemployed people with a low level of qualification who have received basic or transversal skills training courses was 816, including 95 people under 25 years old and 52 NEETs[6]. Nevertheless, this number is small, considering the size of the Romanian workforce.

The National Agency for Employment is also organising vocational training programmes for registered jobseekers to help them acquire IT skills specific to any fields facing labour shortages. In 2020, the agency delivered 50 training courses on digital skills for 711 jobseekers.

In the context of the COVID-19 pandemic, the 'Safe Education' national programme (approved by Government Decision No 756/2020) provides endowments of electronic devices for schools. By 1 April 2021, 39,149 tablets, 4,698 webcams and 3,109 computers had been purchased through this programme. The 'School from Home' national programme is equipping schools with internet-connected electronic devices for online learning for students from disadvantaged environments. Although Romania has a high number of ICT graduates and a high percentage of female ICT specialists, the country is facing a shortage in ICT specialists in the overall workforce, which in time might limit its capacity to innovate and capitalise from innovation. Ensuring that ICT graduates stay in Romania and find work there will increase the number of ICT specialists. Additionally, Romania will need to ensure that the population has minimum software and digital skills.

Human capital in Romania's Recovery and Resilience Plan

The digital education of all sectors of the population is mentioned extensively in the Romanian RRP, its main objective focusing on increasing the resilience of the education system by modernising education infrastructure and related facilities to ensure participation in a quality, modern and inclusive education process. To achieve this, Romania puts forward a number of reforms and investments, notably reforming the compulsory education system, setting up a professional route, increasing the digital competence for public service and digital education for the citizens, adoption of legislative framework for the digitalisation of education, digitisation of SMEs and universities and cybersecurity skills for society among others. The key challenges for the Romanian education system is quality, equality and infrastructure: these challenges restrict Romania's ability to build a modern knowledge-based economy and its ability to facilitate social mobility.

The Romanian Recovery and Resilience Plan includes measures that are entirely or partially linked to digital skills. The total budget allocated specifically to digital skills development is about

[5] https://ec.europa.eu/home-affairs/sites/default/files/pdf/action_plan_on_integration_and_inclusion_2021-2027.pdf.

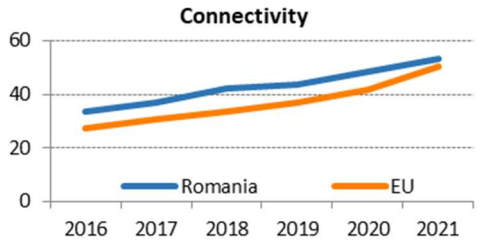
[6] 'Not in education, employment, or training', refers to a person who is unemployed and not receiving an education or vocational training.

EUR 1,267 million. The reforms and investments mainly address challenges linked to education and digital skills training. Among these are the following:

- Advanced Digital Skills Training Programme for Civil Servants as well as grants schemes dedicated to upskilling/reskilling of employees in firms
- Investment to create new cybersecurity skills for society and the economy
- Funding schemes for libraries to become digital skills hubs to enhance basic digital skills
- Digitisation of universities and their preparation for the digital professions of the future
- Transformation of agricultural high schools into professionalisation centres
- Equipping IT laboratories in vocational education and training (VET) schools
- Online School: Assessment platform and content development to provide an integrated approach to teaching activities online or in special situations
- Digitalised classrooms for the schools with the highest percentage of children at risk of dropout.

2 Connectivity

2 Connectivity	Romania		EU
	rank	score	score
DESI 2021	10	53.2	50.2



	Romania			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
2a1 Overall fixed broadband take-up % households	**66%** 2018	**66%** 2019	**67%** 2020	**77%** 2020
2a2 At least 100 Mbps fixed broadband take-up % households	**45%** 2018	**49%** 2019	**52%** 2020	**34%** 2020
2a3 At least 1 Gbps take-up % households	**NA**	**<0.01%** 2019	**<0.01%** 2020	**1.3%** 2020
2b1 Fast broadband (NGA) coverage % households	**76%** 2018	**82%** 2019	**87%** 2020	**87%** 2020
2b2 Fixed Very High Capacity Network (VHCN) coverage % households	**63%** 2018	**68%** 2019	**76%** 2020	**59%** 2020
2c1 4G coverage % populated areas	**96.3%** 2018	**99.1%** 2019	**99.7%** 2020	**99.7%** 2020
2c2 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**0%** 2019	**21%** 2020	**21%** 2021	**51%** 2021
2c3 5G coverage % populated areas	**NA**	**NA**	**12%** 2020	**14%** 2020
2c4 Mobile broadband take-up % individuals	**56%** 2018	**68%** 2019	**68%** 2019	**71%** 2019
2d1 Broadband price index Score (0-100)	**NA**	**92** 2019	**97** 2020	**69** 2020

Romania ranks 10th on Connectivity. In 2020, it improved in terms of coverage while stagnating in terms of overall take-up. Fast broadband coverage increased to 87%, reaching the EU average. Strong infrastructure-based competition in Romania, mainly in urban areas, is reflected in the fixed very high capacity network (VHCN) coverage indicator of 76%, well above the EU average of 59%. Romania's urban-rural digital gap decreased in terms of VHCN coverage after a 17% rise to 56% of coverage for rural areas (double the EU average of 28%). Overall, fixed broadband take-up stalled around 67% of households for the fourth year in a row, well below the EU average of 77%. This is all the more surprising as teleworking was used widely during the pandemic, creating expectations of an increase on the demand side. However, the demand for at least 100 Mbps fixed broadband is reflected in the growth of take-up to 52%, well above the EU average of 34%. Romania closed the gap in terms of 4G coverage, reaching the EU average of 99.7%. The mobile broadband take-up indicator has still not reached the EU average, despite the very low broadband prices. Romania continues to rank first in the EU in terms of broadband prices when analysing all product baskets (fixed, mobile, converged).

The national broadband plan was adopted in 2015 and an update to reflect the Gigabit Society targets is overdue. As reported in previous years, the lack of streamlined administrative procedures at local level for granting construction permits is hampering investment in high-speed broadband networks.

Improvement in this area is crucial for deploying networks. However, Romania is one of the few EU countries that did not submit a Connectivity Toolbox Roadmap to the Commission. This is all the more noteworthy as the importance of effective implementation of the Broadband Cost Reduction Directive was highlighted in the Commission's comments on the market review for wholesale local and central access provided at a fixed location.

A grant scheme for next-generation network deployment with a total contracted budget of EUR 59 million provides support to private operators to deploy backhaul and last-mile access infrastructure to additional localities in white spots. The project aims to cover 160,000 households in white spots.

Only 21% of the total harmonised 5G spectrum is assigned in Romania due to the delay in the 5G spectrum auction.

The national strategy for the implementation of 5G in Romania was adopted on 20 June 2019. The drafting of the strategy involved a large interinstitutional consultation, which included stakeholders from local authorities, who are expected to play a significant role in deploying the new 5G networks.

The national strategy envisages the organisation of a spectrum multi-band auction in the 700 MHz, 800 MHz, 1.5 GHz, 2.6 GHz and 3.4-3.8 GHz bands. The auction process was repeatedly delayed by the transposition into national legislation of a Memorandum between Romania and the US on the security of 5G infrastructure and, in the past year, by the delayed transposition of the European Electronic Communications Code.

By May 2021, three mobile operators had launched 5G services in more than 30 localities served by 768 base stations.

Main market & regulatory developments

The Romanian telecom market continued to become more consolidated.

Orange Romania and OTE Greece signed an agreement on 9 November 2020 for the acquisition of OTE shares in Telekom Romania Communications. However, the transaction does not cover mobile operations (Telekom Romania Mobile Communications). This move would see Orange, the operator with the biggest share in the Romanian mobile market, improving its position significantly in bundled fixed and mobile services[7].

On 1 April 2020, Vodafone completed the acquisition of Liberty Global's cable business in Czechia, Germany, Hungary and Romania, cleared by the European Commission on 18 July 2019. The Commission did not identify competition concerns in Romania. UPC's fixed network footprint ensures that Vodafone Romania will become a strong challenger, offering bundled fixed and mobile services.

Further market consolidation resulted from RCS & RDS SA's acquisition of Digital Cable Systems SA, Akta Telecom SA and ATTP Telecommunications SRL as of 1 August 2020. The National Competition Authority in Romania approved the transaction on 24 July 2020, following a series of commitments endorsed by RCS & RDS SA.

[7] The agreement was notified to the European Commission on 8 June 2021 for merger clearance.

On 4 February 2021, the Commission sent a letter of formal notice to Romania for failing to enact new EU telecom rules, specifically the European Electronic Communications Code.

On 2 August 2020, the Romanian national regulatory authority (ANCOM) notified the European Commission and the Body of European Regulators for Electronic Communications (BEREC) of a measure on market 2 of the 2014 Commission Recommendation[8] on wholesale call termination on individual public telephone networks provided at a fixed location, specifically concerning the update of the fixed termination rate. In its comments, the European Commission encouraged ANCOM to base its future WACC calculations on the notice[9] and the parameters report[10].

On 19 October 2020, ANCOM notified the European Commission and BEREC of its analysis of markets 3a and 3b of the 2014 Commission Recommendation concerning the review of the markets for wholesale local and central access provided at a fixed location. The Commission commented on the market definition, on the assessment of significant market power and on the need to effectively apply the Broadband Cost Reduction Directive.

The outbreak of the pandemic determined an abrupt shift from office-based working to teleworking. This was accompanied by an 11% rise in complaints over issues such as service failure and quality of service (especially regarding internet access service) and availability of service/coverage.

As of 1 April 2020, Advanced Mobile Location has been deployed to ensure handset derived caller location for smartphone users who call the '112' European emergency number.

While progress continued in 2020 on fixed broadband coverage, take-up progressed at a much slower pace despite the teleworking arrangements during the pandemic. It is important that Romania updates its broadband strategy in line with the 2025 gigabit targets. Romania should also fully transpose the EECC. In addition, it is of utmost importance that the national Connectivity Toolbox Roadmap is drawn up and that it includes adequate measures to streamline permit-granting procedures. The multiband auction to award spectrum usage rights in the 700 MHz, 800 MHz, 1.5 GHz, 2.6 GHz and 3.4-3.8 GHz bands should be completed without delay to pave the way for large scale 5G deployment.

Connectivity in Romania's Recovery and Resilience Plan

The reforms in component 7 (Digital transformation) are expected to accelerate the national roll-out of 5G networks and to improve broadband coverage. Romania acknowledges that investments in infrastructure in currently poorly connected regions of the country and digital connectivity in rural areas will be key to reduce the urban-rural digital divide. As regards the use of 5G networks, risk scenarios are related to insufficient security measures, 5G supply chain, modus operandi of key threat actors, interdependencies between 5G networks and other critical systems as well as to the operation of internet of things (IoT), smartphones or devices. The plan

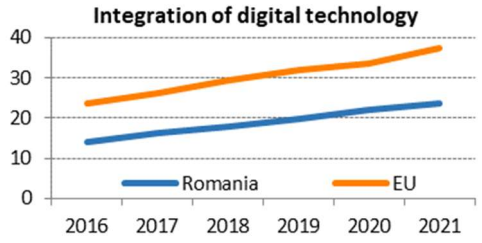
[8] Recommendation 2014/710/EU.
[9] Communication from the Commission: Commission Notice on the calculation of the cost of capital for legacy infrastructure in the context of the Commission's review of national notifications in the EU electronic communications sector, (2019/C 375/01).
[10] Report on WACC parameter calculations according to the European Commission's WACC Notice of 7 November 2019.

also includes reforms implementing the Common Union Toolbox for Connectivity and the entry into force of the 5G security law.

The EUR 94 million earmarked for the implementation of a scheme to support the use of communication services through different types of instruments for beneficiaries, with a focus on white areas is expected to address some of the concerns and risks mentioned above. The objective of this investment is to provide coverage of very high-speed internet access to areas where the market cannot deliver these services on its own (villages, including disadvantaged areas). The minimum speed shall be at least 100 Mbps upgradeable and the networks shall be fibre networks (FTTB/H) and/or 5G.

3 Integration of digital technology

3 Integration of digital technology	Romania		EU
	rank	score	score
DESI 2021	25	23.8	37.6



	Romania			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity % SMEs	NA	NA	33% 2020	60% 2020
3b1 Electronic information sharing % enterprises	22% 2017	23% 2019	23% 2019	36% 2019
3b2 Social media % enterprises	9% 2017	8% 2019	8% 2019	23% 2019
3b3 Big data % enterprises	11% 2018	11% 2018	5% 2020	14% 2020
3b4 Cloud % enterprises	7% 2018	7% 2018	13% 2020	26% 2020
3b5 AI % enterprises	NA	NA	31% 2020	25% 2020
3b6 ICT for environmental sustainability % enterprises having medium/high intensity of green action through ICT	NA	NA	68% 2021	66% 2021
3b7 e-Invoices % enterprises	20% 2018	20% 2018	17% 2020	32% 2020
3c1 SMEs selling online % SMEs	8% 2018	11% 2019	17% 2020	17% 2020
3c2 e-Commerce turnover % SME turnover	5% 2018	5% 2019	8% 2020	12% 2020
3c3 Selling online cross-border % SMEs	2% 2017	6% 2019	6% 2019	8% 2019

Romania ranks 25th in the EU on Integration of digital technology in businesses' activities. Most indicators in this dimension are well below the EU average. Only 33% of SMEs have at least a basic level of digital intensity, compared to the EU average of 60%. Although 17% of Romanian SMEs are taking advantage of the opportunities presented by online commerce, more could be selling across borders (6% compared to the 8% EU average). Only 17% of enterprises are issuing e-invoices, significantly below the EU average of 32%. Some 8% of enterprises use social media (low compared to the EU average of 23%), 13% use cloud services (EU average: 26%) and only 5% of them analyse big data. At the same time, 31% of entreprises are using artifical intelligence, much higher than the EU average of 25%. The percentage of enterprises using ICT for sustainablity is 68%, slightly above the EU average of 66%.

The proposed 2021-2027 Government Strategy to Develop the SME Sector and Improve the Romanian Business Environment towards a Digital and Data Economy[11] is a cross-cutting strategy that aims to

[11] http://www.imm.gov.ro/adaugare_fisiere_imm/2018/11/Propunere-Politica-Publica-.pdf

achieve a digital and data economy in the medium term. The strategy's main measures and actions are: (i) supporting the development of the Digital Innovation Hubs (DIHs) network[12] and defining the role they can play in the Digital Europe Programme to support SMEs; (ii) ensuring that SMEs can acquire the relevant skills for new technologies and that they can easily switch digital service providers and take advantage of data portability; (iii) raising SMEs' awareness and stimulating investments in cyber security.

The main high-performance computing (HPC) initiative in 2020 was the participation in the EuroCC Project (National HPC Competence Centres as part of the EuroHPC Joint Undertaking), a 2-year project started in September 2020 with a budget of EUR 57 million. The National Institute for Research & Development in Informatics (ICI Bucharest) has become the sole partner in the establishment of the National Competence Centre in Romania. Each of the 33 participating countries will open a HPC national competence centre, with the aim of identifying and evaluating available HPC competences and education/training programmes in their respective countries. In parallel, they will identify and analyse the gaps and needs for HPC adoption for target groups/users (public administration, academia, industry & SMEs).

On cyber security, Romania does not yet use a certification system for public procurement or technical regulations at national level. The intention is to regulate this once the primary legislation establishing the Romanian National Cyber Security Directorate (NCSD) is approved, so that the directorate can take over these tasks.

Romanian enterprises do not take full advantage of advanced digital technologies and are generally scoring lower than the EU average. It is therefore very encouraging to see the efforts the country is putting in place to push for the digitalisation of enterprises across a high number of areas, supported by a number of ministries.

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

In the Romanian RRP, the integration of digital technologies is widely addressed in a number of components with the aim to modernise the economy and the response of different entitities to the challenges of today's economy. The Business Support component puts forward targeted actions in order to create a sustainable, predictable and simplified environment for doing business, to increase access to finance by developing tools tailored to business needs, increase the innovation capacity of the RDI system to create research-business synergies, and to develop the necessary prerequisites for sustainable reform of state-owned companies.
The digital measures included in the Plan are expected to increase the country's competitiveness. In particular, Romania is expected to be able to improve the efficiency of the economy and to take much better advantage of its digitalisation potential by: (i) accelerating the digitalisation of both SMEs and large companies with significant investments included in component 9 (Business support, research, development and innovation); (ii) adjusting digital skills to labour market needs and (iii) implementing electronic forms in public procurement procedures. As regards the

[12] The Authority for the Digitalization of Romania organised the national selection procedure for the European Digital Innovation Hubs Network, in collaboration with the Ministry of Economy, between 10 August and 14 September 2020. The evaluation team analysed a total of 18 applications. Out of 18 candidates, 12 DIHs were selected from the country's eight NUTS-2 regions to participate in the European competition to become members of the EDIH network. The future members of the EDIH Network will be co-financed from ERDF funds.

digitalisation of SMEs, several financing schemes shall be established to enhance the innovation potential of businesses by focusing not only on the adoption of existing digital technologies but also on the development of advanced digital technologies such as blockchain, quantum and cloud computing as well as artificial intelligence.

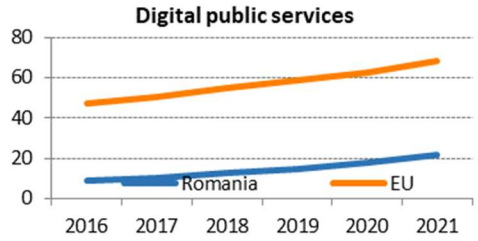
Romania's Recovery and Resilience Plan includes several measures that are entirely or partially linked to the digitalisation of businesses and advanced technologies. They have a total budget of about EUR 1,579 million:

- Private sector aid schemes to support the digitisation of SMEs
- Financial instruments for the private sector to support the digitisation of SMEs
- Digitalisation of the non-governmental organisations sector and increase the level of digital literacy among the employees
- Accelerating the digitalisation of film production and distribution to strengthen the capacity of micro, small and medium-sized enterprises in film production.

The reforms and investments are expected to tackle legislative transparency, de-bureaucratisation and procedural simplification for business, develop digital platforms for the implementation of reforms on legislative transparency and will set up private sector financial instruments and aid schemes. Romania envisaged in the RRPsupport for innovative investments in microelectronics (IPCEI) with EUR 500 million earmarked for this endeavour.

4 Digital public services

4 Digital public services	Romania		EU
	rank	score	score
DESI 2021	27	21.5	68.1



	Romania			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	**12%** 2018	**15%** 2019	**16%** 2020	**64%** 2020
4a2 Pre-filled forms Score (0 to 100)	**NA**	**NA**	**6** 2020	**63** 2020
4a3 Digital public services for citizens Score (0 to 100)	**NA**	**NA**	**44** 2020	**75** 2020
4a4 Digital public services for businesses Score (0 to 100)	**NA**	**NA**	**49** 2020	**84** 2020
4a5 Open data % maximum score	**NA**	**NA**	**69%** 2020	**78%** 2020

Romania ranks last in this dimension among Member States, as all indicators are well below the EU average. Only 16% of Romanian online users engage actively with e-government services, compared with an EU average of 64%. On the indicator for pre-filled forms, Romania's score of 6 is significantly below the EU average of 63. On digital public services for citizens and businesses respectively, Romania scores 44 (EU average: 75) and 49 (EU average: 84). At 69%, the country performs below the EU average of 78% on open data.

The Authority for the Digitalization of Romania has developed a Public Policy on e-Government[13], adopted on 3 June 2021. Its main objective is to increase the number and quality of electronic public services in Romania. The objective should be reached by the end of 2030. The policy will involve: (i) developing digital public services for citizens and businesses; (ii) increasing public bodies' capacity to function in an advanced digital environment and provide mature electronic public services; (iii) consolidating the general digital skills of public sector employees; and (iv) increasing the motivation and specialisation levels of public-sector ICT personnel.

Additionally, the ADR launched in December 2020 a large project creating a strategic national framework for the adoption of innovative technologies in the public administration for the period 2021-2027. The areas covered include artificial intelligence, blockchain, open science cloud and high performance computing. One of the most important parts of this project is the development of a national blockchain strategy for the public administration, including a financing programme for the 2021–2027 financial period.

[13] https://i0.1616.ro/media/2/2701/33605/20230318/1/propunere-de-politica-publica-in-domeniul-e-guvernarii-adoptata-3-iun-2021.pdf.

In 2020, both the public and private sector started to develop and implement numerous blockchain initiatives. One example is 'Connecting Romania through Blockchain', a CEF telecom blockchain project, running between 2021 and 2023. The central aim of the project is to create an extendable and sustainable ecosystem to facilitate and accelerate awareness, knowledge and adoption of the European Blockchain Services Infrastructure (EBSI) by Romanian citizens, businesses, institutions and administrative authorities. In 2021, the National Institute for Research and Development in Informatics (ICI Bucharest) activated the first EBSI[14] node in Romania.

Furthermore, the draft action plan implementing the 2021-2027 National Strategy for Inclusion and Poverty Reduction includes a specific action to make public information accessible to all citizens by publishing information on the websites of town halls and public institutions in an easy-to-read format.

The ADR conducted an analysis of the barriers to digitalising the public and private sector in Romania[15]. As regards the public sector, the report shows that the following barriers should be addressed: the lack of an efficient and effective IT architecture; the lack of IT systems for central public institutions; the reduced number of specialists in e-government; and the absence of a coordinated and efficient legislative and procedural framework.

Highlight 2020-2021: establishment of the Romanian Authority for the Digitalisation of Romania (ADR)

One of the main highlights of 2020, with implications for the development of Romania's digital transformation process, was the establishment of the ADR[16] during the first quarter. Following the dissolution of the former Ministry for Communications and Information Society, the ADR has taken over most responsibilities related to the consistent implementation of policies in the field of digitalisation, acting as a common platform and shared expertise resource mainly for the public administration.

Relevant initiatives launched by the ADR during 2020/2021 include:

- improving the National Electronic System for Online Payments (ghiseul.ro)
- launch of the implementation of the Centralized Digital Identification Software Platform (PSCID) project
- conducting an analysis and finalising the document on Barriers to the digitalisation of the public and private sector in Romania
- finalising the Public Policy on e-Government, which is the action plan for the following 10 years, establishing a programme of efficient and sustainable measures for the digitalisation of public administration
- starting an inventory of existing digital public services offered by central public administrative authorities. Once finalised, the Registry of Digital Public Services will show which areas/sectors are insufficiently digitalised and it will be possible to identify the new courses of action responding to public institutions' real needs

[14] The European Blockchain Services Infrastructure (EBSI) is a network of distributed nodes across Europe that will deliver cross-border public services through the application of blockchain technology.

[15] https://www.adr.gov.ro/wp-content/uploads/2021/04/ADR-Barierele-Digitalizarii-mediului-public-si-privat-din-Romania.pdf.

[16] Government Decision No 89/2020 on the organisation and functioning of the Authority for the Digitalisation of Romania, Official Gazette No 113 of 13 February 2020.

- implementing the IT system for the health registers (RegIntermed) in partnership with the Ministry of Health, to advance the digitalisation of the public health system.

Digital public services in Romania's Recovery and Resilience Plan

The RO RRP includes a key reform on the development of the government cloud in component 7 (Digital transformation), which aims to modernise the public administration by establishing the necessary framework for achieving interoperability of the various public institutions' IT&C systems, ensuring coherence with the eIDAS Regulation and implementing the "once only" principle embedded in the Single Digital Gateway Regulation.

The Plan includes a number of measures that are entirely linked to digital public administration and services, with a budget of about EUR 3,037 million. Some of the reforms and investments are:

- Implementation of the National Building Register
- Developing and implementing a unitary framework for defining the architecture of a government cloud system as well as complete cloud development and migration
- Promotion of the 12 touristic/cultural routes and development of a digital system for cultural funding processes
- Technical support for the revision of the taxation framework, improving tax and tax administration processes
- Supporting the process of assessing and recalculating pension files and support the operational efficiency through digitalisation of the pension system
- Implementation of the eForms electronic forms in public procurement
- Digital transformation in civil service management and investments for digitalisation in employment and social protection
- Developing performance human resources management in the public sector.