Digital Economy and Society Index (DESI) 2021

Ireland

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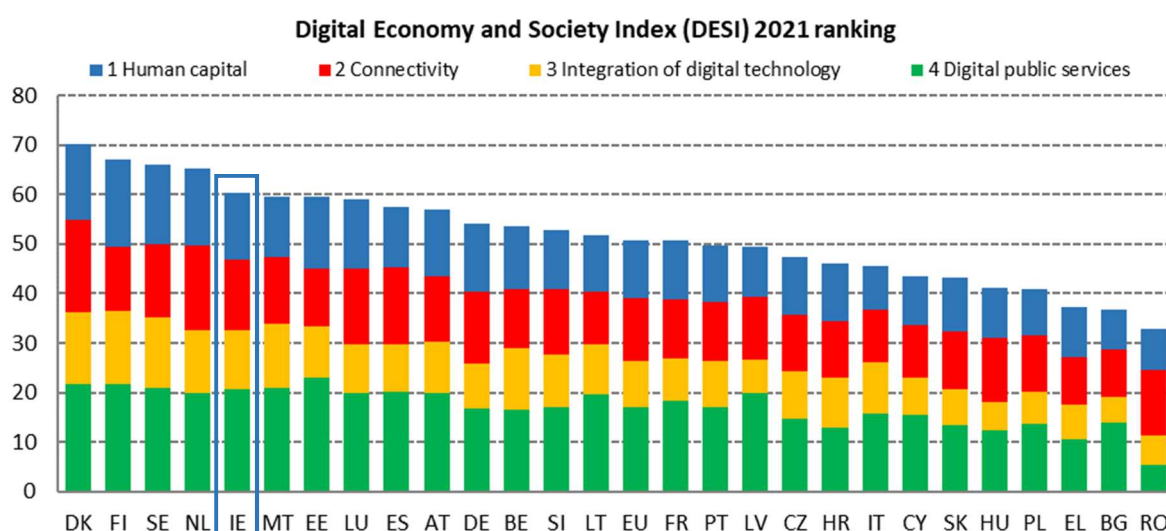
In addition, DESI now includes an indicator measuring the level of support that adopted ICT technologies provided companies in taking more environmentally-friendly measures (ICT for environmental sustainability) and the take up of gigabit services, plus the percentage of companies offering ICT training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

	Ireland		EU
	rank	score	score
DESI 2021	**5**	**60.3**	**50.7**

Digital Economy and Society Index (DESI) 2021 ranking

Ireland ranks 5th of the 27 EU countries in the 2021 edition of the Digital Economy and Society Index (DESI). Ireland performs very well on the integration of digital technology, and maintains its high scores in the use of e-commerce by SMEs (for example, indicators for SMEs selling online and across borders are well above the EU averages). Ireland's performance for connectivity improved substantially in 2020: for example, fixed very high capacity network (VHCN) coverage rocketed from 35% to 83%. Ireland also scores well for digital public services, particularly in open data and providing digital public services for citizens and businesses. With regard to the latter, Ireland scores a perfect 100. Although Ireland performs above the EU average in advanced digital skills (for example, for the indicators on ICT specialists, female ICT specialists and ICT graduates), the basic digital skills of the population are a little lower (53% against the EU average of 56%).

Ireland is committed to continuing its fast-paced digital transformation. The Department of the Taoiseach is currently developing a new National Digital Strategy, which will comprehensively address the entire digital ecosystem. Building on the increased levels of connectivity that are being delivered by the National Broadband Plan, the strategy is expected to further develop Ireland's leadership in new digital technologies, including cloud computing, data analytics, blockchain, Internet of Things and Artificial Intelligence (AI). It will also further drive digital transformation in the public service, with greater integration of digital services.

Further efforts to support the improvement of digital skills are important, as a relatively low percentage of the population, compared with the country's overall digital performance, has at least basic digital and software skills. A number of ongoing initiatives are aimed at upskilling and reskilling in higher education (for example, Springboard+ and Human Capital Initiative Pillar 1). Others are aimed at both employees and the unemployed in the further education and training sector (for example, Skills to Compete, Skills to Advance and EXPLORE). Moreover, a new 10-year Adult Literacy, Numeracy and Digital Literacy Strategy was launched in September 2021. For connectivity, despite the rapid growth in 2020 of fixed VHCN coverage, at least 100 Mbps fixed broadband take-up is only in 31% of

households, which is below the EU average of 34%. Transposition of the European Electronic Communications Code is still ongoing in Ireland. Ireland performs well for 5G mobile broadband coverage and it is important that the remaining 5G spectrum is awarded without delay.

A number of ongoing initiatives to support the adoption of digital technologies by SMEs are now complemented by a strategic National SME and Entrepreneurship Growth Plan (published in January 2021). Ireland is continuing to enhance its high-performance computing (HPC) capacities (for example, in 2020, Ireland's EuroHPC Competence Centre was launched and Ireland acquired a Quantum Learning Platform). To advance Ireland's performance in AI, Ireland's first National Artificial Intelligence Strategy was launched in July 2021. Ireland is also advancing in the blockchain and cyber security technology. To further boost cyber security capacity, ensuring appropriate financial resources and technical and educational skill sets is important.

Ireland maintains its focus on accelerating the digitalisation of public services, for example, by further enhancing the government platform (gov.ie) and national open data portal (data.gov.ie). Ireland is continuing to advance on a number of digital projects. For example, in 2021, Digital Postboxes were introduced and the government is continuing its GovTech engagement. Work is continuing to replace the 2015 Public Service ICT Strategy and the eGovernment Strategy 2017-2020. Further progress can still be made particularly on cross-border electronic identification (eID).
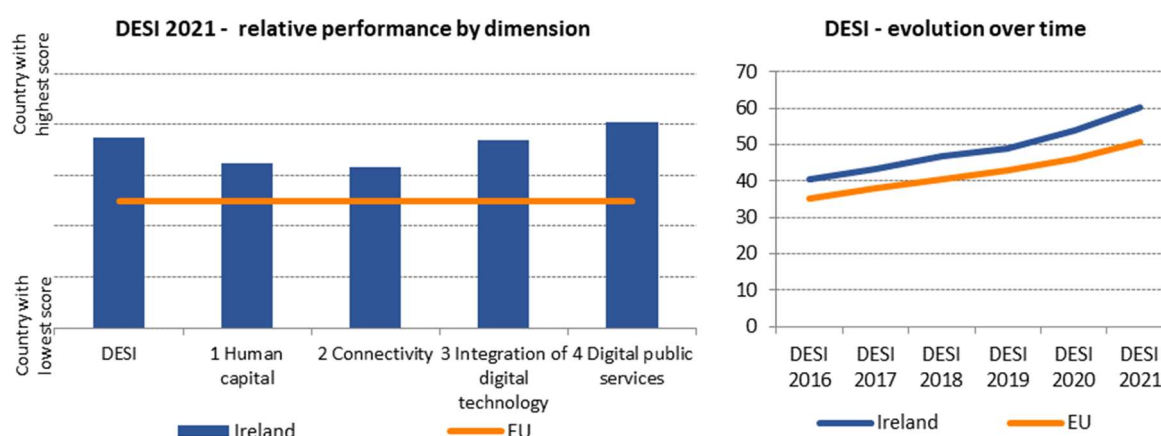
Digital in Ireland's Recovery and Resilience Plan (RRP)

In spite of a relatively modest financial allocation (EUR 989 million), Ireland's Recovery and Resilience Plan includes ambitious and comprehensive digital measures pertaining to all dimensions of the DESI.

The measures supporting digital objectives in the plan account for EUR 312 million, which represents 32% of the plan's total allocation of EUR 989 million, well above the 20% target set out in the Recovery and Resilience Facility (RRF) Regulation. The measures are expected to accelerate and expand Ireland's digital transformation while also being catalysts for the wider economic recovery, growth and increased competitiveness.

Regarding the digital transition, Ireland's plan is expected to support digitalisation of enterprises, contribute to addressing the digital divide, including in the education sector, enhance digital skills, as well as support investment in digital infrastructure, the delivery of digital public services and digital-related R&D activities.

In particular, the plan covers the following digital policy areas identified in Annex VII to the RRF Regulation:

- to support connectivity the plan envisages building a low-latency edge platform;
- digital-related investment in R&D is expected to be covered by the plan as part of the national grand challenge programme;
- human capital is expected to be enhanced by a programme to provide digital infrastructure and funding to schools and also by four reform measures aimed at addressing the digital divide and enhancing digital skills;
- digital public services are covered by installing an online response option for the population census and a suite of eHealth projects;
- digitalisation of businesses is expected to be supported through a programme to drive the digital transformation of enterprise in Ireland;
- digital capabilities and the deployment of advanced technologies are covered by the development of a shared government data centre, which also constitutes a green digital investment.

Finally, the plan envisages the establishment of four Irish European Digital Innovation Hubs as part of a multi-country project.

1 Human capital

1 Human capital	Ireland		EU
	rank	score	score
DESI 2021	8	54.1	47.1

Human capital
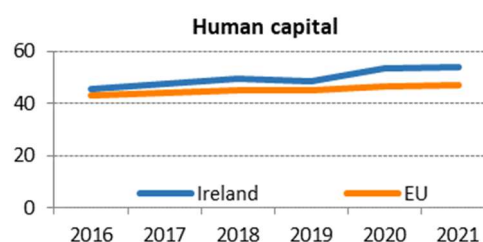
	Ireland			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
1a1 At least basic digital skills	**48%**	**53%**	**53%**	**56%**
% individuals	2017	2019	2019	2019
1a2 Above basic digital skills	**28%**	**34%**	**34%**	**31%**
% individuals	2017	2019	2019	2019
1a3 At least basic software skills	**49%**	**55%**	**55%**	**58%**
% individuals	2017	2019	2019	2019
1b1 ICT specialists	**4.8%**	**4.9%**	**5.7%**	**4.3%**
% individuals in employment aged 15-74	2018	2019	2020	2020
1b2 Female ICT specialists	**19%**	**21%**	**21%**	**19%**
% ICT specialists	2018	2019	2020	2020
1b3 Enterprises providing ICT training	**30%**	**31%**	**27%**	**20%**
% enterprises	2018	2019	2020	2020
1b4 ICT graduates	**7.3%**	**7.9%**	**7.8%**	**3.9%**
% graduates	2017	2018	2019	2019

For human capital, Ireland ranks 8th of the EU's 27 countries and is thus above the EU average. In 2020, the proportion of ICT specialists increased sharply and is above the EU average. Ireland also performs above the EU average for the indicator on female ICT specialists. 27% of enterprises provide ICT training to their employees, which is above the EU average (20%). The proportion of ICT graduates is 7.8% of all graduates, and is significantly higher than the EU average (3.9%). Nevertheless, in 2020, 53% of enterprises reported hard-to-fill vacancies for jobs requiring ICT specialist skills[1]. Although more than half of the population has at least basic digital skills (53%) and at least basic software skills (55%), Ireland performs below the EU average, 56% and 58% respectively, for indicators that measure those skills. On the other hand, 34% of people have above basic digital skills, which is slightly above the EU average (31%).

In Ireland, significant targeted upskilling and reskilling provision in higher education is available through Springboard+[2] (for employed, unemployed and those looking to return to the workforce), Human Capital Initiative (HCI) Pillar 1[3] (for graduates) and July Jobs Stimulus initiatives[4]. While ICT courses under Springboard+ and HCI Pillar 1 are principally geared to address shortages in high-level ICT skills, there is a considerable focus on basic digital skills in all courses provided. Springboard+ 2020 and HCI Pillar 1 were launched in June 2020, and over 15,000 places (including 4,000 in ICT) were added under the July Jobs Stimulus. In 2021, Springboard+ focuses on providing relevant skills for

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[1] Analyse one indicator and compare countries — Digital Scoreboard - Data & Indicators (digital-agenda-data.eu).
[2] https://springboardcourses.ie/
[3] https://hea.ie/skills-engagement/human-capital-initiative/
[4] https://www.gov.ie/en/campaigns/5654a-july-jobs-stimulus/ As a next stage in Ireland's response to the COVID-19 crisis, the July Jobs Stimulus aims at getting Ireland's businesses back on their feet and as many people as possible back to work quickly.

those affected by the COVID-19 public health emergency and an additional EUR 7 million has been provided for Springboard+ under the 2021 budget. In addition, Ireland continues to support the improvement of workforce digital skills, specifically targeting people who have lost their jobs due to the COVID-19 crisis (Skills to Compete), vulnerable employees who require upskilling or reskilling (Skills to Advance), and people who are over 35 years old in the manufacturing sector (EXPLORE).

In July 2020, the National Further Education and Training (FET) Strategy was launched for the period 2020-2024. The priorities are set out across three core pillars: (1) building skills; (2) creating pathways; and (3) fostering inclusion. A key component of the latter is increased literacy and numeracy support. To help individuals build capacity in terms of literacy, numeracy and digital literacy, and participate fully in society, in September 2021, SOLAS[5] launched a new 10-year Adult Literacy, Numeracy and Digital Literacy Strategy[6].

The Mitigating Against Educational Disadvantage Fund, worth EUR 8 million, was targeted at the FET sector in 2020. This fund aims to support educationally disadvantaged learners in accessing and participating in FET and enable investment in building the FET digital infrastructure.

Work is underway on developing the next Digital Strategy for Schools 2021-2027. It builds on the Digital Strategy for Schools 2015-2020 while taking into account the progress made, the learning from the impact of the COVID-19 crisis, feedback from the consultation process, and best international practice. The new strategy will be financed with EUR 200 million under the National Development Plan and Project Ireland 2040.

In 2020, over 3,000 people received informal basic digital skills training under the government's Digital Skills for Citizens Grant Scheme, which focuses on providing people who are not online with the opportunity to gain the basic skills. The scheme is due to end in 2021 once training obligations for pre-funded grants have been delivered.

In 2020, SOLAS also significantly increased the capacity of its online service eCollege, which provides online courses, including computer programming, data science, office productivity and web and graphic design. Science Foundation Ireland's[7] (SFI) Education and Public Engagement programme seeks to promote the awareness and engagement of the Irish public with science, technology, engineering and maths. In March 2021, SFI announced a national investment of EUR 5.2 million through the SFI Discover Programme to support 49 public engagement and education initiatives. These include AI in My Life, led by Dublin City University, to engage 500 Dublin teenagers from disadvantaged backgrounds in workshop series to reflect on AI, personal data processing and digital transformation, and the Cyber Academy, led by Munster Technological University, a series of activities for 11-18 year-olds to help them explore their passion for tech by introducing them to the world of cyber security.

Currently, the Irish National Digital Skills and Jobs Coalition[8] is developing the interface to connect to the new EU Digital Skills and Jobs Platform[9]. Ireland was involved in the 2020 EU Code Week with 123 activities and 6,138 participants (of whom 44% were women), and is set to participate in the 2021 edition.

It is important that Ireland continues to focus its efforts on improving the basic digital and software skills of its population.

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[5] Further Education and Training Authority in Ireland.
[6] https://www.solas.ie/alnd-strategy/
[7] National foundation for research.
[8] https://www.digitalcoalition.ie/
[9] https://digital-skills-jobs.europa.eu/en

## Human capital in Ireland's Recovery and Resilience Plan

The plan dedicates EUR 64 million to support human capital through an investment measure and envisages a reform.

The investment consists of two sub-measures to ensure that learners in primary and post-primary schools are equipped with appropriate digital skills. The first sub-measure shall provide high-speed broadband connectivity for primary schools, and the second shall support schools to provide digital devices and software to disadvantaged students.

The objective of the reform is to support digital transformation of Irish education and training at all levels, enhance digital skills and address the risk of a digital divide. The reform consists of four measures: (i) a Digital Strategy for Schools 2021-2027 that shall aim to realise the potential of digital technologies in teaching, learning and assessment; (ii) a 10-year Adult Literacy, Numeracy and Digital Literacy Strategy to help individuals build their digital literacy; (iii) a measure to increase the number of graduates with high-level ICT skills; and (iv) a measure enabling further and higher education institutions to provide laptops to disadvantaged students.

2 Connectivity

2 Connectivity	Ireland		EU
	rank	score	score
DESI 2021	**7**	**56.4**	**50.2**
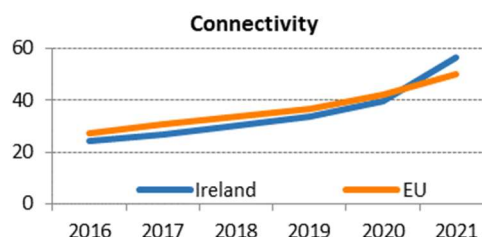
	Ireland			EU
	DESI 2019	**DESI 2020**	**DESI 2021**	**DESI 2021**
2a1 Overall fixed broadband take-up	**73%**	**76%**	**78%**	**77%**
% households	2018	2019	2020	2020
2a2 At least 100 Mbps fixed broadband take-up	**20%**	**25%**	**31%**	**34%**
% households	2018	2019	2020	2020
2a3 At least 1 Gbps take-up	**NA**	**0.26%**	**3.52%**	**1.3%**
% households		2019	2020	2020
2b1 Fast broadband (NGA) coverage	**96%**	**96%**	**96%**	**87%**
% households	2018	2019	2020	2020
2b2 Fixed Very High Capacity Network (VHCN) coverage	**13%**	**35%**	**83%**	**59%**
% households	2018	2019	2020	2020
2c1 4G coverage	**95.8%**	**99.0%**	**99.0%**	**99.7%**
% populated areas	2018	2019	2020	2020
2c2 5G readiness	**30%**	**30%**	**30%**	**51%**
Assigned spectrum as a % of total harmonised 5G spectrum	2019	2020	2021	2021
2c3 5G coverage	**NA**	**NA**	**30%**	**14%**
% populated areas			2020	2020
2c4 Mobile broadband take-up	**69%**	**81%**	**81%**	**71%**
% individuals	2018	2019	2019	2019
2d1 Broadband price index	**NA**	**45**	**63**	**69**
Score (0-100)		2019	2020	2020

With an overall connectivity score of 56.4, Ireland ranks 7th among EU countries. There was a rapid growth in 2020 of the fixed very high capacity network (VHCN) coverage, increasing from 35% to 83%, mainly due to the roll-out of DOCSIS 3.1. Looking at fast broadband (NGA) access, rural areas are covered almost to the same extent as non-rural areas with 91.2 % and 96.2% respectively. In terms of fixed broadband take-up, 78% of all households subscribe to some kind of fixed internet access, slightly above the EU average of 77%. Ireland's rate for at least 100 Mbps fixed broadband take-up is only 31% of households, which is below the EU average of 34%. 4G coverage is at 99%.

There are some notable developments on fixed and mobile VHCN broadband networks. Ireland has over 200,000 (248,000 in Q4 2020) fibre to the premises (FTTP) broadband subscriptions, representing an increase of 59% from Q2 2019 to Q2 2020, albeit starting from a low base. This increased take-up of VHCN comes on the back of investments made in the networks by the following operators: Eir continues to roll out its fibre to the home (FTTH) network (in April 2021, its Gigabit fibre network was available to customers in 79 towns and villages across Ireland); SIRO is also continuing to roll out its network; Virgin Media completed a significant deployment in August 2020 when it announced that it had deployed DOCSIS 3.1 technology across 97.5% of its network in Ireland; and the National Broadband Plan, operated by NBI, is continuing to roll out the network, which eventually aims to provide VHCN to 537,596 premises and 1.1 million people.

Ireland scores 30% for the 5G readiness indicator and has good 5G mobile broadband coverage, with 30.5% of households covered. The three mobile network operators currently publish the following figures for their 5G roll-out: Vodafone is running commercial 5G services in 5 cities; Eir's 5G network currently offers coverage in 268 towns and cities in the 26 counties of the Republic; and in September 2020, Three Ireland switched on its 5G network, rolling out 315 sites across the country.

As for future spectrum awards, the Commission for Communications Regulation (ComReg, the statutory body responsible for the regulation of the electronic communications and postal sectors in Ireland) published its Multi Band Spectrum Award – Information Memorandum and Draft Regulations for the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands on its ComReg website on 16 April 2021. This sets out the timeline, but currently does not indicate an end date for the process.

Main market & regulatory developments

Eir's fixed broadband market share fell slightly during the year from 32.1% in Q2 2019 to 30.7% in Q2 2020 (29.9% in Q4 2020). Vodafone's and Three's retail mobile market share has decreased slightly, while Eir's market share increased to 21.8% in Q2 2020 (21.7% in Q4 2020). This is likely to be due, in part, to the launch of its GoMo sub-brand in Q4 2019. While there were no new entrants in the mobile market during the reporting year, competition intensified. Eir Mobile's GoMo offers customers a plan that includes all calls, texts and data for EUR 12.99 per month for life. In response, Three Ireland promoted its sub-brand labelled '48', which offers new customers a EUR 7.99/month plan with 100 GB of data, all calls and all texts.

At the end of Q2 2020, there were 1,375,126 (1,327,000 in Q4 2020) fixed voice subscriptions (a decrease of 4.1% on Q2 2019). As of Q2 2020, Eir had 39.7% (40.3% in Q4 2020) of all fixed voice subscriptions, followed by Virgin Media with 23.3% (22.6% in Q4 2020), Vodafone with 13.7% (13.6% in Q4 2020), Sky with 13.6% (13.6% in Q4 2020) and Pure Telecom with 3.9% (3.9% in Q4 2020).

The transposition of the European Electronic Communications Code is still ongoing and infringement proceedings have been initiated[10] for non-communication.

ComReg adopted measures to address the high cost of calling non-geographic numbers (NGN) and to tackle confusion about the different NGN ranges. Firstly, since 1 December 2019, the retail cost of a call to a 1850, 1890, 0818 or 076 NGN costs no more than the retail cost of calling a landline number. Secondly, from 1 January 2022, the five NGN ranges will be reduced to two, with a 3-year transition period. In January 2020, ComReg introduced wholesale price controls for 0818 and 1800 NGNs that came into effect on 1 May 2020.

ComReg reviewed the market for broadcasting transmission services in Ireland. It found that 2rn, the wholly owned subsidiary of RTÉ, has significant market power (SMP) on the market for wholesale access to national terrestrial broadcast transmission services; and that RTÉ has SMP on the market for wholesale access to digital terrestrial television multiplexing services. Both SMP operators will have to comply with obligations of access, non-discrimination, transparency, accounting separation, price control and cost accounting.

As regards access regulation, during 2020, ComReg adopted a new methodology for setting the weighted average cost of capital (WACC) for future pricing decisions and calculated the

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[10] INFR(2021)0054.

corresponding WACC values. These values will be recalculated on an annual basis and updated values will be used for any subsequent ComReg decision on price controls.

In January 2020, ComReg also completed its market review of the wholesale high-quality access (WHQA) markets.

ComReg also reviewed the market for wholesale call termination on individual public telephone networks provided at a fixed location (fixed termination markets). It amended the market definition by including 0818 numbers (non-geographic numbers), and designated additional fixed service providers as SMP.

To mitigate identified potential competition problems that could arise from the exercise of market power by additional SMP fixed service providers (FSP), ComReg has imposed a range of ex ante regulatory remedies to ensure effective and efficient access to Fixed Voice Call Termination for the benefit of competition and, ultimately, consumers. In this regard, ComReg imposed similar regulatory obligations on each of the additional SMP FSPs, in line with those that were imposed on the 2019 SMP FSPs under the 2019 Termination Markets Decision.

In its roadmap to implement the connectivity toolbox, Ireland announced plans for action on all the best practices not yet implemented, with a target of end Q1 2022.

During the period 1 January 2020 to 31 October 2020, ComReg's Consumer Line received 7,547 complaints from residential and business customers. This is an overall increase of 43.4% compared with the number of complaints that were raised in the same period in 2019 (5,263). This increase in complaints being reported to ComReg is mainly due to: (a) customer service issues associated with one large service provider; and (b) the critical nature of electronic communications services in enabling consumers to continue to work effectively in a remote environment[11].

ComReg took compliance actions including in relation to open internet transparency measures. In May 2020, ComReg issued six opinions of non-compliance regarding transparency obligations under the Open Internet Regulation[12]. This was the culminating phase of enforcement undertaken in December 2019. These actions concerned issues set out in Article 4 of Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015, and were taken against Digiweb Limited, Pure Telecom Limited, Three Ireland (Hutchison) Limited, Three Ireland Services (Hutchison) Limited, Virgin Media Ireland Limited and Vodafone Ireland Limited[13]. An Opinion of Non-Compliance was issued to Imagine Communications Ireland Limited on 19 February 2021[14].

Regarding caller location information for emergency calls, the Advanced Mobile Location functionality was introduced for 112 SMS on Android phones while the iOS implementation is still ongoing.

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[11] https://www.comreg.ie/consumer-information/consumer-care/consumer-statistics/
[12] https://www.comreg.ie/comreg-issues-opinions-of-non-compliance/
[13]

https://www.comreg.ie/enforcement?date_from=&date_to=&orderby=date__desc&query=open+internet&date_from=01&start-year=1995&end-month=06&end-year=2021

[14] https://www.comreg.ie/publication/information-notice-imagine-opinion-of-non-compliance-open-internet-access-case-reference-1429

Ireland is doing well on 5G mobile broadband coverage, but it is important that the remaining 5G spectrum is awarded without delay. Ireland has already awarded 5G spectrum in the 3.6 GHz band and is now moving forward with the award of the 700 MHz band in line with the published timetable. The Multi Band Spectrum Award – Information Memorandum and Draft Regulations for the 700 MHz Duplex, 2.1 GHz, 2.3 GHz and 2.6 GHz Bands was published on the ComReg website on 16 April 2021.


Connectivity in Ireland's Recovery and Resilience Plan

The plan's allocation for connectivity is EUR 19 million.

The connectivity measure aims at ensuring that public administrations maximise the benefit from 5G technologies. The investment consists in building a low-latency platform with a high-speed backbone using edge compute nodes to enable a faster response. A variety of public services shall subsequently be developed, tested and deployed using the platform, notably for public protection and disaster relief. SMEs and start-ups shall also be able to use the platform to test new services.

3 Integration of digital technology

3 Integration of digital technology	Ireland		EU
	rank	score	score
DESI 2021	7	48.0	37.6

Integration of digital technology
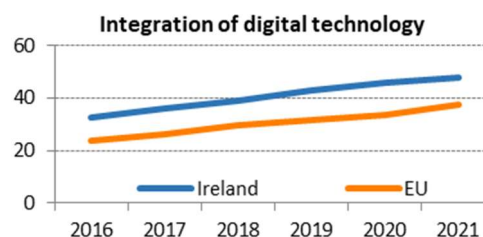
	Ireland			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
3a1 SMEs with at least a basic level of digital intensity % SMEs	NA	NA	66% 2020	60% 2020
3b1 Electronic information sharing % enterprises	28% 2017	28% 2019	28% 2019	36% 2019
3b2 Social media % enterprises	36% 2017	44% 2019	44% 2019	23% 2019
3b3 Big data % enterprises	20% 2018	20% 2018	23% 2020	14% 2020
3b4 Cloud % enterprises	33% 2018	33% 2018	41% 2020	26% 2020
3b5 AI % enterprises	NA	NA	14% 2020	25% 2020
3b6 ICT for environmental sustainability % enterprises having medium/high intensity of green action through ICT	NA	NA	67% 2021	66% 2021
3b7 e-Invoices % enterprises	20% 2018	20% 2018	19% 2020	32% 2020
3c1 SMEs selling online % SMEs	30% 2018	35% 2019	32% 2020	17% 2020
3c2 e-Commerce turnover % SME turnover	26% 2018	29% 2019	27% 2020	12% 2020
3c3 Selling online cross-border % SMEs	17% 2017	18% 2019	18% 2019	8% 2019

Ireland ranks 7th of the 27 EU countries in the integration of digital technology and is thus above the EU average. 66% of SMEs demonstrate at least a basic level of digital intensity. SMEs also maintain a strong e-commerce performance: 32% of SMEs sell online and 18% sell across borders, well above the EU averages of 17% and 8% respectively. 27% of SME total turnover originates from online sales, more than double the EU average of 12%. Irish companies rank high in the use of social media (44%), cloud services (41%) and big data (23%). For the ICT for environmental sustainability indicator, Irish companies are slightly above the EU average of 66%. However, neither the use of AI nor e-invoices is widespread among Irish companies (14% and 19% respectively) in comparison with the EU average (25% and 32% respectively).

To support SMEs in the adoption of digital technologies, Local Enterprise Offices provide a range of assistance, including the Trading Online Voucher Scheme, Business Expansion Grants, training programmes, workshops and digital skills webinars. Enterprise Ireland[15] also offers a range of support grants to help reduce the development cost of new or improved products, services or technical

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[15] Agency responsible for the development and growth of Irish enterprises in world markets.

processes. Furthermore, a National SME and Entrepreneurship Growth Plan[16] (published in January 2021) sets out strategic recommendations, including in the areas of digitalisation, clustering, regulation and education. These recommendations are currently being taken forward by a ministry-led implementation group, in conjunction with relevant government departments and agencies. This work is continuing during the second half of 2021. It also lists the following deliverables on digitalisation: in the short term, online business productivity diagnostic tool and existing digitalisation support extended to traditional non-exporting sectors, and in the medium term implementation and uptake of a competitive digital transformation scheme.

Ireland continues to drive collaboration between research bodies and industry. Science Foundation Ireland (SFI) currently funds six SFI Centres for Research Training, all in the broad area of data and ICT skills for the future. The aim is to train academically outstanding postgraduates, including in the skills and knowledge required to address the future challenges of an ever-changing work environment. In addition, 16 SFI Research Centres provide infrastructure to support researchers to commercialise their research, including in digitalisation (for example, AI, cloud computing, virtual/augmented reality, Internet of Things, and cyber security). Furthermore, Enterprise Ireland helps companies find partners for collaborative research, including in the delivery of digital solutions, through 8 Technology Centres, 16 Technology Gateways, and Knowledge Transfer Ireland. Each year, Enterprise Ireland supports 125 new start-ups with nearly two thirds in ICT (including digital technologies). Starting in 2021, the third call of the Disruptive Technologies Innovation Fund will see 29 projects receive EUR 95 million in funding over the next three years, to develop novel technologies capable of transforming business.

The year 2020 marked the launch of Ireland's EuroHPC Competence Centre. Hosted by the Irish Centre for High-End Computing, this initiative will initially include two programmes: (i) an SME Accelerator offering advanced training in HPC and new technologies for eligible Irish SMEs; and (ii) an Academic Flagship, which aims to increase Irish competitiveness in the European supercomputing landscape. Ireland has dedicated EUR 64,000 (2020) and EUR 510,000 (2021) in funding to EuroHPC activities. In 2020, Ireland acquired a Quantum Learning Platform, which will be used to conduct R&D and national-level skills development activities in quantum technologies. Finally, an HPC Advisory Group was launched in 2021 to exchange views and advise on how best to position Ireland and exploit opportunities in HPC-relevant areas (including EuroHPC, PRACE[17], quantum technologies and AI).

Blockchain technology continues to transform the financial services industry. FINTECHNEXT[18] is a multi-million euro, 4-year collaborative research programme between University College Cork and Fexco, supported by SFI. It started in 2019 with the aim to deliver applied and funded research dedicated to disrupting three key fintech verticals: treasury services, digital taxation, and corporate asset administration.

In 2020, a European Commission enterprise survey indicated that 35% of Irish enterprises had adopted at least one AI technology, which is lower than the EU average of 42%[19]. Ireland's first National Artificial Intelligence Strategy, 'AI – Here for Good'[20], was launched on 8 July 2021. It will serve as a roadmap for how Ireland can leverage the potential of AI for unlocking productivity, for addressing

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[16] https://www.gov.ie/en/publication/e19ff-report-of-the-sme-taskforce-national-sme-and-entrepreneurship-growth-plan/

[17] https://prace-ri.eu/

[18] https://fintechnext.ie/about/

[19] European Commission, European enterprise survey on the use of technologies based on artificial intelligence, a study prepared for DG Communications Networks, Content & Technology by Ipsos and iCite, 2020.

[20] https://www.gov.ie/en/press-release/f4895-taoiseach-and-minister-troy-launch-government-roadmap-for-ai-in-ireland/

societal challenges, and for delivering public services. It envisions a future for Ireland as an international leader in using AI to the benefit of business, public services, and for people, through a people-centred, ethical approach to AI development, adoption and use.

Cyber security in Ireland is implemented under the National Cyber Security Strategy 2019-2024, which covers cyber security research and investment in operation and infrastructure, and references the Cyber Security Skills Initiative. The work of the National Cyber Security Centre (NCSC) received a higher profile due to its advisory role on measures to take in response to remote working as a result of the COVID-19 public health emergency. In July 2021, the government agreed a significant expansion of the NCSC, in terms of the number of staff and associated budget, and other measures to further strengthen its capacity. As regards the Cybersecurity Competence Centre and Network Regulation, the work in relation to identifying an entity to take on the functions of the National Coordination Centre is currently ongoing and it is anticipated that the NCSC will have a role in this area. The main issues to be addressed for boosting cyber security technology in Ireland are the financial resources and technical and educational skillsets that are required both to maintain existing levels of capacity and resilience and to build capacity for the future.

Highlight 2020-2021: European Digital Innovation Hubs (EDIHs)

Ireland has designated four candidate EDIHs to participate in the European Commission's 2021 restricted call for the EDIH network. This represents one hub in each region of the country, as well as a dedicated AI hub. The EDIH network will help companies (notably SMEs) and the public service become more competitive in their business/production processes, and in products or services, by providing access to technical expertise and experimentation in AI, HPC and cyber security and advanced digital skills.

As the Irish economy is dominated by SMEs, which account for 99% of enterprises, it is critical that they receive the digitalisation support they need to compete in global markets. Ireland intends to maximise its contribution to the EDIH programme to fully benefit from the advantages this initiative presents to drive transformational change in Irish enterprise and to build on pan-European expertise in digital technologies through sharing knowledge, equipment and personnel. Subject to the timeframe of the European Commission call, it is intended that the EDIHs will be operational in 2022.

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

The plan allocates EUR 85 million to digitalisation of businesses, EUR 39 million to investment in digital capacities and deployment of advanced technologies and EUR 21 million to digital-related investment in R&D and covers three investment measures.

First, the programme to drive the digital transformation of enterprise in Ireland (EUR 85 million) aims to tackle an unbalanced digitalisation among companies, particularly SMEs, and more generally to enhance the digitalisation of businesses. This measure also aims to support Irish European Digital Innovation Hubs as part of the multi-country project. The hubs shall further help companies become more competitive by undergoing a digital transformation.

In addition, the plan provides for the construction of a high-quality, energy-efficient and fit-for-purpose shared government data centre (EUR 39 million) enabling the migration of servers and

services to it. The data centre shall function in a more environmentally friendly manner, including by using the data centre's waste heat for other buildings.

Finally, the digital dimension of the national grand challenge programme (EUR 21 million) aims to incentivise research teams to develop viable, practical and innovative solutions in the areas of e-government, e-health and e-inclusion.

4 Digital public services

4 Digital public services	Ireland		EU
	rank	score	score
DESI 2021	6	82.6	68.1

Digital public services
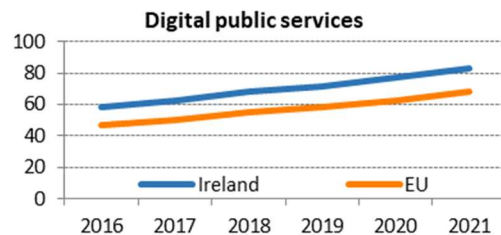
	Ireland			EU
	DESI 2019	DESI 2020	DESI 2021	DESI 2021
4a1 e-Government users % internet users	**64%** 2018	**67%** 2019	**67%** 2020	**64%** 2020
4a2 Pre-filled forms Score (0 to 100)	**NA**	**NA**	**63** 2020	**63** 2020
4a3 Digital public services for citizens Score (0 to 100)	**NA**	**NA**	**86** 2020	**75** 2020
4a4 Digital public services for businesses Score (0 to 100)	**NA**	**NA**	**100** 2020	**84** 2020
4a5 Open data % maximum score	**NA**	**NA**	**92%** 2020	**78%** 2020

For digital public services, Ireland ranks 6th of the 27 EU countries and is thus above the EU average. While Ireland's score for digital public services for businesses is perfect (100), it scores lower in digital public services for citizens (86), although still above the EU average of 75. Ireland also scores very high in open data (92%), while for the indicators measuring e-government users and pre-filled forms, its performance is more or less average.

In 2020, the government continued its efforts to consolidate and simplify access to government services, in particular through enhancing the quality and basic functionality of the Digital Service Gateway (gov.ie), which is a one-stop central platform that provides citizens online access to government services and information. The platform aims to provide user-orientated interaction and to present information in a clear, understandable and accessible manner. Citizens can access the platform using a verified MyGovID account, of which there are now over 600,000. There has been a notable increase in the figures for digital public services transactions: the evidence indicates that more people are visiting the portal site and are staying longer. The objective is that by the end of 2023 towards 90% of the available digital public services will actually be used.

The government platform is a major component of the 'Build to Share' pillar of the 2015 Public Service ICT Strategy and also a key action of the eGovernment Strategy 2017-2020. Work is currently underway on the replacement of the 2015 Public Service ICT Strategy. The new strategy will also replace the eGovernment Strategy 2017-2020.

The Public Service Data Strategy 2019-2023 sets out a detailed vision with a set of goals and actions to deliver a more joined-up whole-of-government approach to how data are used and managed within the public service. A key output of the Department of Public Expenditure and Reform, which is responsible for Ireland's open data policy, has been the development of a national open data portal (data.gov.ie) that provides access to official non-personal government data, in open format. The portal

currently links to over 12,953 datasets from some 148 publishers[21]. This data must be published under an open licence so it can be freely used, reused and redistributed.

Over the course of 2020 and 2021, the departments worked through a list of priority digital projects. At the beginning of 2021, Ireland introduced Digital Postboxes to its citizens through e-Boks, a digital solutions company. This solution provides people with an opportunity to receive their government-related post in a secure digital mailbox via a single shared platform. Building on its GovTech[22] engagement in 2019, the government is further exploring innovative digital opportunities by partnering with industry, in particular the start-up and SME sector.

To embed innovation across the public service, in November 2020, the Public Service Innovation Strategy was published. Its purpose is to deliver improved services, including supporting and promoting digital transformation, for example by using digital solutions that are informed by the right data.

In the 2020 eGovernment Benchmark report[23], Ireland scored 0% on cross-border eID for both citizens and businesses (EU average 9% and 36% respectively). Ireland has not notified an eID scheme under the eIDAS Regulation[24]. This impedes cross-border use of eID.

Although Ireland is committed to drive digital transformation in the public service through continuous development of the integration of digital public services, further efforts, in particular for cross-border eID, are crucial.

Digital public services in Ireland's Recovery and Resilience Plan

The budget allocated to digital public services amounts to EUR 85 million and covers two investment measures.

The objective of developing an online response option for the population census (EUR 10 million) is to improve the efficiency of data collection and analysis by digitalising the census.

The suite of eHealth projects (EUR 75 million) comprises two sub-measures. The first sub-measure shall support the deployment of ePharmacy systems across hospitals in Ireland to better monitor the use and costs of medication. The second sub-measure aims to support the deployment of an integrated financial management system to provide financial and procurement efficiencies within the health system.

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[21] Data as available on 15 October 2021.

[22] GovTech is the application of emerging technologies to deliver enhanced public services through increased efficiency and reduced cost.

[23] https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=69461

[24] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC (OJ L 257, 28.8.2014, p. 73).