Digital Economy and Society Index (DESI)

2019 Country Report

Finland

About the DESI

The European Commission has been monitoring Member States' digital competitiveness with the Digital Economy and Society Index (DESI) reports since 2015. The set of reports includes both country profiles and thematic chapters.

The DESI country reports combine quantitative evidence from the DESI indicators across the five dimensions of the index with country-specific policy insights and best practices. An in-depth telecoms chapter is annexed to the reports for each Member State.

The thematic chapters present a European-level analysis of broadband connectivity, digital skills, use of the internet, digitisation of businesses, digital public services, the ICT sector and its R&D spending, and Member States' use of Horizon 2020 funds.

To improve the methodology and take account of the latest technological developments, a number of changes have been made to the DESI for 2019. The DESI now covers:

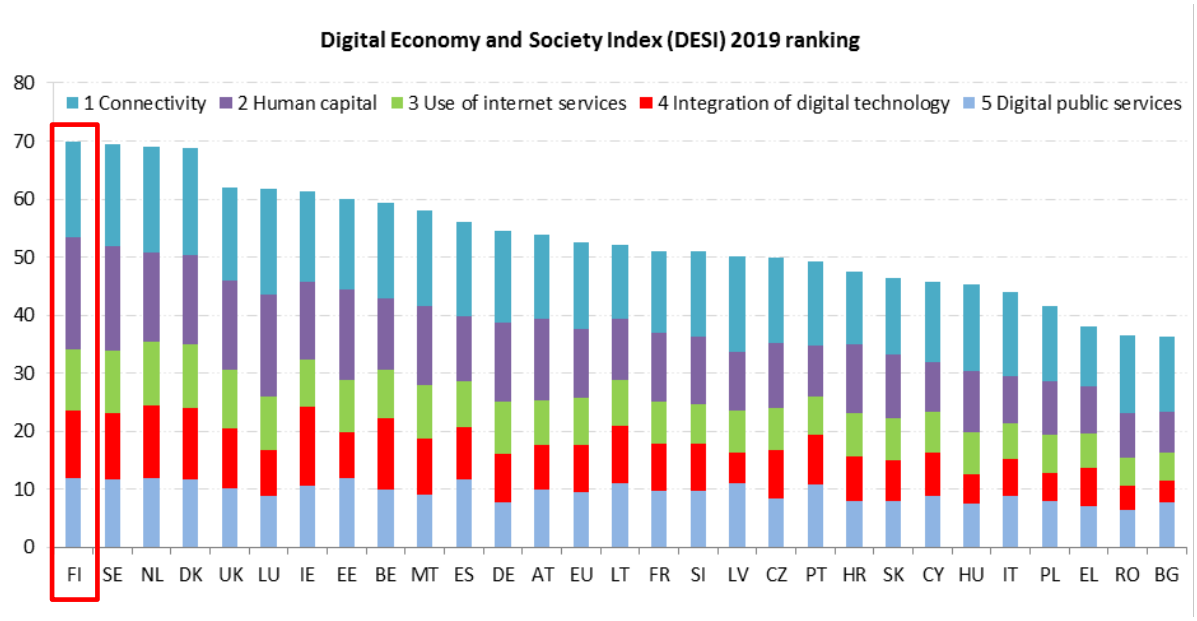
- *5G readiness,*
- *Above basic digital skills,*
- *At least basic software skills,*
- *Female ICT specialists,*
- *ICT graduates,*
- *People who never used the internet,*
- *Professional social networks,*
- *Doing an online course,*
- *Online consultations and voting,*
- *Individuals selling online,*
- *Big data,*
- *Medical data exchange and*
- *e-Prescriptions.*

The DESI was re-calculated for all countries for previous years to reflect the above changes in the choice of indicators and corrections to the underlying data. Country scores and rankings may thus have changed compared with previous publications.

For further information, please consult the DESI website: https://ec.europa.eu/digital-single-market/en/desi.

Finland overview

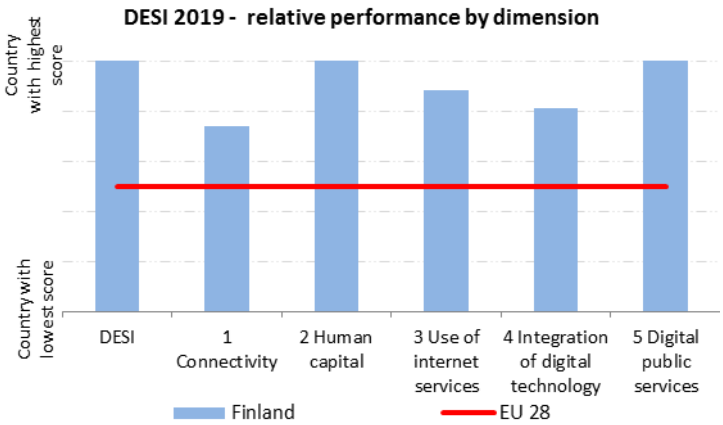
	Finland		EU
	rank	score	score
DESI 2019	**1**	**69.9**	**52.5**
DESI 2018	3	66.3	49.8
DESI 2017	2	63.7	46.9

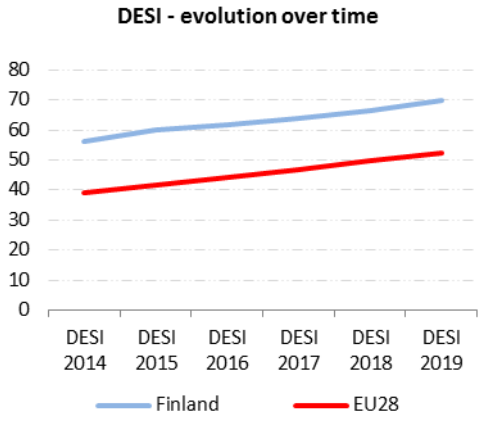


Finland ranks first out of the 28 EU Member States with a score of 69.9 in the European Commission's Digital Economy and Society Index (DESI) 2019. Its overall score largely surpasses the EU average of 52.5, allowing Finland, for the first time, to become the EU digital leader. Finland fares least well in the indicator of connectivity due to the low concentration of fixed broadband connections. Although fixed broadband access is offered to almost all households, its use in Finland is below the EU average (Finland 58 %, EU 77 %). In mobile broadband use, Finland ranks first by a clear margin and is close to twice the EU average. Finland excels in digital public services and integration of digital technologies. Its human capital is one of its strongest competitive advantages where 76 % of the population have basic or above basic digital skills, a long way above the EU average (57 %).

Finland ranks highest in digital public services and human capital. Overall, it maintains its lead in digitisation. It belongs to the high-performing cluster alongside Sweden, Denmark, the Netherlands, Luxembourg, Ireland, the United Kingdom, Belgium and Estonia.

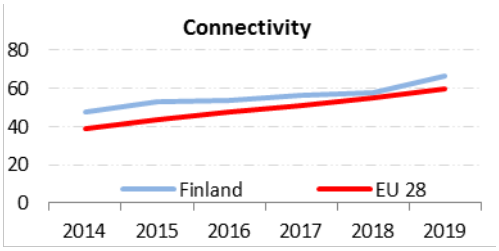
Finland does not have a national Digital Skills and Jobs Coalition (DSJC), nor a digitising industry strategy in place.


DESI 2019 - relative performance by dimension
Country with highest score
Country with lowest score
DESI
1 Connectivity
2 Human capital
3 Use of internet services
4 Integration of digital technology
5 Digital public services
Finland
EU 28


DESI - evolution over time
80
70
60
50
40
30
20
10
0
DESI 2014
DESI 2015
DESI 2016
DESI 2017
DESI 2018
DESI 2019
Finland
EU28

1 Connectivity

1 Connectivity	Finland		EU
	rank	score	score
DESI 2019	**5**	**66.1**	**59.3**
DESI 2018	11	57.3	54.8
DESI 2017	7	56.4	51.2



	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
1a1 Fixed broadband coverage % households	**97%** 2016	**97%** 2017	**94%** 2018	***20***	**97%** 2018
1a2 Fixed broadband take-up % households	**61%** 2016	**57%** 2017	**58%** 2018	***27***	**77%** 2018
1b1 4G coverage % households (average of operators)	**97%** 2016	**98%** 2017	**99%** 2018	***4***	**94%** 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	**147** 2016	**146** 2017	**156** 2018	***2***	**96** 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	**NA**	**NA**	**67%** 2018	***1***	**14%** 2018
1c1 Fast broadband (NGA) coverage % households	**75%** 2016	**75%** 2017	**75%** 2018	***24***	**83%** 2018
1c2 Fast broadband take-up % households	**22%** 2016	**23%** 2017	**29%** 2018	***22***	**41%** 2018
1d1 Ultrafast broadband coverage % households	**NA**	**59%** 2017	**58%** 2018	***19***	**60%** 2018
1d2 Ultrafast broadband take-up % households	**16%** 2016	**17%** 2017	**21%** 2018	***14***	**20%** 2017
1e1 Broadband price index Score (0 to 100)	**94** 2016	**94** 2017	**94** 2018	***1***	**87** 2017

With an overall connectivity score of 66, Finland ranks 5th among the Member States. Fixed broadband is available to 94 % of households, despite the specific geographical characteristics of the country. While Finland is slightly below the EU average of ultrafast broadband coverage (58 % against 60 % in the EU as a whole), its fibre-to-the-premises coverage is above the EU average (37.5 % against 29.6 % in the EU as a whole.)

At 58 %, fixed broadband take-up is significantly behind the EU average of 77 %. Only 29 % of households with fixed broadband chose to subscribe to fast broadband (at 30 Mbps or above), which is far below the EU average of 41 %. One of the reasons for the relatively low take-up of fixed broadband connectivity can be seen in Finland's excellent performance in mobile broadband. It should be noted that the relevant pattern is not price-related either in so far as Finland leads the ranks in terms of broadband price index (94 against 87 for the EU), which pertains to fixed technology and mobile broadband prices are also below the EU average (the least expensive offer for handset (1 GB + 300 calls basket) was €19.3/PPP against €22.3/PPP for the EU). Finland is second in mobile broadband take-up and is not far off twice the EU average: its mobile broadband take-up was

156 in June 2018 (subscriptions per 100 subscribers), against 96 for the EU as a whole over the same period.

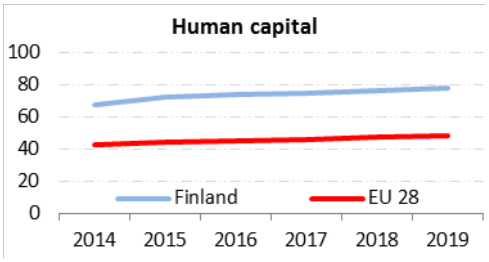
Finland's national broadband plan, the 'fast broadband project', runs until the end of 2019. The project aims at providing an optical fibre or cable network enabling connections of 100 Mbps within two kilometres of 99 % of all permanent residences and offices in Finland. State aid is available under the Fast Broadband project to finance high-speed broadband networks. Broadband access and take-up are lower in rural areas. There are two programmes to support the rollout of fibre networks in those areas; namely the National State Aid Scheme for sparsely populated areas and EU funding through EAFRD. As of January 2019, the combined use of those sources of funding had enabled the rollout of about 24,000 km of fibre network, corresponding to 95,000 dwellings. Network building companies have had difficulties in finding financing for their part of the costs. Therefore, they have not been able to run the project on time as planned in the initial phase of the 'fast broadband project'. Amended state aid rules applicable to broadband funding are reportedly working better and have enabled many projects to be undertaken.

In October 2018, the Ministry of Transport and Communications published a digital infrastructure strategy, applicable to both wireless and fixed connections. Through the relevant digital infrastructure strategy, Finland aims to meet the gigabit connectivity objectives set by the Commission, as a minimum. Indeed, by 2025, all Finnish households should have access to at least 100 Mbit/s connections and it should be possible to increase the speed of the connection to one gigabyte per second. The measures proposed in the strategy notably involve the construction of 5G networks and spectrum policy, streamlining network permit and construction procedures. In Finland, 50 % of the spectrum harmonised at EU level for wireless broadband has been assigned. In terms of spectrum policy, Finland is a frontrunner and this is reflected in its position in the 5G readiness indicator: the entire 3410-3800 MHz spectrum band was assigned in September 2018 in accordance with Commission Decision (EU) 2019/235, and the latter spectrum is available for 5G use by 2019. The assignment process has enabled the acquisition of large blocks of spectrum (130 MHz), facilitating the provision of gigabit 5G services at reasonable prices (€4 cents/MHz/pop). Nevertheless, there are use restrictions due to unresolved cross-border coordination issues with a non-EU country. Furthermore, the strategy provides that the 26 GHz spectrum band will also be allowed for use for wireless broadband, so that the user rights for the entire spectrum will be issued in spring 2020. The 700 MHz band was auctioned in November 2016 under the obligation to cover 99% of the population of mainland Finland within three years of the start of the licence period (1 February 2017).

While Finland has good fixed broadband and 4G coverage overall, coverage in rural areas could be further improved. The main problem encountered has been the lack of incentive for market players to invest in sparsely populated areas of the country. State aid rules were amended in order to tackle this issue. So far, many broadband rollout projects are ongoing as a result of better functioning rules.

2 Human capital

2 Human capital	Finland		EU
	rank	score	score
DESI 2019	**1**	**77.5**	**48.0**
DESI 2018	1	76.1	47.6
DESI 2017	1	74.7	45.4



	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
2a1 At least basic digital skills	**73%**	**76%**	**76%**	***4***	**57%**
% individuals	2016	2017	2017		2017
2a2 Above basic digital skills	**44%**	**45%**	**45%**	***6***	**31%**
% individuals	2016	2017	2017		2017
2a3 At least basic software skills	**76%**	**76%**	**76%**	***4***	**60%**
% individuals	2016	2017	2017		2017
2b1 ICT specialists	**6.5%**	**6.6%**	**6.8%**	***1***	**3.7%**
% total employment	2015	2016	2017		2017
2b2 Female ICT specialists	**3.0%**	**3.0%**	**3.1%**	***1***	**1.4%**
% female employment	2015	2016	2017		2017
2b3 ICT graduates	**6.6%**	**6.7%**	**7.1%**	***1***	**3.5%**
% graduates	2014	2015	2016		2015

Finland ranks first among EU countries and well above the EU average in human capital. The country boasts high digital social inclusion, with 76 % of the population possessing basic or above basic digital skills. Finland outperforms the EU average and ranks first in female ICT specialists. It is doing well compared to other countries when it comes to basic digital skills of women: 77 % of women have at least basic digital skills (55 % in the EU overall) while 22 % of ICT specialists are women in Finland (17% in the EU as a whole). In Finland, STEM is an integral part of the school curriculum, as it is considered a problem-solving approach to education tied to the instructional standard. Despite Finland's high ranking in digital skills, almost 60 % of Finnish companies reported hard-to-fill vacancies for jobs requiring information and communications technology specialist skills.

As of 2018, Finland is implementing a comprehensive reform of its vocational education and training system to increase digital and workplace learning. The new funding model will encourage VET providers to improve the effectiveness and quality of learning. As of 2016-2017, the new curriculum for primary and lower secondary education includes coding as a mandatory, cross-curricular theme starting from first grade.

Finland does not have an e-skills strategy or a national digital skills and jobs coalition. The Digital Skills and Jobs Coalition is one of the 10 key actions under the New Skills Agenda for Europe. It has been operational since 2016 and brings together Member States and stakeholders from the private and public sectors to develop a large digital talent pool and ensure that Europe's citizens and labour force are equipped with adequate digital skills.

As of mid-2018, more than 100 enterprises, education providers and NGOs have pledged to reduce digital skills gaps by taking actions such as training courses, matching for digital jobs, certification and awareness raising.

The main policy strategy for the information society in Finland is the Digital Agenda for 2011-2020, 'Productive and inventive Finland'[1]. It contains a range of policy measures to support ICT development in Finland, and clearly identifies e-skills and ICT-related education as a cornerstone for the future of the country. Multi-stakeholder partnerships of major relevance to the e-skills include INFORTE.fi and Rails girls. The first of these is a state-wide programme for ICT professionals with networking and education goals. The second one, Rails girls, is a grassroots initiative launched in 2010 aiming to organise all-female workshops for practising and developing programming skills. Today it has become an international non-profit volunteer community where everybody, including the programming professionals coaching in the workshops, works on a voluntary basis.

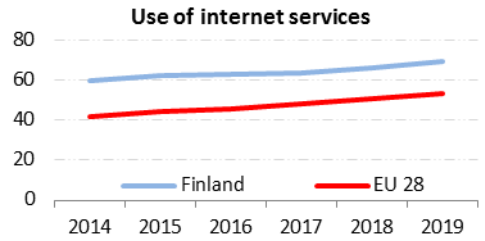
In EU Code Week 2018, Finland registered 39 activities and an estimated 1300 participants. EU Code Week is a voluntary grass-root movement that promotes coding and related activities in their countries as Code Week Ambassadors.

Finland's first position among EU countries as regards human capital is flanked by difficulties experienced by a significant number of Finnish companies to fill ICT-related vacancies. Finland is addressing this challenge through an extensive reform of its vocational and training schemes with a strong focus on digital skills and the quality of learning. Introducing coding and embedding it as a mandatory transversal element of the school curriculum is a long-term action with the potential to satisfy the current appetite for qualified ICT-related labour.

[1] http://www.oph.fi/download/135323_productive_and_inventive_finland.pdf

3 Use of internet services

3 Use of internet services	Finland		EU
	rank	score	score
DESI 2019	**4**	**69.2**	**53.4**
DESI 2018	5	66.2	50.7
DESI 2017	5	63.7	47.8

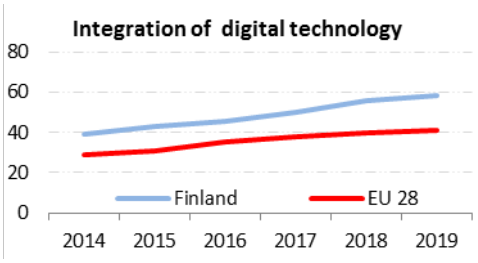


	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
3a1 People who have never used the internet % individuals	**4%** 2016	**5%** 2017	**4%** 2018	***6***	**11%** 2018
3a2 Internet users % individuals	**91%** 2016	**92%** 2017	**93%** 2018	***4***	**83%** 2018
3b1 News % internet users	**85%** 2016	**90%** 2017	**90%** 2017	***4***	**72%** 2017
3b2 Music, videos and games % internet users	**91%** 2016	**91%** 2016	**94%** 2018	***1***	**81%** 2018
3b3 Video on demand % internet users	**37%** 2016	**37%** 2016	**50%** 2018	***5***	**31%** 2018
3b4 Video calls % internet users	**34%** 2016	**37%** 2017	**46%** 2018	***21***	**49%** 2018
3b5 Social networks % internet users	**66%** 2016	**70%** 2017	**71%** 2018	***17***	**65%** 2018
3b6 Professional social networks % internet users	**17%** 2015	**20%** 2017	**20%** 2017	***6***	**15%** 2017
3b7 Doing an online course % internet users	**15%** 2016	**17%** 2017	**17%** 2017	***2***	**9%** 2017
3b8 Online consultations and voting % internet users	**16%** 2015	**14%** 2017	**14%** 2017	***6***	**10%** 2017
3c1 Banking % internet users	**92%** 2016	**93%** 2017	**94%** 2018	***1***	**64%** 2018
3c2 Shopping % internet users	**72%** 2016	**75%** 2017	**74%** 2018	***8***	**69%** 2018
3c3 Selling online % internet users	**22%** 2016	**25%** 2017	**29%** 2018	***8***	**23%** 2018

Overall, the use of internet services in Finland is well above the EU average. Finns are keen to engage in a variety of online activities in line with the rest of the EU, the most popular online activity being banking, followed by music, video and games, and news. 90 % of Finnish internet users read news online (72 % in the EU as a whole). Finns score above the EU average in all internet activities, with notable leadership in online banking. Furthermore, with 50 % of users, video on demand is the activity that has grown most, followed by video calls. With only 4 % of Finns who have never used the internet, Finland is well below the EU average (11 %).

4 Integration of digital technology

4 Integration of digital technology	Finland		EU
	rank	score	score
DESI 2019	**5**	**58.3**	**41.1**
DESI 2018	5	55.9	39.6
DESI 2017	6	49.9	37.6



	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
4a1 Electronic information sharing	**37%**	**39%**	**39%**	***9***	**34%**
% enterprises	2015	2017	2017		2017
4a2 Social media	**26%**	**29%**	**29%**	***6***	**21%**
% enterprises	2016	2017	2017		2017
4a3 Big data	**15%**	**15%**	**19%**	***5***	**12%**
% enterprises	2016	2016	2018		2018
4a4 Cloud	**40%**	**48%**	**50%**	***1***	**18%**
% enterprises	2016	2017	2018		2018
4b1 SMEs selling online	**17%**	**20%**	**20%**	***8***	**17%**
% SMEs	2016	2017	2018		2018
4b2 e-Commerce turnover	**NA**	**NA**	**NA**		**10%**
% SME turnover	2016	2017	2018		2018
4b3 Selling online cross-border	**6%**	**6%**	**6%**	***23***	**8%**
% SMEs	2015	2017	2017		2017

On the integration of digital technology by businesses, Finland ranks 5th among EU countries, well above the EU average, maintaining its position from last year. Results across all indicators remain stable with a slight increase in the enterprises using big data and cloud solutions. Finnish enterprises continue to take advantage of the possibilities offered by online commerce: 20 % of SMEs sell online (above the EU average of 17 %) and 6 % of all SMEs sell cross-border. Furthermore, 50 % of enterprises use cloud computing (up from 48 % in 2016) and 19 % take advantage of big data (up from 15 % in 2016).

Currently, and despite the overall strong position and policy support for digitisation, there remain significant disparities among businesses. According to the Finnish Innovation Survey, the importance of digitalisation for enterprises' business activity is much more strongly acknowledged in services than in manufacturing enterprises: 41 % of service enterprises consider one form or another of digitalisation key to the firm's operations, compared to 25.4 % of manufacturing enterprises.

Finland is committed to the advancement of new digital technologies and to investing strategically in digital technologies through EU-coordinated programmes (e.g. the country is a member of the EuroHPC Joint Undertaking; it has also signed the Declaration on European Blockchain Partnership, and the Declaration on Cooperation on Artificial Intelligence).

Finland's national Artificial Intelligence (AI) strategy (2017)[2] is designed to make it a leader in applying AI. In May 2018, the Finnish government launched a free online course on artificial intelligence, 'The Elements of AI', targeting anyone interested in learning about AI, with no prior mathematical or programming skills required. The initiative seeks to attract 1 % of the population to learn the basics in AI topics such as machine learning and neural networks by the end of 2018. The Finnish AI programme engages companies to take part in a year-long project of training for their workforce.

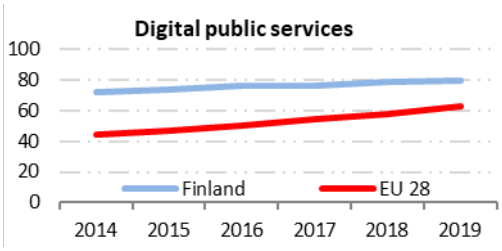
The Finnish government has allocated more than €100 million, including direct capital funding and regional grants, to support various digital projects being run by the country's local authorities between 2018 and 2022. This investment is linked to the government's Digital Finland Framework, which aims to maximise future opportunities, based on global megatrends, and Finnish expertise in specialised IT sectors. This strategy is designed to encourage more IT enterprises to invest in commercialising their innovations and digitising their offerings for both domestic and export markets. The planned regional digitisation process will require new information management legislation and the establishment of a one-stop-shop service system. The government plans to have laws in place to support this during the second half of 2019.

Recent action includes the identification of priority areas (clean-tech, bio economy, ICT and health) to focus investment on technology-intensive sectors with the potential for upscaling. Finnish enterprises continue to be among the most advanced business in the EU in the integration of digital technologies.

[2] http://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/160391/TEMrap_47_2017_verkkojulkaisu.pdf

5 Digital public services

5 Digital public services	Finland		EU
	rank	score	score
DESI 2019	**1**	**79.9**	**62.9**
DESI 2018	2	78.6	57.9
DESI 2017	3	76.3	54.0



	Finland				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
5a1 e-Government users	**91%**	**91%**	**92%**	***3***	**64%**
% internet users needing to submit forms	2016	2017	2018		2018
5a2 Pre-filled forms	**82**	**86**	**82**	***5***	**58**
Score (0 to 100)	2016	2017	2018		2018
5a3 Online service completion	**93**	**94**	**96**	***6***	**87**
Score (0 to 100)	2016	2017	2018		2018
5a4 Digital public services for businesses	**80**	**80**	**86**	***16***	**85**
Score (0 to 100) - including domestic and cross-border	2016	2017	2018		2018
5a5 Open data	**NA**	**NA**	**62%**	***19***	**64%**
% of maximum score			2018		2018
5b1 e-Health services	**NA**	**49%**	**49%**	***1***	**18%**
% individuals		2017	2017		2017
5b2 Medical data exchange	**NA**	**NA**	**65%**	***7***	**43%**
% of general practitioners			2018		2018
5b3 e-Prescription	**NA**	**NA**	**99%**	***2***	**50%**
% of general practitioners			2018		2018

In digital public services, Finland ranks first among EU countries, well above the EU average. That is attributable especially to the improved availability of open data and to digital healthcare services. There is a high level of online interaction between public authorities and the public. 92 % of Finnish online users actively engage with e-government services, 1 % up from last year. For e-health services, Finland ranks first in the EU, with 49 % of Finns having used health and care services provided online, which is over double the EU average. E-prescription is used by almost all general practitioners and 65% of them exchange medical data.

The public sector ICT department at the Ministry of Finance is tasked with digitising Finland's public services. It collaborates with local government to develop user-focused digital public services. The objective is to create an agreed framework between central government and municipalities covering the digitisation of all public services. The regional digitisation process will require new information management legislation and the establishment of a one-stop-shop service system. The government plans to have laws in place to support this in the second half of 2019. Municipalities will also launch projects to increase public sector productivity and pave the way for greater streamlining of public services. It will include the use of spatial data in services, scaling up supervision and the development of automated financial management processes, procurement activities and reporting systems.

The Government's 'special three-year fund for digitisation', with €100 million, has allocated €30 million for regional and local governments to implement their own digital projects. That includes

direct capital funding and regional grants to support various digital projects by local authorities between 2018 and 2022. One of these projects uses blockchain to provide welfare payments to asylum seekers. The national immigration service now provides payment cards containing grants for refugees to get a basic standard of living.

The Suomi.fi portal is a one-stop service shop where members of the publics and businesses can receive messages and decisions from authorities electronically; reply or submit additional information to them; authorise another party to act on their behalf or request a mandate to act on behalf of another person or company, as well as view their information in different registers. Finland introduced e-authorisation to assist those without easy access to a computer or the skills to use it, allowing people to use e-services on behalf of another person. For instance, people can now book medical appointments on behalf of ailing parents who cannot use the digital services. Finland is the first country in the world that allows people to electronically authorise another person to make important decisions for them.

The digitisation of municipal administration and frontline healthcare infrastructure is an essential part of the government-led Smart Economy project. The initiative aims to ensure the availability of public funding and capital investments for digital transformation schemes. The Finnish Research and Innovation Council (FRIC) with oversight from the prime minister's office oversees the government's national digital strategy. It expects public and private sector investments in research and innovation to reach 4 % of Finland's GDP by 2025. Finland has introduced a virtual hospital hub where healthcare professionals can diagnose, treat patients and refer them to specialists remotely, and where patients can access self-help exercises and therapies, both on websites and through mobile apps. Additionally, My Kanta is a citizens' online service where they can browse their own health records and medication recorded by healthcare services.

Finland ranks top in the section on digital public services, and is one of the world leaders in the domain. Its government has prioritized the digitisation of public services approaching it as a transversal theme that cuts across all milestone projects. The ultimate goal is to make available public services that are digital and user-centred by developing principles for the digitisation of all public services and a one-stop-shop service system and information management legislation.

2019 highlight: cross-border e-prescriptions and e-dispensation between Finland and Estonia

Since January 2019, Finnish patients have been able to buy medicine in pharmacies in Estonia prescribed electronically by their doctor in Finland. A first step in line with the Commission's policy on digital health and care, a policy that aims to empower patients and ensure continuity of care.

E-prescription and e-dispensation allow any EU citizen to retrieve his/her medication in a pharmacy located in another EU Member State, thanks to the electronic transfer of their prescription from his/her country of residence to the country of travel. The country of residence is then informed about the retrieved medicine in the visited country. Data protection rules are strictly observed and patients must provide their consent before these services are accessed. This service was made possible thanks to the e-health Digital Service Infrastructure, which allows e-health national services to exchange health data. They are funded by the Commission's Connecting Europe Facility.