



Digital Economy and Society Index (DESI)

2019 Country Report

Luxembourg

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:

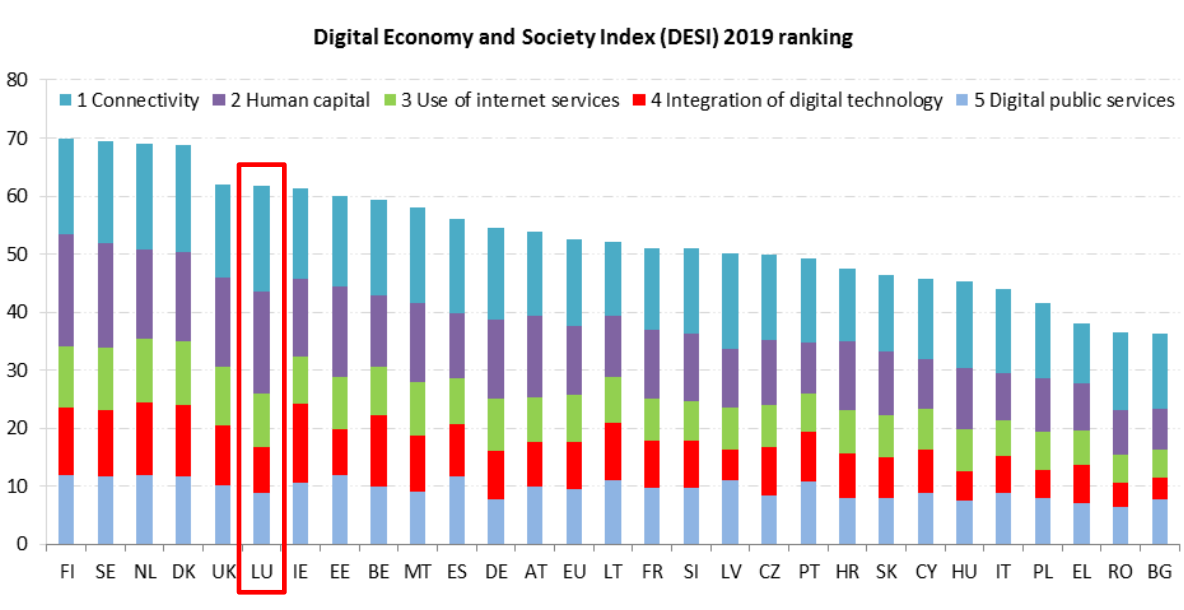
- *5G readiness,*
- *Above basic digital skills,*
- *At least basic software skills,*
- *Female ICT specialists,*
- *ICT graduates,*
- *People who never used the internet,*
- *Professional social networks,*
- *Doing an online course,*
- *Online consultations and voting,*
- *Individuals selling online,*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

Luxembourg overview

	Luxembourg		EU
	rank	score	score
DESI 2019	6	61.8	52.5
DESI 2018	5	59.5	49.8
DESI 2017	5	56.4	46.9



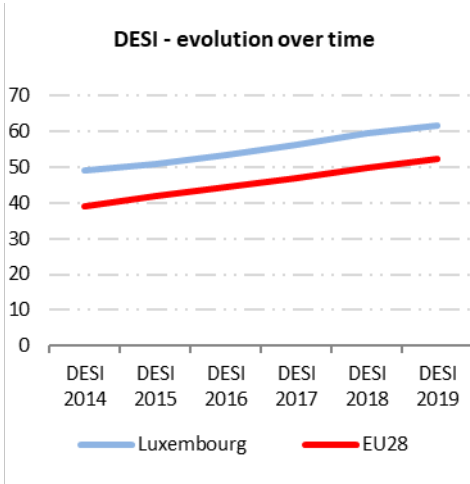
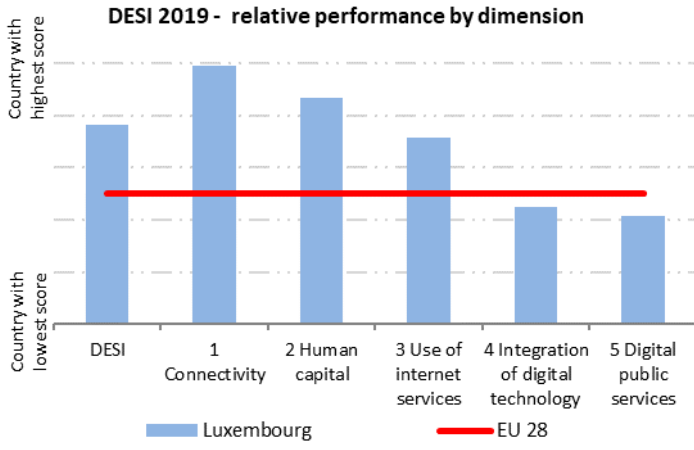
Luxembourg ranks 6th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2019, a drop of one position.

Luxembourg performs best in Connectivity, in which it now ranks second among EU countries. Integration of digital technology and Digital public services continue to be the country's weakest points in the DESI, both scores being below the EU average, but the progress rates over the last two years indicate that the country is actively addressing both areas.

The country ranks well in all indicators of the Connectivity dimension, with wide availability of fast and ultrafast fixed and mobile broadband networks, and increasing take-up levels for fast and ultrafast broadband. The country ranks third in Human capital, with a slight improvement in its score compared to last year. The percentage of individuals with at least basic digital and software skills was well above EU average in 2017 (ranked first), while the share of ICT specialist as a percentage of total employment has increased to 5 % and is well above the EU average of 3.7 %. The country ranks 6th on the Use of internet services.

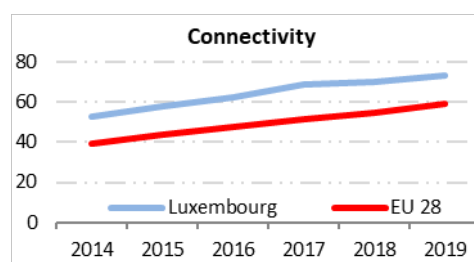
In Integration of digital technology, Luxembourg remains below the EU average but it is narrowing the gap and now ranks 17th. The country performs well in the share of enterprises analysis big data and there has been notable progress in the share of SMEs selling online, though this remains

substantially below the EU average. Digital public services have continued to improve, but the score remains several points below the EU average. Medical data exchange and e-prescriptions indicators show a performance well below the EU average.



1 Connectivity

1 Connectivity	Luxembourg		EU
	rank	score	score
DESI 2019	2	73.3	59.3
DESI 2018	2	70.1	54.8
DESI 2017	2	68.5	51.2



	Luxembourg				EU
	DESI 2017 value	DESI 2018 value	DESI 2019 value	DESI 2019 rank	DESI 2019 value
1a1 Fixed broadband coverage % households	>99.5% 2016	>99.5% 2017	100% 2018	1	97% 2018
1a2 Fixed broadband take-up % households	96% 2016	94% 2017	88% ¹ 2018	3	77% 2018
1b1 4G coverage % households (average of operators)	95% 2016	98% 2017	99% 2018	6	94% 2018
1b2 Mobile broadband take-up Subscriptions per 100 people	116 2016	123 2017	139 2018	4	96 2018
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	NA	NA	0% 2018	13	14% 2018
1c1 Fast broadband (NGA) coverage % households	94% 2016	95% 2017	98% 2018	4	83% 2018
1c2 Fast broadband take-up % households	47% 2016	52% 2017	62% 2018	4	41% 2018
1d1 Ultrafast broadband coverage % households	NA	87% 2017	92% 2018	5	60% 2018
1d2 Ultrafast broadband take-up % households	15% 2016	22% 2017	33% 2018	6	20% 2017
1e1 Broadband price index Score (0 to 100)	89 2016	89 2017	90 2018	7	87 2017

Luxembourg is among the leaders in Connectivity and has improved its score at almost the same pace as the EU average. The country is fully covered by fixed broadband networks. Next generation access (NGA) coverage is 98 %. Luxembourg performs very well in the take-up of mobile broadband services (139 subscriptions to mobile broadband services per 100 people, against an EU average of 96). To some extent, this growth in mobile broadband take-up (16 percentage points in 2018) comes at the expense of fixed broadband take-up. Although the latter is significantly above the EU average, it fell by six percentage points in 2018. Demand for fast and ultrafast broadband services, however, is increasing: 62 % of subscriptions are for fast broadband and 33 % for ultrafast broadband, compared with 52 % and 22 % respectively one year ago. Luxembourg's 4G coverage (99 %) is higher than the EU average (94 %). As fibre roll-out continues, FTTP (fibre-to-the premises) coverage has topped 63 %.

¹ Break in series.

Luxembourg will probably miss its national policy target of having everyone connected by the end of 2020 at 1Gbps speed. Full coverage is not achievable by 2020 through fixed networks only, while 5G could further improve coverage. So far, the country has relied mainly on market-driven broadband roll-out based on competition among operators. In the future, it is intended to address the digital divide by using national and EU funds as well. Further details are still to be defined. In 2018, new fibre was rolled out to another 3 % of households that were not connected previously, thanks to infrastructure works by the incumbent POST. The POST fibre network passes now 63 % of residential customers. This figure is expected to increase to at least 75 % by 2023. This fibre network already covers all business customers. Competitors are increasingly making use of fibre unbundling. Uptake of fibre has progressed significantly. The largest cable operator, Eltrona, has upgraded its cable network to DOCSIS 3.1.

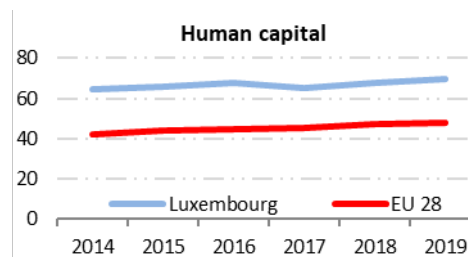
Luxembourg's national regulatory authority, the *Institut Luxembourgeois de Régulation* (ILR) is preparing award procedures for the 700 MHz and 3.6 GHz spectrum. It is planning to launch the public consultation in spring 2019. There are also plans to launch a public consultation and issue licences for the 26 GHz band in the second half of 2020. Some spectrum in the 2.6 GHz band was handed back in 2018. In Luxembourg, only 25 % of the spectrum harmonised at EU level for wireless broadband has been assigned. The national 5G action plan was published in September 2018.² A cross-border trial with participants from Germany (DE), Luxembourg (LU) and France (FR) is running for automated driving on the motorway from Merzig (DE) through LU to Metz (FR), supported by the automotive industry and using 5G technology. The incumbent POST is providing the mobile infrastructure on the territory of Luxembourg for this trial. Luxembourg City is set to be the 5G city; both touristic, residential and business zones will be covered with the country's first 5G network. The process of defining the applications and the verticals involved has started. The launch of commercial services is expected before the end of 2020. State co-financing of further 5G pilots is planned. Luxembourg is also considering EU funding should such an option be available in the future. Luxembourg intends to examine technological solutions to avoid a situation in which people crossing borders and moving from one national mobile network lose their connection. Research in this area is suggested in the 5G action plan, including an analysis of potential regulatory obstacles.

Luxembourg is well on track to achieve the EU's fixed broadband targets for 2020: to supply every European with access to at least 30 Mbps connectivity, and to provide half of European households with connectivity speeds of 100 Mbps. However, it is unlikely to meet the more ambitious targets under national policy by 2020. The preparations by ILR to assign additional spectrum which can be used for 5G services are crucial to meet the EU target for 5G.

² https://digital-luxembourg.public.lu/sites/default/files/2018-11/Digital-Luxembourg_Strategy5G_V1_WEB.pdf

2 Human capital

2 Human capital	Luxembourg		EU
	rank	score	score
DESI 2019	3	69.9	48.0
DESI 2018	3	67.6	47.6
DESI 2017	2	65.1	45.4



	DESI 2017	Luxembourg	DESI 2019	EU
	value	DESI 2018	value rank	DESI 2019
2a1 At least basic digital skills % individuals	86% 2016	85% 2017	85% 1 2017	57% 2017
2a2 Above basic digital skills % individuals	54% 2016	55% 2017	55% 1 2017	31% 2017
2a3 At least basic software skills % individuals	88% 2016	87% 2017	87% 1 2017	60% 2017
2b1 ICT specialists % total employment	4.6% 2015	4.1% 2016	5.0% 5 2017	3.7% 2017
2b2 Female ICT specialists % female employment	1.3% 2015	1.3% 2016	1.4% 12 2017	1.4% 2017
2b3 ICT graduates % graduates	3.6% 2014	5.9% 2015	5.8% 5 2016	3.5% 2015

In the Human capital dimension, Luxembourg ranks third, scoring well above the EU average. Based on the data from DESI 2018 (collected in 2017), Luxembourg ranked first in all three digital literacy indicators. In 2017, 87 % of 16-74-year-olds in Luxembourg had basic digital skills compared to 57 % in the EU. New data from 2018 shows that the country also performs comparatively well in advanced digital skills, with 5.8 % of graduates holding ICT degrees. Furthermore, the share of ICT specialist as a percentage of total employment has increased to 5 %, well above the EU average of 3.7 %. At the same time, Eurostat data³ show that Luxembourg experiences significant labour shortages in terms of ICT specialists. Of the enterprises who recruited or tried to recruit ICT specialists in 2017, 71 % reported having had hard-to-fill vacancies, significantly above the EU average of 53 %. This rate was up from 61 % in 2016 and was as high as 78 % for companies in the ICT sector.

The government's digital education strategy, Digital(4)Education⁴, was launched in 2015. It targets young people in primary, secondary and vocational education and has two components: Digital Education and Digital for Education. As part of this strategy, new specialisations focusing on digital competencies have been created throughout the different stages of the school system. In parallel, the Ministry of Education is in the second year of a programme that has equipped 30 % of secondary school students with tablets. The Ministry is also investing heavily in digital content, giving all teachers and students access to a wide selection of video streaming platforms for learning.

³ Digital Scoreboard, 2019.

⁴ <https://portal.education.lu/digital4education/>

In 2017, the Ministry of Education initiated a program for high schools innovating in ICT called Future Hub⁵. Signed up schools commit to offering innovative ICT courses (cloud computing, game development, etc.). The schools also offer extra-curricular activities for students and outside participants, such as science and robotics labs, as well as coding clubs.

In May 2018 the Ministry of Labour launched the pilot phase of the Digital Skills Bridge project⁶. The project helps companies and their workers anticipate and adapt to changes to their jobs brought by digital technologies. To this end, the programme supports firms' efforts to provide re-skilling and up-skilling through financial support, working time adaptations, etc. Over 300 people from a dozen companies in different sectors participated in the first phase of the pilot. A second phase is due in 2019.

A number of projects co-financed by the European Social Fund foster digital skills & literacy among jobseekers, migrants and young people. Of note are Fit4Coding⁷, which enables participants to become front-end developers following 3.5 months of full-time training, and Digi4All, that offers basic IT training in different languages to newly arrived migrants to help them integrate into the labour market.

The significant difficulties experienced by Luxembourg enterprises trying to recruit ICT specialists limit their capacity to innovate and grow. Increasing the number of ICT specialists, narrowing the employment gender gap, and re-skilling the labour force, is thus of utmost importance if Luxembourg is to reap the full benefits digitising its economy.

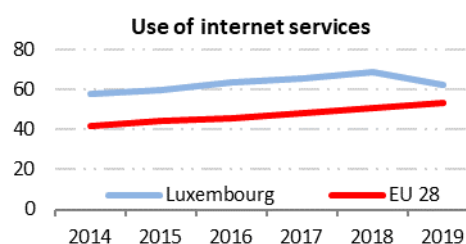
⁵ <https://portal.education.lu/futurehub/>

⁶ <https://www.skillsbridge.lu/>

⁷ <http://www.fonds-europeens.public.lu/fr/projets-cofinances/fse/2014-2020/1026/index.html>

3 Use of internet services

3 Use of internet services	Luxembourg		EU
	rank	score	score
DESI 2019	6	62.4	53.4
DESI 2018	4	68.7	50.7
DESI 2017	4	65.2	47.8



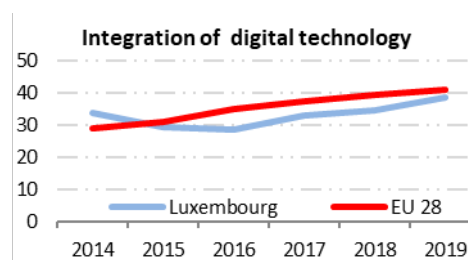
	Luxembourg ⁸				EU
	DESI 2017 value	DESI 2018 value	DESI 2019 value	DESI 2019 rank	DESI 2019 value
3a1 People who never used the internet % individuals	2%	2%	3%	2	11%
3a2 Internet users % individuals	97%	96%	92%	5	83%
3b1 News % internet users	89%	88%	88%	7	72%
3b2 Music, videos and games % internet users	89%	89%	72%	24	81%
3b3 Video on demand % internet users	29%	29%	24%	13	31%
3b4 Video calls % internet users	54%	57%	49%	19	49%
3b5 Social networks % internet users	69%	70%	66%	21	65%
3b6 Professional social networks % internet users	23%	24%	24%	3	15%
3b7 Doing an online course % internet users	10%	10%	10%	7	9%
3b8 Online consultations and voting % internet users	18%	33%	33%	1	10%
3c1 Banking % internet users	73%	78%	70%	13	64%
3c2 Shopping % internet users	80%	82%	74%	7	69%
3c3 Selling online % internet users	15%	18%	15%	18	23%

Overall, Luxembourg scores well in the Use of internet services dimension, ranking sixth among the EU Member States (somewhat lower than a year ago, probably because of a break in series for several indicators in this dimension). Internet use, in particular, is very high, with only 3 % of people reporting they have never used the internet and 92 % of people (down from 96 %) declaring themselves as internet users, against an EU average of 83 %. When compared with the average EU internet user, Luxembourg's users are more likely to bank and shop online, but less likely to sell online (15 % versus 23 % EU average).

⁸ There is a break in series for several indicators.

4 Integration of digital technology

4 Integration of digital technology	Luxembourg		EU
	rank	Score	score
DESI 2019	17	38.7	41.1
DESI 2018	21	34.6	39.6
DESI 2017	20	32.9	37.6



	DESI 2017	Luxembourg		EU	
	value	DESI 2018	DESI 2019	rank	DESI 2019
4a1 Electronic information sharing % enterprises	39%	41%	41%	5	34%
4a2 Social media % enterprises	19%	20%	20%	13	21%
4a3 Big data % enterprises	13%	13%	16%	7	12%
4a4 Cloud % enterprises	12%	NA	16%	14	18%
4b1 SMEs selling online % SMEs	9%	8%	12%	20	17%
4b2 e-Commerce turnover % SME turnover	NA	NA	NA		10%
4b3 Selling online cross-border % SMEs	6%	8%	8%	17	8%

On the Integration of digital technology by businesses, Luxembourg, ranked 17th and continues to perform below the EU average. The country has made good progress over the last year (21st position). In line with the country's ambition to transition to a data-driven economy, Luxembourg performs well in the share of enterprises analysing big data (16 % versus an EU average of 12 % ranking seventh). The country continues to perform well below the EU average as regards the share of SMEs selling online. However, progress over the last year has been promising, suggesting that Luxembourg SMEs are starting to take advantage of the opportunities offered by e-commerce (see highlight 2019).

Luxembourg is committed to advancing and deploying new digital technologies. The country is a member of the EuroHPC Joint Undertaking and has signed the Declaration of European Blockchain Partnership, as well as the Declaration on cooperation on Artificial Intelligence (AI). Digitisation continues to figure prominently in the Luxembourg's government political agenda following the October 2018 national elections: a new ministry in charge of all topics linked to digitisation has been created, while the development of AI is explicitly mentioned in the government programme.

In June 2018 it was announced that Luxembourg would host the EuroHPC headquarters. The government announced in parallel its intention to procure a national supercomputer in 2019, which will benefit from 35 % European co-funding and will later be connected to the EuroHPC network.

In July 2018 the Government signed a memorandum of understanding with the American chip manufacturer Nvidia. This partnership will establish a joint AI laboratory that brings together Nvidia's AI research experience with Luxembourg's research community.

The InfraChain initiative⁹, a public-private partnership founded in May 2017 by the Luxembourg government and 11 private actors, is a non-profit aimed at driving faster and wider adoption of blockchain technology. InfraChain aims to provide a framework that bridges the current gap where many blockchain pilots cannot be deployed in a public chain environment as these do not provide sufficient regulatory compliance. To do so InfraChain is building a community-driven permissioned node network able to host blockchain applications while providing trust and accountability in its nodes; a sustainable operational environment with a service level agreement, and regulatory compliance (e.g. GDPR). The node network has an additional level of governance rules that defines how the community governs the permissioned infrastructure and guarantees the independence of the actors involved in the operation of the hosted applications. This differentiates the initiative from current cloud alternatives on the market.

The initiative Digital4Industry¹⁰ (D4I) was launched in June 2016 by the Ministry of Economy to enable the early adoption of Industry 4.0 solutions by manufacturing companies. The initiative is designed to identify and address systemic challenges experienced by the local industry, and helps create awareness among enterprises about the risks and opportunities related to the implementation or non-implementation of Industry 4.0 solutions. In addition, D4I helps initiate collaborative pilot projects between companies to help showcase the potential for value creation brought by such solutions.

For Luxembourg to fully reap the rewards of the digitising its economy, it will need to seize the full range of benefits from the adoption of digital technologies by SMEs. Increasing awareness of the relevance of digitising SMEs and their needs will be important.

Highlight 2019: Fit4Digital¹¹

Fit4Digital is an innovative programme launched in January 2018 by the Ministry of Economy and Luxinnovation to help SMEs in their digital transformation. Participating SMEs undergo a 360-degree review of their organisation and processes with an approved external consultant.

A digitisation-oriented action plan is put in place to help the companies integrate digital tools that will make it more profitable and efficient (for example helping SMEs, operating in retail sector, build an e-commerce website to reach more customers).

Public aid of up to a maximum of 50 % of the costs incurred is made available for the implementation of the plan.

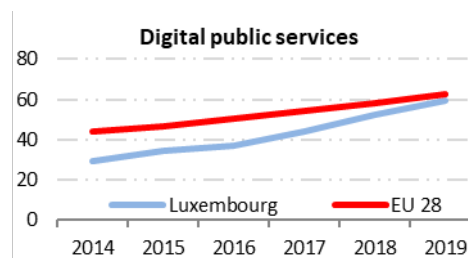
⁹ <https://infrachain.com/>

¹⁰ <https://digital4industry.lu/>

¹¹ <https://www.luxinnovation.lu/innovate-in-luxembourg/performance-programmes/fit-4-digital/>

5 Digital public services

5 Digital public services	Luxembourg		EU
	Rank	score	score
DESI 2019	17	59.3	62.9
DESI 2018	18	52.5	57.9
DESI 2017	22	44.1	54.0



	Luxembourg				EU
	DESI 2017	DESI 2018	DESI 2019		DESI 2019
	value	value	value	rank	value
5a1 e-Government users % internet users needing to submit forms	45%	49%	55%	18	64%
	2016	2017	2018		2018
5a2 Pre-filled forms Score (0 to 100)	30	50	55	16	58
	2016	2017	2018		2018
5a3 Online service completion Score (0 to 100)	77	81	87	16	87
	2016	2017	2018		2018
5a4 Digital public services for businesses Score (0 to 100) - including domestic and cross-border	80	82	86	15	85
	2016	2017	2018		2018
5a5 Open data % of maximum score	NA	NA	76%	6	64%
			2018		2018
5b1 e-Health services % individuals	NA	19%	19%	12	18%
		2017	2017		2017
5b2 Medical data exchange % of general practitioners	NA	NA	25%	18	43%
			2018		2018
5b3 e-Prescription % of general practitioners	NA	NA	14%	23	50%
			2018		2018

In Digital public services, Luxembourg ranks 17th among EU countries. Although its score remains a few points below the EU average, its performance in Digital public services has been improving faster than the EU28 over the last few years. However, there is a low level of online interaction between public authorities and citizens. Only 55 % of Luxembourg internet users actively engage with e-government services (substantially below the EU average of 64 %). Luxembourg also performs below the EU average in pre-filled forms and online service completion, but both scores have shown significant progress over the last few years. In open data, the country performs particularly well (ranked sixth). In the new indicators for medical data exchange and e-prescriptions the country scores substantially below the EU average. Only 14 % of general practitioners used e-prescriptions in 2018, compared to an EU average of 50 %. However, Luxembourg performed well in the broader e-health services indicator measured last year, ranking 12th in the EU.

The government coalition confirmed by the general elections in October 2018 has highlighted digitisation as one of its top political priorities. A full chapter of the coalition agreement is dedicated to digitisation and improving digital public services.

In 2018 the Luxembourg Point of Single Contact '*Guichet.lu*', a one-stop shop for administrative procedures, was entirely redesigned and migrated to a new technical infrastructure. It serves as a central portal for both citizens and businesses and is available in French, German and English. As of

2018, 242 interactive online administrative procedures have been accessible¹². The use of the MyGuichet transactional procedures has been growing exponentially in recent years with 393,620 procedures submitted through the platform in 2018, up from 75,121 in 2015.

In 2018 Luxembourg effectively implemented eIDAS. The country is among the few Member States who have already notified their e-ID scheme. Since September 2018, citizens from other Member States that have notified their home country e-ID scheme can thus prove their identity on 'MyGuichet' using their own national eIDs, thus obviating the need to get a separate Luxembourg e-ID.

Luxembourg's national e-health strategy aims to facilitate the exchange of personal health records to improve coordination between each patient's different treatments and enable a better patient follow-up. To fulfil this objective a national e-health platform has been put in place, with tools such as the Shared Health Care File¹³ (DSP, *Dossier de Soins Partagé*), an electronic personal health record file that centralises all medical data needed to coordinate patient care. 10 % of the population already has access to their own DSP and can manage its rights of access. The Luxembourg government is now preparing the legal framework that will enable the DSP to be gradually made available to all patients.

Full implementation of the commitments made in the new coalition agreement have the potential to lead to major improvements in the area of digital public administration. In the area of e-health, speeding up the roll-out of the '*Dossier de Soins Partagé*' to all patients and deploying a country-wide e-prescription service will bring major benefits to citizens.

¹² <https://guichet.public.lu/en/myguichet.html>

¹³ <https://www.esante.lu/portal/fr/espace-professionnel/my-dsp,140.html>