

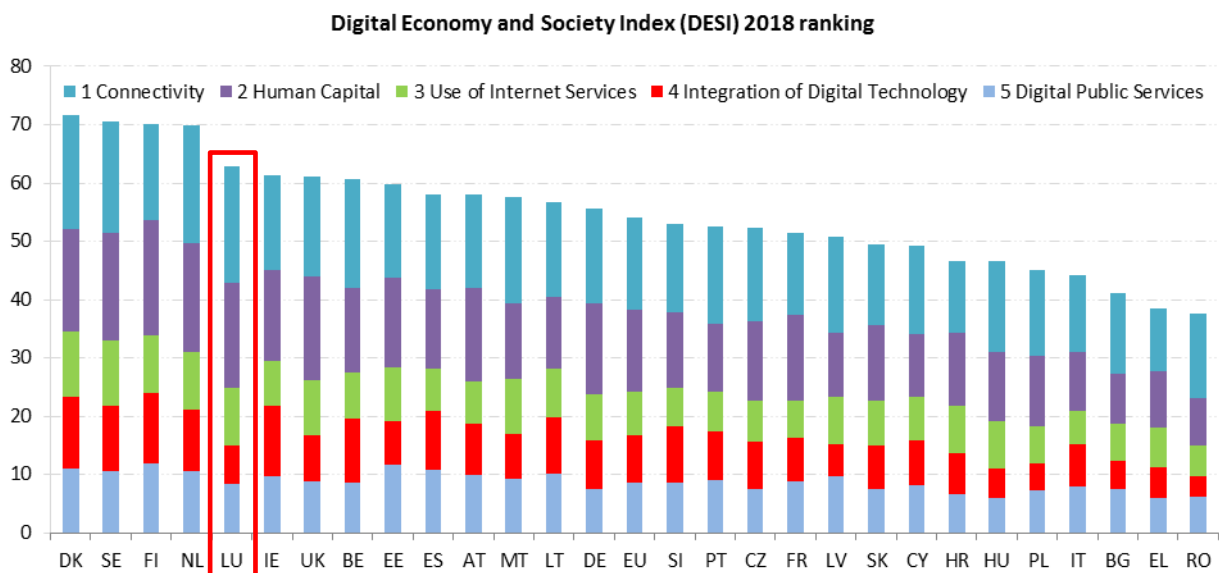
# Digital Economy and Society Index (DESI)<sup>1</sup> 2018

## Country Report Luxembourg

The DESI report tracks the progress made by Member States in terms of their digitisation. It is structured around five chapters:

<b>1 Connectivity</b>	Fixed broadband, mobile broadband, broadband speed and prices
<b>2 Human Capital</b>	Internet use, basic and advanced digital skills
<b>3 Use of Internet Services</b>	Citizens' use of content, communication and online transactions
<b>4 Integration of Digital Technology</b>	Business digitisation and e-commerce
<b>5 Digital Public Services</b>	eGovernment

The DESI was re-calculated for the previous years for all countries to reflect slight changes in the choice of indicators and corrections to the underlying indicator data. As a result, country scores and rankings may have changed from the previous publication. For further information please consult the DESI methodological note at <https://ec.europa.eu/digital-single-market/en/desi>.



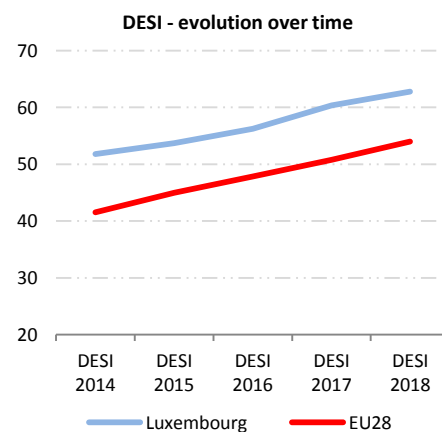
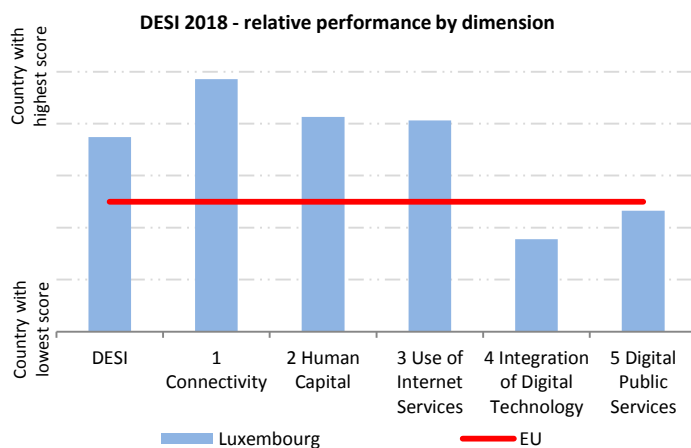
<sup>1</sup> <https://ec.europa.eu/digital-single-market/en/desi>

	Luxembourg		Cluster	EU
	rank	score	score	score
<b>DESI 2018</b>	<b>5</b>	<b>62.8</b>	<b>64.0</b>	<b>54.0</b>
DESI 2017	5	60.4	61.2	50.8

Luxembourg ranks 5<sup>th</sup> out of the 28 EU Member States. Overall it has maintained its rank and improved its score slightly since last year. Luxembourg performs well in connectivity (2<sup>nd</sup> rank in DESI 2018), both for coverage and subscription (take-up). It records very good results (5<sup>th</sup> rank in DESI 2018) for human capital, especially in use or in digital skills where it is a top performer. It achieves very good results for internet use by its residents (4<sup>th</sup> rank in DESI 2018). On the other hand, it lags behind in the integration of digital technologies by companies (22<sup>nd</sup> rank in DESI 2018), for e-business and even more for e-commerce. It also lags behind in digital public services (17<sup>th</sup> rank in DESI 2018).

Luxembourg belongs to the high-performing cluster of countries<sup>2</sup>. However, this good overall performance masks more diverse performance levels across the five dimensions.

Luxembourg has undertaken an ambitious economic diversification strategy for the digital sector. This strategy is multidimensional and collaborative, embracing skills, infrastructure, the digital ecosystem and public services. The strategy is grouped under an umbrella initiative called *Digital Luxembourg*<sup>3</sup>.



<sup>2</sup> High-performing countries are Denmark, Sweden, Finland, the Netherlands, Luxembourg, Ireland, the UK, Belgium and Estonia.

<sup>3</sup> <http://www.digital-luxembourg.lu>

# 1 Connectivity

1 Connectivity	Luxembourg		Cluster	EU
	rank	score	score	score
DESI 2018	2	80.1	71.9	62.6
DESI 2017	1	77.9	67.9	58.5

	Luxembourg				EU
	DESI 2018		DESI 2017		DESI 2018
	value	rank	value	rank	value
<b>1a1 Fixed Broadband Coverage</b> % households	>99.5% → 2017	5	100% 2016	4	97% 2017
<b>1a2 Fixed Broadband Take-up</b> % households	94% ↓ 2017	2	96% 2016	1	75% 2017
<b>1b1 4G Coverage</b> % households (average of operators)	98% ↑ 2017	6	95% 2016	6	91% 2017
<b>1b2 Mobile Broadband Take-up</b> Subscriptions per 100 people	126 ↑ 2017	4	116 2016	5	90 2017
<b>1c1 Fast Broadband (NGA) Coverage</b> % households covered by VDSL, FTTP or Docsis 3.0	95% ↑ 2017	6	94% 2016	5	80% 2017
<b>1c2 Fast Broadband Take-up</b> % homes subscribing to >= 30Mbps	52% ↑ 2017	6	47% 2016	4	33% 2017
<b>1d1 Ultrafast Broadband Coverage</b> % households covered by FTTP or Docsis 3.0	87% 2017	6	NA		58% 2017
<b>1d2 Ultrafast Broadband Take-up</b> % homes subscribing to >= 100Mbps	22.5% ↑ 2017	9	14.7% 2016	10	15.4% 2017
<b>1e1 Broadband Price Index</b> Score (0 to 100)	88 ↓ 2017	9	89 2016	8	87 2017

Luxembourg performs very well in comparison with other Member States and is making significant progress on connectivity. It is particularly strong in fixed and mobile broadband take-up.

Luxembourg is fully covered by broadband services, including fixed, mobile and satellite networks. Next generation access (NGA) coverage is 95 %. Luxembourg performs very well in the uptake of mobile broadband services (126 subscriptions to mobile broadband services per 100 people compared with the EU average of 90). To a limited extent, this growth in mobile broadband take-up (10 percentage points in 2017) comes at the expense of fixed broadband take-up. Fixed broadband take-up is significantly above the EU average, but has fallen by 2 percentage points in 2017. Demand for fast and ultrafast broadband services is also increasing; 52 % of subscriptions are for fast broadband and 22.5 % for ultrafast broadband versus 47 % and 14.7 % respectively one year ago. On spectrum, Luxembourg has made only very limited progress, and has now assigned 50.46 % of the overall harmonised spectrum for broadband (50 % in 2016), due to lack of demand from operators. However, this has not prevented Luxembourg from achieving a 4G coverage that is better than the EU average (98 % versus 91 %). As fibre roll-out continues, FTTP (fibre-to-the premises) coverage has reached more than 60 %.

Luxembourg is sticking to its national broadband policy aim of ensuring everyone has coverage of 1Gbit/second by the end of 2020. The country relies mainly on market-driven broadband roll-out based on competition among operators. There are therefore no plans to use public financing. Internet operators, the national regulatory authority and the Ministry are aware of the significant challenges facing investment in 5G network infrastructure. A recent study concludes that operators might call for extending the possibilities for spectrum sharing for 5G provided by the current legislative framework.

Although Luxembourg is well on track to achieve the broadband targets at EU level, it may not meet the more ambitious targets set out by national policy by 2020. As it continues the current market-driven approach, Luxembourg could consider how future policy could encourage more predictability of further FTTH roll-out (which would be relevant both for fixed ultrafast broadband coverage and for 5G).

## 2 Human Capital

2 Human Capital	Luxembourg		Cluster	EU
	rank	score	score	score
DESI 2018	5	71.3	70.7	56.5
DESI 2017	2	73.2	69.4	54.6

	Luxembourg				EU
	DESI 2018		DESI 2017		DESI 2018
	value	rank	value	rank	value
<b>2a1 Internet Users</b> % individuals	96% ↓	1	97%	1	81%
	2017		2016		2017
<b>2a2 At Least Basic Digital Skills</b> % individuals	85% ↓	1	86%	1	57%
	2017		2016		2017
<b>2b1 ICT Specialists</b> % total employment	4.1% ↓	9	4.6%	5	3.7%
	2016		2015		2016
<b>2b2 STEM Graduates<sup>4</sup></b> Per 1 000 individuals (aged 20-29)	NA		NA		19.1
	2015		2014		2015

On human capital, Luxembourg maintains a very good position (5<sup>th</sup> rank in DESI 2018). It takes the first rank in the percentage of individuals who are regular internet users (96 % in 2017, EU average: 81 %) and the percentage of individuals who have at least basic digital skills (85 % in 2017, EU average: 57 %). It has an above-average record in the proportion of information and communication technologies (ICT) specialists in the workforce (4.1 % in 2016). However, a large share of companies report that their vacancies for ICT specialists are hard to fill (65 % of enterprises which recruited/tried to recruit reported that their vacancies for jobs requiring ICT specialist skills were hard to fill in 2017, EU average: 48 %).

In STEM subjects (science, technologies, engineering and mathematics) as in other subjects, about 70 % of Luxembourg students (residents) study abroad and not in Luxembourg (for instance at the University of Luxembourg).

Addressing the shortage of ICT specialists remains crucial to support digital transformation. This objective is being pursued through the four measures below.

1 The national coalition for digital skills and jobs: In line with the Digital Luxembourg initiative, the national coalition for digital skills and jobs was launched on 29 May 2017. The coalition brings together various actors from the public and private sectors involved in promoting digital skills. It includes the government, the education and training sector, professional chambers and federations, ICT companies and non-governmental organisations. The objective is to effectively address the shortage of ICT specialists to support the digital transformation of the country.

<sup>4</sup> The most recent data has been used in DESI 2018. It may refer to 2016 or 2015 depending on the Member State. This is reflected in the 2018 DESI ranking. Historical data has been updated by Eurostat.

2 Digital(4)Education<sup>5</sup>: The Digital(4)Education action was launched by the Luxembourg government in 2015 for young people in primary and secondary education. It comprises two components: 'Digital Education' and 'Digital for Education':

A programme for high schools innovating in ICT, called 'Future Hub', was initiated in 2017 (the first three high schools in the programme have already received the Future Hub label). These schools commit to developing their IT infrastructure and their teaching, to enable students to pursue their passions while acquiring the hard science skills necessary for them to achieve their own goals. These schools offer innovative courses that specialise in ICT (cloud computing, game development, IT and communication) as well as informal opportunities for students and regional participants to discover scientific activities such as robotics labs, coding clubs and traditional science facilities.

Makerspaces are also part of the government's digital education strategy. Designed as places of discovery, the network of makerspaces throughout Luxembourg are creative and multidisciplinary spaces open to young people and anyone interested in using new media creatively to carry out their own digital projects. The activities offered stimulate talent, encourage young people to take an interest in technological tools and motivate them to invest themselves in this field. Unlike a classic classroom, where knowledge transfer is emphasised, makerspaces stress the value of creativity, experimentation, craftsmanship, experience, learning-by-doing and the concrete realisation of people's ideas. The makerspaces are equipped with machines that can be used by young people and by trainers: hand tools, computers, soldering irons, robots, 3-D printers, cutting lasers and much more.

In the context of the 'one2one' project, the Ministry of Education introduced a programme to equip 50 % of all high school students with tablets in the next four years. The Ministry provides logistical and technical support and teacher-training to ensure full advantage is taken of this creative tool. At the same time, the Ministry is currently also updating the infrastructure of all high schools to provide high-speed internet through fibre.

In parallel, the Luxembourg Tech School provides an extra-curricular activity for high school pupils wanting to implement their digital knowledge in a real-life business project.

3 The Cybersecurity Competence Centre (C3) was opened in October 2017 to further strengthen the Luxembourg economy in cybersecurity by focusing on three areas: observation, training and testing. On training, C3 offers different training packages, including cyberattack simulation tools (e.g. Room 42 — do[n't] panic). C3 began as an initiative by Securitymadein.lu, GIE (Economic Interest Grouping) made up of the Luxembourg government and various local and private partners.

4 The Digital Skills Bridge project was announced in October 2017 by the Minister of Labour, Employment and the Social and Solidarity Economy. The aim is to help companies and their workers anticipate and adapt to disruptive changes in the content of their jobs due to digital technological change. These companies are in sectors such as banking, insurance, industry and logistics. To this end, the government will support re-skilling and up-skilling of the companies through different means (financial support, working time changes, etc.). A pilot project is set to start in May 2018, targeting 300 people in the financial sector and 300 people in the industrial and logistics sectors.

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<sup>5</sup> [www.portal.education.lu/digital4education/](http://www.portal.education.lu/digital4education/)

### 3 Use of Internet Services

3 Use of Internet Services	Luxembourg		Cluster	EU
	rank	score	score	score
DESI 2018	4	65.9	63.4	50.5
DESI 2017	3	63.9	60.5	47.5

	Luxembourg				EU
	DESI 2018		DESI 2017		DESI 2018
	value	rank	value	rank	value
<b>3a1 News</b> % individuals who used Internet in the last 3 months	88% ↓	7	89%	4	72%
	2017		2016		2017
<b>3a2 Music, Videos and Games</b> % individuals who used Internet in the last 3 months	89%	5	89%	5	78%
	2016		2016		2016
<b>3a3 Video on Demand</b> % individuals who used Internet in the last 3 months	29%	6	29%	6	21%
	2016		2016		2016
<b>3b1 Video Calls</b> % individuals who used Internet in the last 3 months	57% ↑	8	54%	6	46%
	2017		2016		2017
<b>3b2 Social Networks</b> % individuals who used Internet in the last 3 months	70% ↑	17	69%	15	65%
	2017		2016		2017
<b>3c1 Banking</b> % individuals who used Internet in the last 3 months	78% ↑	6	73%	9	61%
	2017		2016		2017
<b>3c2 Shopping</b> % internet users (last year)	82% ↑	5	80%	4	68%
	2017		2016		2017

In Luxembourg, internet use by individuals is clearly above average in all dimensions (4<sup>th</sup> rank in DESI 2018) and the country's score has also improved slightly (65.9 in DESI 2018 vs. 63.9 in DESI 2017). Among individuals who used the internet in the last three months, 88 % read online news (EU average: 72 % in 2017), 89 % played games or downloaded music/videos (EU average: 78 % in 2016), 29 % subscribed to video-on-demand (EU average: 21 % in 2016), and 57 % made an online telephone or video call (EU average: 46 % in 2017). People in Luxembourg participate in social networks more than the EU average (70 % compared with 65 % on average in the EU). Finally, individuals in Luxembourg often carry out online transactions: 79 % use online banking (average EU: 61 % in 2017) and 82 % shop online (average EU: 68 % in 2017).

## 4 Integration of Digital Technology

4 Integration of Digital Technology	Luxembourg		Cluster	EU
	rank	score	score	score
DESI 2018	22	33.2	47.0	40.1
DESI 2017	22	29.9	44.0	36.7

	Luxembourg				EU
	DESI 2018		DESI 2017		DESI 2018
	value	rank	value	rank	value
<b>4a1 Electronic Information Sharing</b> % enterprises	41% ↑ 2017	5	39% 2015	10	34% 2017
<b>4a2 RFID</b> % enterprises	6.1% ↑ 2017	6	4.9% 2014	10	4.2% 2017
<b>4a3 Social Media</b> % enterprises	20% ↑ 2017	13	19% 2016	12	21% 2017
<b>4a4 eInvoices</b> % enterprises	NA 2017		10.9% 2016	20	NA 2017
<b>4a5 Cloud</b> % enterprises	NA 2017		12.2% 2016	14	NA 2017
<b>4b1 SMEs Selling Online</b> % SMEs	7.8% ↓ 2017	26	9.1% 2016	24	17.2% 2017
<b>4b2 E-commerce Turnover</b> % SME turnover	NA 2017		NA 2016		10.3% 2017
<b>4b3 Selling Online Cross-border</b> % SMEs	7.7% ↑ 2017	17	6.3% 2015	18	8.4% 2017

Luxembourg is well below the EU average in the integration of digital technologies by companies (22<sup>nd</sup> rank in DESI 2018) and its position has not changed since the previous year. In business digitisation, companies in Luxembourg are in a good position for electronic information sharing (41 % in 2017, EU average: 34 %), radio frequency identification (6.1 % in 2017, EU average 4.2 %), and in an average position for the use of social networks (20 % in 2017, EU average 21 %). However, Luxembourg recorded below-average results in e-commerce for small and medium-sized enterprises (SMEs - between 10 and 249 persons employed, excluding financial sector): only 7.8 % of SMEs sell online (EU average: 17.2 %) and 7.7 % of SMEs sell online cross-border (EU average: 8.4 %).

In order to reduce the dependence of Luxembourg on the financial sector, the government has embarked on an economic 'multi-specialisation' strategy and identified five priority sectors, one of which is the ICT sector.

Luxinnovation, the Luxembourg agency for innovation and research, promotes business development linked to innovation, including in the ICT sector.

The Luxembourg Cluster Initiative, managed through Luxinnovation, supports at present ten cluster organisations, one of which is the ICT cluster. The ICT cluster brings together various industry and research stakeholders with the aim of encouraging business development in ICT.



The Fit4Start action supports start-up companies with financing and training. It was started in October 2015 and implemented by Luxinnovation. At the end of 2017, 18 start-up companies had followed this programme.

The platform 'Digital4Industry' was launched in June 2016 by FEDIL, Luxinnovation and the Ministry of the Economy. The initiative is funded by the Ministry of Economy via investment aid (10 % for medium-sized enterprises; 20 % for small enterprises) for tangible and intangible investments depreciated over three years or more. The initiative also awards grants for R&D and innovation, according to the bottom-up principle with different funding rates depending on the company's size.

Building on Luxembourg's experience in the financial sector, several actions have been launched in financial technologies with the ambition of making Luxembourg the European hub of fintech.

The InfraChain initiative was incorporated in May 2017. It is a public-private partnership (founded by the state of Luxembourg plus 11 private actors) that aims to develop a European infrastructure for blockchain operations. It strives to develop a stable governance framework in the spirit of the General Data Protection Regulation (GDPR), as well as a technical framework able to support operators using blockchain technology (not only fintech but also healthcare, public services, etc.). It also includes a large majority of Luxembourg's blockchain ecosystem and fosters the community through events and knowledge sharing.

At the end of 2017, an e-commerce platform called 'LetzShop.lu' was launched by the government in collaboration with the chamber of commerce, the Luxembourg Confederation of Commerce (CLC) and the main towns of the country. This website is a digital showcase for shops in Luxembourg to allow traders to gain visibility and improve their image through a developed network of shops. The aim is to increase their traffic and sales, erase barriers between physical and digital stores, and improve customer service by offering customers a path to purchase online.

#### **Highlight 2018: The Luxembourg House of Fintech (LHoFT)<sup>6</sup>**

LHoFT opened its gates in April 2017 as the entrepreneurial hub of the Grand Duchy in financial technologies (fintech). This initiative brings together public partners (led by the Ministry of Finance) and private partners (13 companies in the financial sector) which finance it equally.

It has three goals.

1°) To serve as a business incubator: LHoFT is dedicated to start-up companies using ICT that aim to bring innovation to the financial sector.

2°) To provide a physical space for companies to work and interact: LHoFT offers coworking spaces and is also a place to organise events. Finally it is a soft landing platform for companies from outside the EU.

3°) To act as a training centre: LHoFT offers training courses as well as advice from its professional partners in the financial sector

LHoFT typically hosts between 5 and 10 startups in several fields: online payment (e.g. BITPESA: foreign-currency exchange platform for frontier markets), money transfer (e.g. UniSkip), Know-Your-Customer applications and software, cryptocurrencies and blockchain.

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<sup>6</sup> <https://www.lhoft.com/>.

## 5 Digital Public Services

5 Digital Public Services	Luxembourg		Cluster	EU
	rank	score	score	score
<b>DESI 2018</b>	<b>17</b>	<b>56.2</b>	<b>63.0</b>	<b>57.5</b>
DESI 2017	20	47.0	60.2	53.7

	Luxembourg				EU
	DESI 2018		DESI 2017		DESI 2018
	value	rank	value	rank	value
<b>5a1 eGovernment Users<sup>7</sup></b> % internet users needing to submit forms	<b>49%</b> ↑ 2017	<b>20</b>	<b>45%</b> 2016	<b>22</b>	<b>58%</b> 2017
<b>5a2 Pre-filled Forms</b> Score (0 to 100)	<b>50</b> ↑ 2017	<b>15</b>	<b>30</b> 2016	<b>20</b>	<b>53</b> 2017
<b>5a3 Online Service Completion</b> Score (0 to 100)	<b>80</b> ↑ 2017	<b>19</b>	<b>77</b> 2016	<b>19</b>	<b>84</b> 2017
<b>5a4 Digital Public Services for Businesses</b> Score (0 to 100) - including domestic and cross-border	<b>82</b> ↑ 2017	<b>16</b>	<b>80</b> 2016	<b>17</b>	<b>83</b> 2017
<b>5a5 Open Data</b> % of maximum score	<b>85%</b> ↑ 2017	<b>6</b>	<b>57%</b> 2016	<b>14</b>	<b>73%</b> 2017
<b>5b1 eHealth Services</b> % individuals	<b>19%</b> 2017	<b>12</b>	<b>NA</b>		<b>18%</b>

In digital public services, Luxembourg ranks below the EU average. It ranked 17<sup>th</sup> in DESI 2018, having progressed slightly from the 20<sup>th</sup> rank in 2017. 49 % of internet users needed to submit online forms to public authorities (well below the EU average of 58 %) in 2017. According to the e-government benchmark, Luxembourg has a score of 50 for pre-filled data in online forms (EU average: 53) and a score of 80 for registration of life events that can be completed online (EU average: 84). The substantial progression of Luxembourg in open data should be noted: according to the measure of the European Open Data Portal, there was a significant jump from 57 % in 2016 to 85 % in 2017, causing a speedy ascent up the rankings, from 14<sup>th</sup> to 6<sup>th</sup> rank.

Government policy on digital public services is based on three principles: 'digital by default', 'once only' and transparency. These three principles have been implemented to achieve three goals of public management.

1°) Simplification: the 'Simple Luxembourg' (Einfach Lëtzebuerg) policy aims at simplifying a set of administrative procedures (88 procedures were identified, 36 were completed, 22 were in progress and 22 were reviewed at the end of 2017).

2°) Efficiency: through the website myguichet.lu people and companies are able to complete an increasing number of administrative procedures (78 new procedures since 2016).

3°) Transparency: beyond the mere transposition of the 2013/37/EU PSI 2 directive in 2016, the Luxembourg government has embarked on an open data strategy. At the legal level, new

<sup>7</sup> The definition of this indicator has been changed. The new indicator measures eGovernment users as a percentage of those internet users needing to submit forms to the public administration.

texts must be in a format that is machine readable; in addition, all texts will be linked to metadata.

The Data Embassy project resulted from an agreement between the governments of Luxembourg and Estonia signed in June 2017. In its terms, a data centre in Luxembourg keeps a copy of the critical data of Estonia with extraterritorial privileges. It is a world first.

In e-health, the Clinnova project was launched in September 2017 by the Minister of Health. The Clinnova project aims to set up a research centre for digital health and personalised medicine. This project will bring together both Luxembourg (the Luxembourg Institute of Health, the NORLUX laboratory) and foreign partners (the University of Southern Denmark, the German Cancer Research Centre). This project was presented as an opportunity for both health and digital technologies. It will bring advances in medical research but also patient knowledge through personalised data.