



Digital Economy and Society Index (DESI)

2019 Country Report

Denmark

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.*

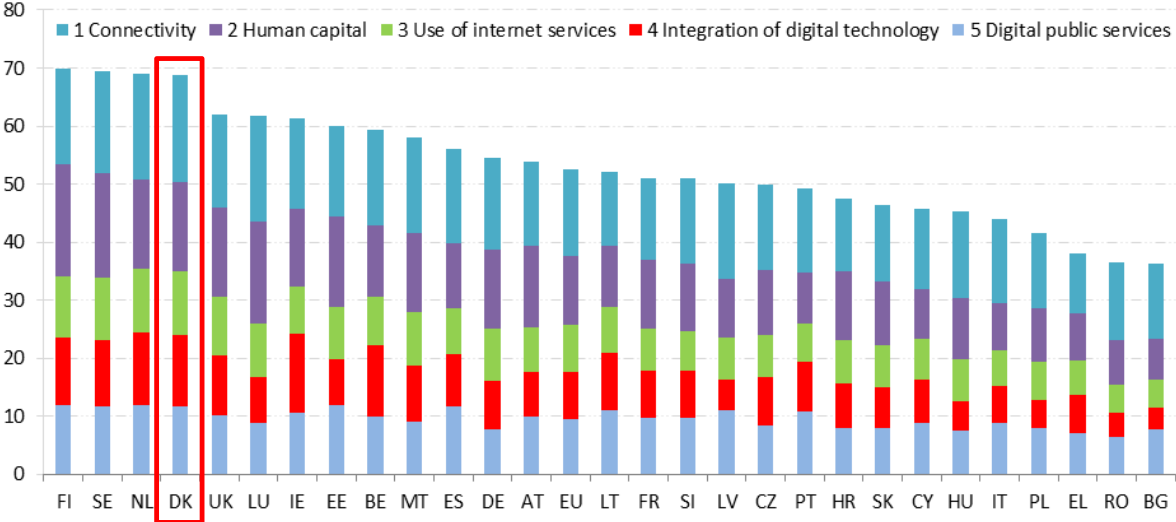
The DESI was re-calculated for all countries for previous years to reflect the above changes in the choice of indicators and corrections to the underlying data. Country scores and rankings may thus have changed compared with previous publications.

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

Denmark overview

	Denmark		EU
	rank	score	score
DESI 2019	4	68.8	52.5
DESI 2018	4	66.1	49.8
DESI 2017	1	65.6	46.9

Digital Economy and Society Index (DESI) 2019 ranking



Denmark ranks 4th out of the 28 EU Member States in the European Commission Digital Economy and Society Index (DESI) 2019. Denmark improved its score in all dimensions.

The coverage of fixed broadband, 4G and NGA in particular is approaching 100 %, which is a long way above the EU average. Only 2 % of individuals have never used the Internet and only three out of ten still lack basic digital skills. Danish SMEs are transforming their business and following the digital evolution. This translates into a leading position for SMEs that sell online and a good performance in terms of e-commerce turnover.

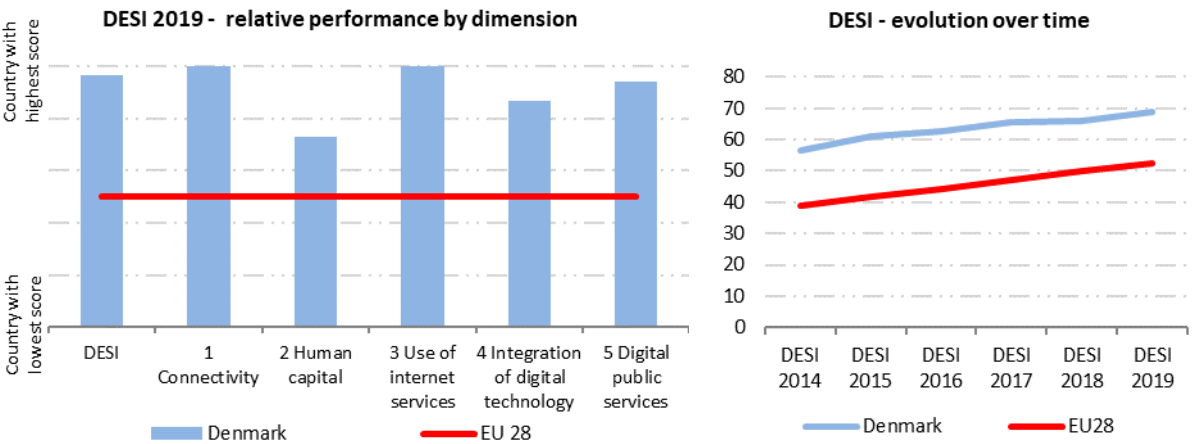
Denmark made most progress in integrating digital technology retaining the same position as last year (4th), while ranked 1st in the Use of internet services.

With the newly launched ‘Digital Strategy for Denmark’s Digital Growth’¹, the country has a good foundation to remain at the forefront of digital developments. As part of a political agreement, the government has allocated almost DKK 1 billion until 2025 for the implementation of the initiatives making up the strategy. To track the progress of the objectives, the government has set as its main priority the aim of ensuring that all Danes are the most digitally prepared in the EU.

¹ https://eng.em.dk/media/10566/digital-growth-strategy-report_uk_web-2.pdf

In November 2018, the Danish government decided to prepare a strategy for use of data in the public sector. The strategy aims at creating more coherent and targeted services through data, as well as ensuring a clear framework for use of data. In March 2019, the Danish government launched its National Strategy for Artificial Intelligence². With the strategy, the government aims to provide a common ethical and human centric foundation for AI as well as a set of goals for using AI within the public, private and research sector. Furthermore, the strategy establishes a number of initiatives to further strengthen Denmark’s development and application of AI.

Since 2016, the ‘Digital Strategy 2016-2020’³ (e-government strategy) has been setting the course for Danish public sector digitisation efforts and their interaction with businesses and industry. In addition, the government acknowledges the importance of providing confidence in the security of digital solutions to boost the digital development in Denmark. In May 2018, the government published the ‘Danish Cyber and Information Security Strategy 2018-2021’⁴. It plans to launch 25 initiatives and six targeted strategies addressing the most critical sectors’. These initiatives range from efforts to improve cyber and information security to improving the technological resilience of digital infrastructure and to boosting citizens’, businesses’ and authorities’ knowledge and skills with a view to strengthening coordination and cooperation in this area.



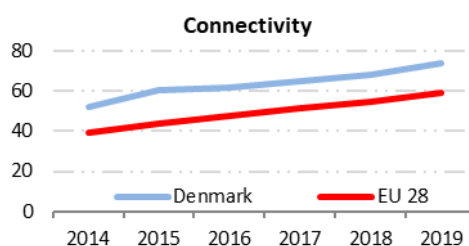
² <https://investindk.com/insights/the-danish-government-presents-national-ai-strategy>

³ https://en.digst.dk/media/14143/ds_singlepage_uk_web.pdf

⁴ https://en.digst.dk/media/17189/danish_cyber_and_information_security_strategy_pdf.pdf

1 Connectivity

1 Connectivity	Denmark		EU
	rank	score	score
DESI 2019	1	73.6	59.3
DESI 2018	3	68.1	54.8
DESI 2017	3	65.1	51.2



	DESI 2017	Denmark	DESI 2019	EU
	value	DESI 2018	value rank	DESI 2019
1a1 Fixed broadband coverage % households	99%	99.5%	99.5% 10	97%
1a2 Fixed broadband take-up % households	83%	86%	82% 8	77%
1b1 4G coverage % households (average of operators)	97%	97%	99% 5	94%
1b2 Mobile broadband take-up Subscriptions per 100 people	120	128	131 5	96
1b3 5G readiness Assigned spectrum as a % of total harmonised 5G spectrum	NA	NA	33% 3	14%
1c1 Fast broadband (NGA) coverage % households	93%	95%	95% 6	83%
1c2 Fast broadband take-up % households	41%	52%	55% 8	41%
1d1 Ultrafast broadband coverage % households	NA	86%	92% 4	60%
1d2 Ultrafast broadband take-up % households	11%	19%	28% 11	20%
1e1 Broadband price index Score (0 to 100)	89	86	86 13	87

Denmark became the leader in the Connectivity dimension⁵. 4G and next-generation (NGA) coverage are among the best in the EU (99 % and 95 %, respectively). Mobile and fixed broadband take-up have progressed, in particular in ultrafast broadband, where there has been a sharp increase in take-up from 19 % in the previous year to 28 % in 2018. Ultrafast broadband coverage (92 %) is also well above the EU-average (60 %). On rural NGA coverage, the situation has improved, but with 70.6 % coverage these remote areas are still lagging considerably behind total NGA coverage which stands at 95 %.

In May 2018, all political parties in the Danish Parliament agreed on a new political framework for the telecommunications industry. The agreement confirmed the national broadband target that all homes and businesses should be covered by broadband speeds of minimum 100/30 Mbps downlink/uplink by 2020, and they should have good mobile coverage. In 2020 the parties will

⁵ As Denmark is relatively strong in a wide range of connectivity indicators it is fully consistent that its average rank (4) is even above the best ranks (5) achieved in the '4G coverage' and 'Mobile broadband take-up' sub-dimensions.

discuss whether the target would need to be updated. The political agreement confirmed the fundamental principle of the Danish telecom policy, that the roll-out of digital broadband is primarily done by the telecom sector on ordinary market terms. State aid should only be a possibility in local areas with poor prospects for better coverage by the market. The National Broadband Fund, established in 2016 by the Danish government, has been focused further towards lowly populated areas in 2018. There was an amount of DKK 100 million in the fund for 2018⁶. The fund can offer grants to the roll-out of high-speed broadband (minimum 100/30 Mbps downstream/upstream) in underserved areas (which have access to max 10/2 Mbps – ‘white spots’). In November 2018, the Danish Parliament adopted a proposal to amend the Telecommunications Act in order to establish a more concise framework for financial grants from municipalities to support the local roll-out of digital infrastructure.

The spectrum award of the 700 MHz, 900 MHz and 2.3 GHz spectrum bands was planned for the end of February 2019 but did not start yet. The coverage obligations in the 700 MHz and 900 MHz bands require at least 90 % outdoor area coverage. In the 2.3 GHz band, coverage obligations apply to a list of specified addresses and for fixed reception at these addresses. A public consultation on the interest for the 3.6 and 26 GHz bands for 5G use had been under way at the end of 2018. In Denmark, 32 % of the of the total 2090 MHz spectrum harmonised at EU level for wireless broadband has been assigned. In Denmark, mobile operators are already testing 5G; not least in order to clarify technical issues related to the new technology. At the same time, different sectors have begun to look at how 5G could be used in the future. For example, the Danish Agency for the supply of data and the effectiveness of efficiency in collaboration with DTU Space and Aarhus municipality has started a project for a high precision positioning system. This could support i.e. precision agriculture, driverless vehicles and the use of drones. Overall, research and trials of 5G are at a small scale and focus on the health sector, transport, pharmaceuticals, agriculture and broadcasting⁷.

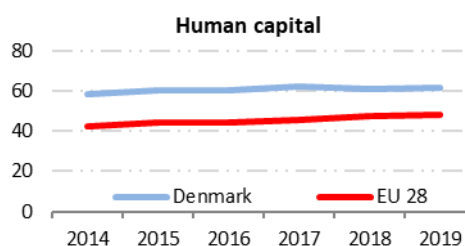
Fixed broadband and mobile network coverage are significantly above the EU average. As Denmark overwhelmingly relies on private investment, more clarity on the issue of prospects for regulated access to fibre networks resulting from the market reviews under preparation could help investors to assess potential benefits and risks more reliably. Bringing down the administrative burden for small localised fixed broadband funding projects in white spots will be another challenge.

⁶ The same amount is expected for 2019 (subject to parliamentary approval).

⁷ The Danish 5G action plan has been published on 18 February 2019, see https://ens.dk/sites/ens.dk/files/Tele/5g-handlingsplan_for_danmark.pdf

2 Human capital

2 Human capital	Denmark		EU
	rank	score	score
DESI 2019	7	61.5	48.0
DESI 2018	6	60.6	47.6
DESI 2017	4	62.4	45.4



	Denmark		EU	
	DESI 2017	DESI 2018	DESI 2019	DESI 2019
	value	value	value rank	value
2a1 At least basic digital skills % individuals	78% 2016	71% 2017	71% 5 2017	57% 2017
2a2 Above basic digital skills % individuals	53% 2016	47% 2017	47% 3 2017	31% 2017
2a3 At least basic software skills % individuals	79% 2016	72% 2017	72% 6 2017	60% 2017
2b1 ICT specialists % total employment	3.9% 2015	4.2% 2016	4.4% 8 2017	3.7% 2017
2b2 Female ICT specialists % female employment	1.5% 2015	1.8% 2016	1.8% 6 2017	1.4% 2017
2b3 ICT graduates % graduates	4.4% 2014	4.4% 2015	4.5% 9 2016	3.5% 2015

On Human capital dimension, Denmark ranks 7th among EU countries, which is above the EU average. Denmark performs very well regarding digital skills and of the proportion of ICT specialists is rising. 71 % of Danes reportedly have basic digital skills, while nearly 50 % have above basic skills. Every year the percentage of ICT specialists is increasing (reaching 4.4 % in 2018), which is a larger proportion of the workforce than in EU as a whole (3.7 %), putting Denmark in the 8th place among the Member States. Similarly, the share of female ICT specialist has been improving and is above the EU average of 1.4 %, placing Denmark 6th among EU countries.

‘Digital skills for all’ is one of the six strategic focus areas of the digital growth plan. The ‘Danish Technology Pact’, one of the initiatives included in the national growth plan, provides initiatives designed to improve Danish people’s STEM (Science, Technology, Engineering & Mathematics) skills. Between 2019 and 2022, DKK 20 million (approximately EUR 2.7 million) will be allocated annually to supporting these initiatives. In addition, the government will initiate a project worth DKK 43.4 million (approximately EUR 5.8 million) financed from the national pool of structural funds, to improve the number of STEM graduates. It shall further stimulate actions across the private, public and educational sectors in order to support technological and digital skills.

Also, as part of The Digital Strategy 2016-2020 an initiative has been launched to include and train citizens who lack basic digital competencies in communicating with the public sector.

Denmark has a National Coalition for Digital Skills⁸ established in January 2019. . Denmark also actively participated in the EU Code Week⁹ in 2018 with 21 events and an estimated 800 teachers and students taking part.

In order to increase basic digital skills The government has also set up a programme to improve understanding of technology in primary and lower secondary education. It is designed to provide schools with appropriate equipment and to back up these efforts by developing teachers' skills. The programme, which runs from 2018 to 2021has assigned DKK 68 million (approximately EUR 9.1 million) so far. 46 schools will be testing the program. In addition, capacity-building programmes will be tested and offered from universities to strengthen businesses, public authorities and individuals.

The Vocational Education and Training (VET) sector creates links with the market and industry in terms of digital skills. The mismatch between the existing and the desired set of digital skills is being tackled by new specialised programmes, which are offered as part of secondary technical and vocational education. The digital 'Technology and Programming' specialisation is one of the programmes. The Centre for the application of IT in teaching in vocational education disseminates experience and new knowledge about the use of IT and technology in teaching for the benefit of students and teachers. It is to work in close collaboration with researchers from Danish universities to create a new knowledge base on IT in teaching.

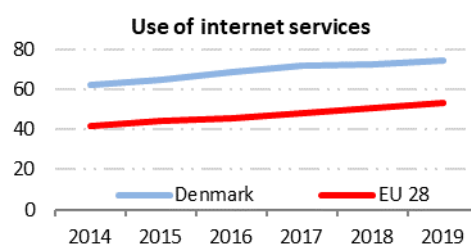
Denmark is progressing in addressing the demand for digital skills in the workforce. In the last ten years, the admission of new students into the higher education STEM degree programs (most in demand on the Danish labour market) has doubled. Furthermore, the government has established an objective to increase the number of tertiary STEM-graduates by 20 percent by 2028 as part of the Danish Technology Pact. To keep pace with the demand for ICT specialists and fill ICT vacancies, it would be beneficial to continue taking similar measures to raise awareness about the need to develop future-proof levels of digital skills. In addition, it is important to boost policies improving the participation of women in ICT.

⁸ <https://dit.dk/dsjc>

⁹ <https://codeweek.eu/>

3 Use of internet services

3 Use of internet services	Denmark		EU
	rank	score	score
DESI 2019	1	74.1	53.4
DESI 2018	1	72.2	50.7
DESI 2017	1	71.9	47.8

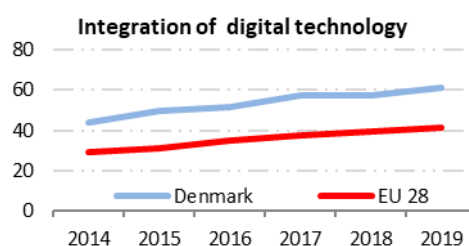


	DESI 2017	Denmark		EU	
	value	DESI 2018	DESI 2019	rank	DESI 2019
3a1 People who never used the internet % individuals	2%	2%	2%	1	11%
3a2 Internet users % individuals	94%	95%	95%	1	83%
3b1 News % internet users	NA	86%	86%	9	72%
3b2 Music, videos and games % internet users	90%	90%	90%	4	81%
3b3 Video on demand % internet users	49%	49%	56%	3	31%
3b4 Video calls % internet users	60%	62%	69%	5	49%
3b5 Social networks % internet users	77%	78%	81%	6	65%
3b6 Professional social networks % internet users	30%	31%	31%	2	15%
3b7 Doing an online course % internet users	NA	9%	9%	10	9%
3b8 Online consultations and voting % internet users	14%	14%	14%	5	10%
3c1 Banking % internet users	91%	92%	92%	3	64%
3c2 Shopping % internet users	84%	82%	86%	2	69%
3c3 Selling online % internet users	36%	30%	30%	5	23%

Denmark is a leader in the Use of internet services. Almost all Danes (95 %) are regular internet users, which is above the EU average (83 %). People in Denmark are keen to engage in a variety of online activities. Remarkably, only 2 % of Danes have never used internet, while the EU average is 11 %. Dane’s most popular online activities are listening to music, watching videos and playing video games with 90 % of internet users engaging in these activities, while the EU average is slightly lower at 81 %. Banking and shopping online are also very popular among Danes who use internet, and Denmark scores well above the EU average (92 % and 86 % respectively). Doing an online course is the least popular activity among Danes, but it is still above the EU average: almost one in ten Danes takes online courses.

4 Integration of digital technology

4 Integration of digital technology	Denmark		EU
	rank	score	score
DESI 2019	4	61.3	41.1
DESI 2018	4	57.4	39.6
DESI 2017	2	57.2	37.6



	DESI 2017	Denmark	DESI 2019	rank	EU
	value	DESI 2018	value		DESI 2019
4a1 Electronic information sharing % enterprises	47% 2015	40% 2017	40% 2017	6	34% 2017
4a2 Social media % enterprises	27% 2016	29% 2017	29% 2017	5	21% 2017
4a3 Big data % enterprises	12% 2016	12% 2016	14% 2018	11	12% 2018
4a4 Cloud % enterprises	30% 2016	38% 2017	41% 2018	4	18% 2018
4b1 SMEs selling online % SMEs	27% 2016	28% 2017	31% 2018	1	17% 2018
4b2 e-Commerce turnover % SME turnover	18% 2016	14% 2017	17% 2018	4	10% 2018
4b3 Selling online cross-border % SMEs	10% 2015	9% 2017	9% 2017	11	8% 2017

In the Integration of digital technology by businesses, Denmark ranks 4th among EU countries, retaining last year's position. 29 % of enterprises use social media, almost one in five SMEs use e-invoicing, and 9 % of SMEs selling services or products cross border. The total number of SMEs selling online rose further to 31 % compared with 28 % in 2017, making Denmark a leader among EU countries. Furthermore, 14 % of enterprises actively analyse big data.

Denmark is committed to the advancement of new digital technologies and it invests in digital technologies through EU-coordinated programmes. Denmark signed the Declaration on cooperation on Artificial Intelligence (AI) in 2018.

In September 2018, the government launched the new 'Danish cyber and information security strategy 2018-2021'. With its 25 initiatives, the new strategy will improve the technological resilience of digital infrastructure, improve knowledge and skills of citizens, businesses and authorities and step up national coordination and cooperation on information security. The Danish government has set three clear benchmarks for becoming more digitally secure as a country over the coming four years: (i) everyday safety for citizens and businesses; (ii) better competences for citizens, authorities and businesses; and (iii) joint efforts and a clear division of roles and responsibilities in the area of cyber and information security for authorities and businesses that fulfil key functions in society.

To promote businesses' use of data, the Government has recently launched a new portal (brugdata.dk) with user-friendly business-oriented information and guidance material on the rules regarding responsibility, ownership and rights on the use of data.

In early 2019, the government presented the report "Prepared for the Future of Work"¹⁰, follows up on the Danish Disruption Council set up in May 2017. The report sets out a number of conclusions on the Council's discussions and work to date.

Danish industry is flourishing, and governmental policies support SMEs and large enterprises to digitise. However, there is still further scope for SMEs to broaden their markets and reach markets abroad, for all enterprises to incorporate new technologies for creating a competitive advantage (e.g. big data).

Highlight 2019: 'SME: Digital'

Although Denmark leads the EU in the use of digital technologies in business, the government aims to further boost digitisation in SMEs and their use of e-commerce.

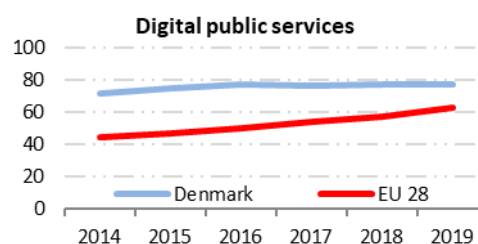
'SMEs: Digital', one of the initiatives included in the growth plan, helps SMEs exploiting the new digital technologies to create growth and jobs in Denmark. Through www.smvdigital.dk, SMEs can get private procurement grants to help them clarify how they can digitise further and to identify economic and business potential. The initiative is also designed to improve SMEs' use of e-commerce by SMEs. 28% of SMEs sell online, while the percentage is almost double that among big companies (54%).

Over the next four years, up to 2,000 SMEs are expected to benefit from what SMEs: Digital has to offer. As part of SMEs: Digital, a small board will be set up to provide input to the Minister for Business on promoting digital conversion in SMEs and ensuring that SMEs:Digital meets business needs. The Board will comprise business representatives, experts and organisations.

¹⁰ https://www.regeringen.dk/media/6332/regeringen_disruptionraadet_uk_web.pdf

5 Digital public services

5 Digital public services	Denmark		EU
	rank	score	score
DESI 2019	5	77.8	62.9
DESI 2018	3	77.4	57.9
DESI 2017	2	76.7	54.0



	DESI 2017	Denmark	DESI 2019	rank	EU
	value	DESI 2018	value		DESI 2019
		value	value		value
5a1 e-Government users % internet users needing to submit forms	89% 2016	86% 2017	90% 2018	4	64% 2018
5a2 Pre-filled forms Score (0 to 100)	71 2016	71 2017	69 2018	12	58 2018
5a3 Online service completion Score (0 to 100)	95 2016	95 2017	95 2018	7	87 2018
5a4 Digital public services for businesses Score (0 to 100) - including domestic and cross-border	100 2016	100 2017	100 2018	1	85 2018
5a5 Open data % of maximum score	NA	NA	37% 2018	27	64% 2018
5b1 e-Health services % individuals	NA	42% 2017	42% 2017	3	18% 2017
5b2 Medical data exchange % of general practitioners	NA	NA	98% 2018	1	43% 2018
5b3 e-Prescription % of general practitioners	NA	NA	98% 2018	3	50% 2018

On Digital public services, Denmark ranks 5th among EU countries having fallen 2 positions since 2017. Denmark is leading in medical data exchange, 55 percentage points above the EU average (43 %), while 42 % of Danes used e-health services and almost every practitioner (98 %) exchanged medical data online. Denmark provides top-class digital services for businesses (100 %), which places the country 1st among EU Member States. The online interaction between public authorities and citizens is high (90 %) and well above the EU average (64 %).

The 33 initiatives in the e-government strategy have produced the first results, consolidating Denmark's worldwide leading position on public service digitisation. In March 2019, central and local government took a joint step to enable seamless digital delivery of services across administrations and collaboration in the public service with the new "Digitisation Pact". The overall aim is to accelerate public sector digitisation efforts and contribute to better and more coherent welfare by making sure that more people benefit from new digital possibilities and technology.

The 'e-Government Security Policy' ensures a high common level of network and information security across government information and communication systems. In line with the eIDAS regulation, Denmark has focused on developing an eID gateway that will enable members of the public from within the EU to use their national eID to log into another EU country's digital self-service

solutions. In the long term, the objective is for citizens to use the digital solution in any EU country. Several public authorities in Denmark have been involved in the process and have prepared their own solutions for foreign citizens.

In 2018, Denmark launched the ‘Digital Health Strategy 2018-2020’¹¹, which has the overall aim of helping the healthcare actors take responsibility for interconnecting patient pathways across individual interactions with the health care sector. Digitisation enables more tasks to be performed close to patients in a personalised and coherent health system, which looks at the person as a whole, not just at the individual diagnosis. The strategy defines five focus areas for achieving the objectives of putting patient needs first and making daily workflows easier for healthcare professionals.

Furthermore, in 2018, the Danish Government launched the health data strategy “Healthcare in the future – responsible use of data for the benefit of patients”. The strategy’s main principle is that better use of health data for healthcare services, research and quality improvement is a key condition for addressing the challenges that face the healthcare system. The strategy includes goals and initiatives within three focus areas. Firstly, it focuses on transparency about the use of health data, enhanced privacy of citizens’ information, and increased cyber and information security. Secondly, it focuses on increased quality and coherence of patient pathways across general practice, hospitals and municipalities through better sharing and use of existing data and good conditions for research and life science. Thirdly, it focuses on updating the legislation to a digital age that supports digital collaboration with and about the patient, and which ensures transparency about the use of data.

Denmark has a sound foundation on which it can continue digitising public services and health system. It is essential for Denmark to pursue its efforts to further improve the availability and usability of open data, as well as, the amount of data that is pre-filled in public services’ online forms.

¹¹ https://sundhedsdatastyrelsen.dk/-/media/sds/filer/rammer-og-retningslinjer/strategi-digital-sundhed/digital-health-strategy-2018_2022.pdf