

National strategies on Artificial Intelligence A European perspective in 2019

Country report – Denmark



In March 2019, the Danish government has published its [national strategy for artificial intelligence](#) (Denmark, 2019). The Danish strategy sets out the goals and visions for AI development in Denmark, it presents the challenges to be addressed and eventually it identifies specific policy initiatives and priority areas.

It aims at putting Denmark at the forefront of responsible development of artificial intelligence and sets out four objective to achieve this goal:

- Develop a common ethical and human-centred basis for AI;
- Prioritise and support research in AI;
- Encourage the growth of Danish businesses by developing and using AI;
- Ensure that the public sector uses AI to offer world-class services for the benefits of citizens and society.

The strategy contained 24 initiatives for which €9.2 million has been reserved by the Danish government for the period 2019-2027. The budget has since been reprioritised and lowered to €5 million. The government plans to evaluate the strategy in order to determine future actions regarding artificial intelligence.

In addition, the Finance Act 2019 earmarked €39.5 million for research in new digital technologies. Furthermore, €26.8 million is being earmarked for a new Investment Fund (2019-2022) helping the dissemination of digital welfare solutions and new technologies. Technological possibilities, such as artificial intelligence, also play a role in the research funding established via the Finance Act 2020.

The outlined policy initiatives below also include those presented in the [Strategy for Denmark's Digital Growth](#) (Denmark, 2018): a policy report setting the direction on how Denmark can seize the opportunities of the digital transformation. This report contains 38 initiatives. A part of them relates directly to artificial intelligence or provides initial policy steps that will affect the development of artificial intelligence technologies.

1 Human capital

While access to technology and data is primordial for the development of AI, it only adds value in interaction with people. Hence, fully exploiting the benefits of artificial intelligence requires governments to invest in people as to have the right digital competences and skills. In terms of **formal education and training**, the Danish Government has launched these programs:

- Technology Pact: the [pact](#) signed by 80 participating institutions aims to attract 250 participating members and to increase the number of students choosing STEM subjects ((science, technology, engineering and mathematics) by 20%, or 10,000 students by 2028;
- A four-year test program has been launched (2019-2021) to strengthen technology understanding in primary and lower secondary education. Various teaching models will be evaluated and efforts will be devoted to developing the skills of teachers.

Furthermore, a national action plan to strengthen digital competences and digital learning on higher education institutions was launched in April 2019, including funding to support continuous upskilling courses for teachers (€6 million in 2019).

The Danish government is not only targeting an increased uptake of education in digital and AI-related skills, but is also promoting a **culture of lifelong learning and continuous up/reskilling of the existing workforce**. The government thus has set up a vocational adult education and training working group to advise new forms of vocational education programs to target the upcoming needs of the labour market. The Government will set up a centre for the application of IT in vocational education teaching, and will support vocational courses, among others in AI.

2 From the lab to the market

As mentioned above regarding the Finance Acts 2019 and 2020, Denmark is investing in a range of programs to **boost research and development** in digital and artificial intelligence research and pilot projects. Policy initiatives include among others:

- The creation of the National Centre for Research in Digital Technologies: the aim of the [centre](#) is to develop and support the digital field through research in AI, Big Data, Internet-of-Things (IoT) and IT Security;
- AI research funds: The [Innovation Fund Denmark](#) and the [Independent Research Fund Denmark](#) financially support research into new technological possibilities such as artificial intelligence.

In order to increase **innovation in AI** and foster the creation and growth of AI businesses, the Danish strategy highlights the following policy initiatives and investment instruments:

- Investment for AI businesses: The Danish Growth Fund will launch a pilot project in the form of an investment pool of €3.1 million over four years targeting companies with a business model based on artificial intelligence. It will take the form of co-investments with private investors;
- [Sprint:Digital](#) – a coordinated scheme to support the digital transformation of Danish SMEs, which can benefit their ability to innovate in AI. The aim of this policy is to promote the digital transformation of SMEs by using agile design sprints to develop and test new digital solutions and business models.

The Danish AI strategy foresees the following **four priority areas**:

- Healthcare;
- Energy and utilities;
- Agriculture;
- Transport.

Besides policies directed to the private sector, the Danish government aims also to support more effective deployment and use of new technologies, including **artificial intelligence, across the public sector**:

- National Centre for Public Sector Innovation (COI): this [centre](#) supports more effective deployment and use of new technologies, such as AI, in the public sector;
- The Danish government has launched [15 signature projects](#) within health, social affairs, employment, and cross-sector case processing, to foster the use of artificial intelligence;
- The [Digital Strategy 2016-2020](#) sets the course for Danish public sector digitisation efforts and their interaction with businesses and industry. It prepares the public sector to upcoming technological challenges and opportunities of AI and big data (Denmark, 2016).

In order to develop artificial intelligence tools into effective and efficient products and services, both public and private sector players should have the **possibility of testing AI solutions**. To this purpose, the Danish government foresees several policy initiatives:

- Digital welfare solutions: the Danish government allocates investment fund to test and deploy new technologies and digital welfare solutions in municipalities and regions;
- [Performance contracts](#) with seven Danish [GTS](#) institutes: the government is setting up performance contracts with seven GTS institutes allowing them to test new technologies, including for instance AI.

3 Networking

A major challenge for the Danish government is to create a collaborative environment for the development of digital technologies. In this respect, the Danish AI strategy pays particular attention to **improve opportunities for partnerships between public and private sectors**, in particular for new technologies such as the Internet of Things, artificial intelligence and data analysis:

- National Centre for Public Sector Innovation: one of the objectives of this [centre](#) is to help strengthen public-private collaboration, so that the public sector incorporates private sector competences, resources and experience.

4 Regulation

The use of AI technologies is expected to raise new ethical and legal issues, calling for the development of a responsible ethical and legal framework for the use of artificial intelligence.

The Danish strategy foresees to develop an ethical framework based on six principles in order to improve the level of trust and confidence in AI. The six principles for AI relate to self-determination (i.e. ensuring that citizens can make informed and independent decisions) and to human dignity, equality and justice (i.e. ensuring that there is no infringement of human rights and maintaining respect for diversity). It also covers aspects of responsibility and explainability (i.e. openness and transparency). The sixth principle stipulates that AI development should be ethically responsible. To ensure that **ethical issues** are taken up, the Danish government advocates:

- In May 2019 an independent [Data Ethics Council](#) was launched with the purpose of making recommendations on ethical issues, in particular on responsible and sustainable use of data by the public and private sector;
- In December 2019 a [Data Ethics Toolbox](#) was launched to support companies to adopt and implement data ethics into their business models;
- A [joint cybersecurity and data ethics seal](#) is a labelling scheme has been agreed upon and is expected to be launched in the first half of 2020 by an independent multi-stakeholder consortium involving consumer groups, research institutes and the industry;
- The Danish government is going to present a law on disclosure of Data Ethics Policy for the largest Danish companies in spring 2020. This means that companies will have to explain their company data ethics policy and comply with the aforementioned law – in a similar way as they are already doing for their corporate social responsibility policies.

In terms of **legislation**, the Danish strategy highlights the need to evaluate the current legal framework and to adopt new legislation to guarantee a responsible development of artificial intelligence applications. New legislation relates among others to data ethics and security regulations and include initiatives as:

- Setting up an inter-ministerial working group to analyse to what extent the existing legislative framework is sufficiently covering the current needs of AI regulations, and to determine if new legislation should be launched;
- Legislative amendment to the Danish Financial Statements Act with the obligation for businesses to report about their data-ethics policy;
- Cyber security directive: This directive, properly known as the Directive on security of network and information systems (NIS) requires Member States to adopt a national cyber-security strategy. The [Danish cyber-security strategy](#) has been published in May 2018.

The Danish strategy recognises the importance of **international standards** in AI. In this regard, the Danish government will initiate work to develop national technical specifications based on the specific needs of Danish businesses. In particular, the [Strategy for Denmark's Digital Growth](#) foresees to:

- Support the development of international standards for small and collaborative robots (cobots).

5 Infrastructure

Data is an essential prerequisite for the use of artificial intelligence. Hence, the Danish government recognises the importance of facilitating access to data and making it available for citizens, businesses, public authorities and researchers. Concretely, the Danish government foresees to develop the following **policy initiatives related to data infrastructure** in the near future:

- Common Danish language resource: the need to develop a structured collection of digital datasets that will be made free available to everyone. The aim is to foster language technology solutions by providing access to a high-quality shared language resources;
- Access to public sector data: the need to prepare a strategy for data in the public sector which will encourage the use and dissemination of public-sector data. A concrete example:
 - Danish Health data: The Copenhagen Healthtech Cluster – a partnership of public and private actors – develops the [Data Saves Lives](#) initiative that aims to provide better use and access to Danish health data;
- Development of digital export certificates: the government supports the development of digital certificates for exported goods (in particular in food sector) aiming at improving traceability and transparency of the export process. The use of Big Data from the system will be used for smarter and more focused guidance for exporters;
- Fostering the [Open Science Policy](#): the Danish Government's policy of Open Science is focused on three important elements, including open access to scientific publications, research integrity and open research data.

In addition, the policy framework for artificial intelligence is further strengthened with initiatives for a good **digital and telecom infrastructure**, including a modernised telecommunications agreement and a 5G action plan:

- Cloud technologies: the need to establish a strategy for fostering data storage in the cloud in order to cheap access to massive computational power and storage capacity.
- A new national strategy for digital research infrastructure was launched in 2019 comprising recommendations for a strengthened national cooperation with respect to digital research infrastructure.

6 Update

The outlined strategy constitutes a first step towards the development of AI in Denmark. As new challenges will arise in the future, it will be necessary to adjust existing initiatives and to define new policy actions. To this purpose, the Danish government will monitor developments and will evaluate the strategy on an annual basis.

References

Denmark (2016). A Stronger and More Secure Digital Denmark: Digital Strategy 2016-2020. Danish government. https://en.digst.dk/media/14143/ds_singlepage_uk_web.pdf

Denmark (2018). Strategy for Denmark's Digital Growth. Ministry of Industry, Business and Financial Affairs. https://eng.em.dk/media/10566/digital-growth-strategy-report_uk_web-2.pdf

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Background information

This country report has been prepared in the context of [AI Watch](#) and the [OECD AI Policy Observatory](#).

AI Watch is the European Commission knowledge service to monitor the development, uptake and impact of Artificial Intelligence (AI) for Europe, launched in December 2018.

The OECD AI Policy Observatory (OECD.AI) is an inclusive hub for public policy on AI. It aims to help countries encourage, nurture and monitor the responsible development of trustworthy AI systems for the benefit of society.

This country report has been created on the 25th of February 2020. Please visit <https://ec.europa.eu/knowledge4policy/ai-watch/denmark-ai-strategy-report> for regular updates.

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