

National strategies on Artificial Intelligence A European perspective in 2019

Country report – Sweden



In May 2018, the Swedish Government released its AI strategy, [National Approach for Artificial Intelligence](#) (Sweden, 2018). It points out the general direction for AI in Sweden and aims at providing a base for future policy actions and priorities. In this sense, the strategy document serves as a reference to help the government to outline forthcoming policy initiatives aiming at strengthening Sweden's welfare and competitiveness by fully exploiting the benefits of AI. To this purpose, the Swedish strategy proposes to focus on the following priority areas:

- Education and training;
- Research;
- Innovation and use;
- Framework and infrastructure.

Prior to the release of the strategy, [Vinnova](#) – Sweden's innovation agency – published an extensive [policy report](#) outlining the opportunities and challenges of AI in Sweden, and Sweden's capabilities to embrace the full potential of AI (with concrete examples of ongoing AI projects).

This section presents the policy recommendations of Sweden's AI strategy. Where possible, it aims to incorporate new policy initiatives that have been rolled out since the launch of the strategy in May 2018.

The Swedish AI strategy does not disclose financial provisions or estimations for its implementation.

1 Human capital

Training and education instruments to increase the stock of AI talent and to encourage skills development are primary conditions for the successful deployment of AI. Endorsing this point of view, the Swedish government assesses the need for **formal education and training as well as lifelong learning** in AI in the following policy recommendations:

- Education institutions need to provide a sufficient number of people with AI education and training, including continuing education for professionals. Swedish universities have started proposing bachelor's and master's programs in AI fields, e.g.:
 - Master programs on [Data engineering](#), [Machine learning and statistics](#), [Image analysis and machine learning](#) at Uppsala University;
 - Master programs on [Design for Creative and Immersive Technology](#) at Stockholm University;
 - Master programs on [Machine learning](#), and [Systems, Control and Robotics](#) at KTH Royal Institute of Technology;
 - Master programs on [Language technology](#) and [Logic](#) at the University of Gothenburg;
 - Three newly launched [AI-related](#) master programs on [Data science and AI](#), [High-Performance computer systems](#) and [Physics](#) at Chalmers University.
- Incorporating a strong AI component in non-technical programmes as to foster a broad and responsible understanding of the use of AI;
- Foster strong links between research, higher education and innovation in the field of AI;
- Continuing and further education for professionals.

- This recommendation has been rolled out in an effective policy in the form of a course on the [Elements of AI](#).

In order to evaluate and prepare for **changes in skill needs on the labour market** due to AI technology developments, the following initiatives have been set up:

- The Agency for Economic and regional Growth together with the Swedish Higher Education Authority are analysing and recommending how the supply of competences in advanced digital technologies can develop in both short and long term. The work aims at improving the supply of such competences as well as improve statistics and forecasts of future needs in the Swedish labor market;
- A [pilot project](#) to identify the need for skills development of companies and organizations in the southern region to better utilize new smart technologies based on artificial intelligence. The aim is then to develop AI courses in accordance to the needs that have been identified.

2 From the lab to the market

The creation, use and further deployment of AI applications largely depend on the opportunities to conduct research in the field of AI and on the available support to transform innovative ideas into market products and services. In this respect, the Swedish strategy emphasizes the need for:

- A strong basic and applied research environment in AI;
- A strong relation with leading international AI research environments;
- Pilot projects, testbeds and environments for development of AI applications;
- Efforts to prevent and manage risk associated with AI;

Some policy initiatives that have been initiated to answer to these needs are:

- [AI Innovation of Sweden](#): an ambitious program with a holistic approach to foster the development of AI applications in Sweden. With funding from among others [Vinnova](#), it is organised as a national centre for applied AI research and innovation with almost 70 partners from the industrial and public sectors, research institutions, and the academic world. AI Innovation of Sweden initiated and runs a number of projects supporting AI research and innovations. It also provides a platform for collaborations, and technology/data infrastructure;
- [AI-related innovation projects](#) financed through [Vinnova](#), Sweden's innovation agency. On 19th of November 2019, a total of 187 ongoing projects have been retrieved in Vinnova's project database with the keywords "artificial intelligence" and "AI";
- [Startup AI activities](#): Vinnova also provides funding support to SMEs and public organisations to start their first innovation project in AI. A call for proposals of projects has been closed recently in which participants can apply for a maximum of SEK 500,000;
- Vinnova is pointed out as national coordinator to strengthen [testbeds and demonstration](#) activities in Sweden. To this purpose it disseminates information on the hundreds of ongoing testbeds in Sweden, among others in the field of AI.

3 Networking

Building networks and partnerships is essential to harness the benefits of new AI opportunities, in particular for a small country such as Sweden with a relatively limited domestic market. Hence, teaming up with prominent players within the country or across borders with other Member States or beyond the EU is primordial to extent the possibilities of developing AI applications and technologies. To this purpose, the Swedish government is setting up policies to:

- Foster strong collaborations and partnerships between business, the public sector and research in AI;
- Develop collaboration and partnerships on the use of AI applications with other countries.

One example of an initiative that foster collaboration and partnership is the AI Innovation of Sweden program. Within the framework of the AI Innovation of Sweden program, [nodes and co-location areas](#) are created or planned across Sweden to boost and enable collaborations and partnerships for AI innovation, e.g.:

- [Gothenburg node](#): placed at Lindholmen, the Gothenburg office space offers workspaces and meeting areas for the research partners;
- [Greater Stockholm node](#): a pre-study is ongoing to shape the collaborative office space in this region;
- [Southern Sweden node](#): a pre-study is ongoing to study how the southern Swedish AI hub should be organised and financed in the long term;
- [Northern Sweden node](#): In March 2020 a plan for the set-up of the northern node should be ready;

- [Örebro node](#): a collaboration between Örebro University and Region Örebro County, will form the foundations of the new node in Örebro, which will work among others on health issues.

Another example is Analytic Imaging Diagnostic Arena ([AIDA](#)), which is a Swedish arena for research and innovation on analytic image-based diagnostics. AIDA is a **cross-disciplinary and cross-sectoral collaboration** aiming for largescale usefulness from Artificial Intelligence (AI) in healthcare.

In terms of **international attractiveness** the Swedish strategy (p. 5) claims that *“if Sweden can strengthen policy conditions across all policy areas, it will be well placed to offer an internationally attractive working environment for business, researchers and others interested in AI research, development and use”*.

4 Regulation

Regulation is an integral part of every Member States strategy. It includes recommendations for the development of a legislation to foster AI innovations, it covers aspects of ethics and inclusion, and it incorporates standard settings to drive the adoption and application of AI. The Government has identified the need to:

- Develop rules, standards, norms and ethical principles to guide ethical and sustainable AI and use of AI;
- Push for Swedish and international standards and regulations that promote the use of AI and prevent risk.

With regard to **ethical and sustainable AI**, it is important to develop ethical guidelines to ensure a transparent, explainable, and non-discriminatory development of AI. This is particularly important in systems that may affect the physical world, such as self-driving vehicles or AI applications in health care. To this purpose, the Swedish government established a Committee for Technological Innovation and Ethics ([KOMET](#)) in August 2018. Following initiatives have been launched to foster the creation of ethical and sustainable AI:

- The establishment of the AI sustainability centre: a [hub](#) co-founded by companies, universities and public authorities with a specific focus on social and ethical aspects of AI;
- [Seminars](#) at universities on the ethical challenges of AI in business, administration and across various sectoral areas.

The Swedish strategy recommends a well-established **legislation** to foster the use of AI and to prevent risks for both society and individuals. In this sense, the new legislation should safeguard privacy, ethics, trust and social values. At the time of writing this report, new legislation is still in the starting blocks and hence Swedish legislation related to data protection and ownership for instance is largely based on EU law.

The Government has established the Committee for Technological Innovation and Ethics. It will help identify policy challenges, contribute to reducing uncertainty surrounding existing regulations and accelerate policy development linked to new technologies. Automation and AI are natural areas of interest for the committee.

The development of appropriate frameworks of **(international) standards** is also suggested in the Swedish strategy. In terms of standardisation, Sweden has the following organisations and bodies:

- Swedish Institute for Standards ([SIS](#)): an international organisation specialised in national and international standards;
- Swedish Standards Council: the principal body for all Swedish standardization. Its task is to promote interest in standardisation and to encourage the use of standards.

5 Infrastructure

The Swedish strategy emphasizes the need for a digital infrastructure to harness the opportunities that AI can provide, including both a high-quality data infrastructure and a well-developed digital and telecommunication infrastructure in terms of computer power, connectivity and network capacity. Both the development of the data infrastructure – by improving data quality, data availability and data sharing opportunities – and the setting up of the IT infrastructure are covered by the AI Innovation of Sweden program.

With regard to the **data infrastructure**, Sweden needs to:

- Review the need for digital infrastructure to harness the opportunities AI can provide;
- Continue work on making data available to serve as infrastructure for AI use.

Within the the AI Innovation of Sweden program, work is ongoing related to access to datasets through the [Data Factory](#). In order to accelerate AI innovation and applications, the Data Factory aims to provide horizontal resources to all research partners, ensuring that data sets are made available across industries and application areas. the AI Innovation of Sweden program foresees the following policy:

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With regard to AI in the public sector the Swedish Agency for Digital Government ([DIGG](#)) is working on supporting the public sector's capacity to use AI. In the [policy report](#) presented, on the 14th of January 2020, it points out that there are potentially large economic gains to be made in Swedish public sector as a result of AI. The report includes a mapping exercise on how AI is being used in Swedish public sector and presents suggestions for an increased usage. DIGG is also working to elevate the public sectors capability in both making open data available and conduct open and data driven innovation. By supporting better access to data, conditions for making good use of technological development are improved.

In 2019, the Government assigned Statistics Sweden to measure the use of AI and big data analysis in businesses, public administrations and in higher education. The agency will report its result by the end of 2020.

6 Update

The Swedish national strategy on AI will be reviewed on a regular basis to assess the policy progress and to foster the development and use of AI.

Reference

Sweden (2018). National approach to artificial intelligence. Government Offices of Sweden.
<https://www.government.se/491fa7/contentassets/fe2ba005fb49433587574c513a837fac/national-approach-to-artificial-intelligence.pdf>

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/sweden-ai-strategy-report> for regular updates.

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