National strategies on Artificial Intelligence
A European perspective in 2019

Country report – Finland

In October 2017, the Finnish Ministry of Economic Affairs and Employment published a national AI strategy entitled Finland's Age of Artificial Intelligence (Finland, 2017). This report fits under the umbrella of a broader Artificial Intelligence Programme in Finland (also labelled as AI Finland) with a view to establishing artificial intelligence and robotics as the cornerstones of success for Finnish companies.

The strategy highlights Finland's possibilities in the global market along with its strengths and weaknesses in AI. It describes how artificial intelligence will transform society and provides a range of policy actions and recommendations for Finland to thrive in the age of artificial intelligence.

The goal is to position Finland as a leading country in artificial intelligence. Finland will adopt an open data policy and will create adequate conditions for a prosperous development of AI. Overall, it will strive to:

- Increase the competitiveness of business and industry;
- Provide high-quality public services and improve the efficiency of the public sector;
- Ensure a well-functioning society and wellbeing for its citizens.

Within the scope of the Artificial Intelligence programme of Finland, two other reports have been published on Work in the Age of Artificial Intelligence (Finland, 2018) and on Leading the way into the Age of Artificial Intelligence (Finland, 2019). The Finnish Ministry of Economic Affairs and Employment published the second and third report in September 2018 and June 2019. The list of policy recommendations outlined below aims to incorporate the reflections presented in these three reports.

On pages 80-82 of the third report, the Finnish government provides investment figures for several flagship policies. For instance, the AI Business Programme has been allocated €100 million over a four-year period. The Finnish Centre for Artificial Intelligence (FCAI) was granted € 8.3 million in flagship funding for 2019–2022.

1 Human capital

The presence of a well-established, harmonised and effective education system is one of Finland's main strengths. As a result, Finland has a highly educated and tech-friendly population. However, current available skills directed to the utilisation and development of artificial intelligence and robotics are mainly present in technological and mathematical fields, which are often too broadly defined to support society in these times of change. Hence, the Finish Ministry proposes an active reform of education systems towards the provision of high-quality courses in AI. The reform should not only include AI-oriented courses but should also incorporate communication and social skills, problem solving and creativity.

A Competence and innovations committee has been established under the Artificial Intelligence Programme to support education reforms. In particular, the Finish strategy provides the following policy recommendations towards **education and training in AI**:

- Guaranteeing artificial intelligence literacy across the Finish population (including elderly) to ensure that all citizens have a basic understanding of AI applications. This can be achieved through MOOCS to ensure elementary knowledge on AI:
- MOOC on elements of AI (English – Finnish);

- Online introduction course to Python.
- Introducing Masters and Bachelors programmes at university providing courses in artificial intelligence. Examples:
    - Master's program in machine learning, data science and AI at Aalto university;
    - Master's programs on data science or digital humanities at University of Helsinki.
- Incentives and training mechanisms for teachers to use artificial intelligence in their courses and teaching methods.

Particular attention is devoted to the working-age population with policy recommendations targeting **vocational training and lifelong learning opportunities**:

- MOOCs: Massive open online courses in AI and programming as a possible tool for further education of people in the labour market;
- Lifelong learning opportunities to train working-age population with the provision of personalised and motivating learning methods.
- To promote lifelong learning, a skills account or voucher will be created for all working-age people, which they can use to update their skills and purchase the training they need.

As mentioned in the second AI report, about one million Finns are estimated to need reskilling/upskilling training to adapt to changes in occupational structures. In order to **close the gap of available skills and the needs of the labour market**, the Finnish strategy advocates modular education programmes to address incompatibilities between current skills and new skills requirements:

- Opportunities for expanding qualification contents will be integrated in education programmes to facilitate adaptations to workforce's skills needs.

2 From the lab to the market

Bringing AI developments from the lab to the market can only be successful in a developed and well-supported enterprise-driven ecosystem with sufficient scope and funding for R&D and innovation activities, including incentives for experimentation and trial and error. Funding and support programmes should target the development of initial ideas to pave the path towards promising emerging fields in AI. In addition, it is critical to provide support to transform AI concepts into successful products and services, with policy instruments all along the innovation process from the lab to the market.

In this perspective, Business Finland, Finland's main funding agency for innovation, plays an important role in providing finance and support to AI companies. Initiatives from this agency are complemented with technical support on research and innovation from VTT, the Technical Research Centre of Finland.

In particular, the Finnish government is implementing the following policy initiatives to **encourage research and innovation in AI**:

- The creation of an AI maturity tool helping organisations to increase their business opportunities in identifying their most important areas for improvement in AI;
- The formation of a Finnish Centre for Artificial Intelligence (FCAI) to promote both AI research, and the use and application of AI in companies and elsewhere in society;
- The launch of an Artificial Intelligence Accelerator to facilitate companies in bringing AI experiments into production;
- The use of innovation vouchers to support companies to innovate and grow;
- The launch of an AI Business Programme that offers innovation funding, networking and internationalization services for R&D, among others;
- The Hyteairo Programme (Well-being and Health Sector's Artificial Intelligence and Robotics Programme) to support utilisation of artificial intelligence and robotics in the well-being sector;
- Support to the development of significant test environments and testbeds.

3 Networking

Fully exploiting the potential of artificial intelligence requires seamless collaborations and networking between various players. Finnish businesses have traditionally low thresholds in engaging in collaborations. In this respect, the AI Business

Programme supports 15 enterprise-driven ecosystems[1] organised in platforms to encourage the share of competences at different levels (e.g. innovative solutions, data, but also legislation, ethical guidelines or standards).

Besides this initiative, the Finnish government highlights various support instruments and reforms to **foster collaborations in AI**:

- Business Finland – Growth Engines: creating new AI business opportunities and growth areas in Finland through an enterprise-driven partnership model of companies, research organizations and public actors;
- Business Finland – Connected Intelligent Industries supporting AI and digital collaboration and joint-efforts of SMEs, large companies, R&D institutions and research organizations at every stage of innovation;
- Support for the creation of Digital Innovation Hubs in Finland to foster the digital and AI transformation of industries, particularly SMEs based on multi-actor networks and ecosystems;
- AIPSE programme: a programme to promote novel applications of artificial intelligence in physical sciences and engineering research with special focus on international collaborations;
- DIMECC: a co-creation network to encourage breakthrough innovations and collaborations with companies, universities and research institutions. It is a large network of R&D&I professionals from a wide range of organisations providing support to speed up innovations and to supply courses in machine learning for industrial employees);
- AuroraAI is a national artificial intelligence programme to prepare Finland for a human-centric and ethical society in the age of artificial intelligence. It provides a decentralised open network and data-based model for smart services and applications. AuroraAI is speeding up the establishment of an ecosystem serving the needs of citizens, public administration and industry.

A main priority in many AI strategies – besides ensuring top-level expertise in AI by means of an outstanding and high-quality education system – is attracting promising AI talents from abroad. To **improve the international attractiveness of Finland** for foreign AI talents and start-ups, the Finnish government launched the following initiatives:

- Talent Boost – International talents boosting growth action plan: a sectoral programme to make Finland more attractive to international talents. To attract start-ups from outside the EU in particular, this programme includes a Finnish Startup Permit.

In terms of **monitoring and dissemination of the use and understanding of** AI to a larger population, the Finnish government provides following initiatives:

- The development of a Finnish AI landscape presenting a regularly updated list of top AI companies in Finland;
- The Business Finland's AI Business programme promoted the establishment of local AI Hubs in Tampere and Turku and disseminated AI and platform economy knowledge in smaller localities;
- A blog and forum on the Artificial Intelligence programme website of Finland used to share understanding and information about the business impacts of the application of artificial intelligence with concrete examples.

4 Regulation

In December 2018, the Finnish Government has proposed a new information policy to promote the good management and the effective utilisation of information. The policy report on Ethical information policy in an age of artificial intelligence outlines principles for fair data governance, including guidelines for the use of information and ethical values.

Information policies discussed in the report relate to data access rights, data ownership, copyrights, security and personal data protection. The development and deployment of AI raises uncertainty about the application of the current legislation on these issues and increases the need for a reform of the legislative and regulatory framework.

Policy recommendations or initiatives towards a **reform of the legislative or regulatory framework** in Finland include among others:

- Reform of the national cybersecurity strategy by the Finnish Security Committee in view of developing comprehensive state security and expanding towards the fields of AI and digitalisation;

[1] Open customer-centred ecosystem, CleverHealth Network, Communication network operations, Connected Intelligence, Corridor as a service, Digital design and manufacturing excellence, Digital Fiber, Intelligent Industry Ecosystem, Intelligent Packaging, OneSea - Autonomous Maritime Ecosystem, OuluHealth ecosystem, Research alliance for Autonomous systems, Smart building ecosystem, Smart Otaniemi, Reboot IoT Factory.

- Act on Public Administration Information Management: defined the entire lifecycle of information in public administration. This reform intends to ensure consistent management of the authorities' data sets and secure data processing. It will take effect on 1 January 2020;
- A review of the Public Procurement Act is needed in such a manner that it would enable effective public-private co-development. In addition, public sector operators should be secured sufficient resources and incentives to engage in such development, paying particular attention to sort out the rights of the outcomes of co-development;
- A new national intellectual property (IP) strategy is currently in preparation to improve the present IP situation in Finland.

In terms of ethics and values, the Finnish Government advocates the development of ethical foundations ensuring a sustainable use of AI that rests on fundamental and human rights. The creation of ethical principles are a first step towards a trust-based use of AI. It is should be based among others on principles of transparency, reliability, and accountability, in which ownership and responsibilities are clearly defined.

The Finnish government has established an AI ethics committee to gain understanding on ethical principles and to ensure that Finland's AI development is human-oriented and based on trust. Policies directed to the development of **ethical guidelines** include:

- Setting up an AI ethics challenge on the Artificial Intelligence programme website to incentivise companies to contribute to the creation of ethical principles for AI;
- Preparing the foundations for ethical guidelines in the public administration's ecosystem-based AuroraAI programme.

5 Infrastructure

Data is the fuel that powers artificial intelligence. Hence, excellent data quality and effective use of data in all sectors is critical for the success of artificial intelligence. This requires in first instance a robust data infrastructure ensuring the needs of information security, data protection, the gathering and combining of information, information disclosure and storage.

While several data infrastructure initiatives are deployed at large scale, others are proposed in a restricted environment and serve as regulatory sandboxes. In the public sector, regulatory sandboxes can for instance serve to 1) pilot opportunities for second use of personal data by the public sector with consent of citizens, 2) evaluate the usefulness for citizens and 3) prepare an appropriate legislative framework for successful deployment.

In terms of **data infrastructure with a regulatory sandbox philosophy**, the Finnish government proposes following policy initiatives among others:

- Providing support to the MyData service[2]: a human-centred, open and compatible data management approach fostering data interoperability, sharing and protection of individual's rights on personal data. Two examples of initiatives complying with the MyData philosophy are:
    - Koski service: a comprehensive data repository of study credits, degrees and qualifications of citizens. This national education warehouse can also be used to promote vocational training and lifelong learning;
    - HUCS diabetes sandbox: a sandbox organised at the Helsinki University Central Hospital (HUCS) to simplify diabetes treatment with the help of AI services on patients' data and consent. The implementation is based on the IHAN concept, which provides an operating model to ensure fair exchange and exploitation of data with citizens' consent.

A committee on Data and platform economy has been established to propose policy to facilitate the construction and use of data resources in all sectors. These initiatives are complemented and in line with an Open Science policy to coordinate and foster a research community in which open science aims can be reached and monitored.

To foster the **digital infrastructure** for research purposes, the Ministry of Education and Culture has developed a research infrastructure development program for data management and computing with research and innovation actors in 2017–2021. The development program foresaw an investment of EUR 37 million in data management and computing infrastructures and related services.

[2] The following white paper published by the Finnish Ministry of Transport and Communications provides more details about the aim and working of the MyData service: https://mydatafi.wordpress.com/portfolio/publications/.

6 Update

In 2017, the Finnish Government has launched the Artificial Intelligence Programme to draw up an AI strategy for Finland. The programme has been finalised in spring 2019 and delivered among others three policy reports with concrete policy actions as outlined above. In the final report, the steering group of the Artificial Intelligence Programme has produced an implementation plan for the coming years and presents a vision of Finland in the age of artificial intelligence in 2025.

References

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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/finland-ai-strategy-report for regular updates.

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