



Flanders
State of the Art

A graphic illustration representing artificial intelligence. It shows a white robotic hand on the left and a human hand on the right, both reaching towards a central point where a bright light emanates. A network of white nodes connected by thin lines, resembling a neural network or data structure, is overlaid on the scene. The background is a light blue gradient with some blurred light spots.

ARTIFICIAL INTELLIGENCE

IN SWEDEN

FLANDERS INVESTMENT & TRADE MARKET SURVEY

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SWEDEN

Flanders Investment & Trade

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1. INTRODUCTION

In the last few years, artificial intelligence has become more and more known by the public. Events are appearing more often and the public knowledge about the working of artificial intelligence (AI) is becoming better. This is also the case in Sweden. As a country with a knack for innovation, it is an important forefront runner in the market of AI.

As a country, Sweden invests three percent of the national GDP in research and innovation, of which artificial intelligence still is a big part (Sweden, 2020).

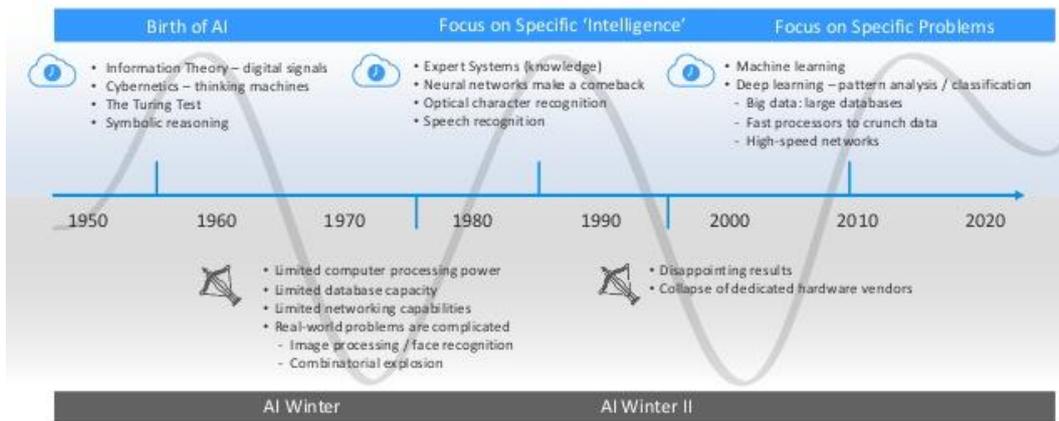
With artificial intelligence already quite embedded in everyday society, it is expected to have an even bigger impact in the future, in personal life as well as in a business environment.

2. WHAT IS ARTIFICIAL INTELLIGENCE?

A real set-in-stone definition of artificial intelligence does not exist, as it has many degrees of application. Originated in the 1950's, with the first implementation of AI, Minsky and McCarthy, the leaders in the AI field defined it as "any task performed by a program or machine if a human carried out the same activity, we would say the human had to apply intelligence to accomplish the task" (ZDnet, 2020).

Despite discussions about the right definition for AI, it is generally accepted as the following: artificial intelligence is shortened to AI and can be defined as a system that demonstrates a human behavior associated with human intelligence such as problem-solving, planning, perception, motion and sometimes emotional intelligence and creativity (ZDnet, 2020). The system learns from the earlier sequences or tasks and eliminates errors in the own system that way.

An AI Timeline



are one of the most important sectors to use implementations of AI. These applications are often regarding customer experience and service.

2.4.5 Energy, Logistics, and transport

Regarding the energy sector, 29 % of companies worldwide have mentioned implementing AI solutions and are satisfied with the solutions it has provided. This according to a study by Infosys (Decide Solucions, 2018). AI is often used in energy efficiency, intelligent analysis and forecasting of supply and demand.

Logistics and transport are making rapid advancements regarding the use of AI, for example, self-driving cars. This also has an impact on time efficiency, as the full 24 hours can be used. Regarding this sector, Intel and Strategy Analytics expect the implementations within the sector to move to 7 billion dollars around 2050 (Decide Solucions, 2018).

3. AI MARKET IN SWEDEN

Because artificial intelligence is still in big development in Sweden, and the Swedish government is planning for Sweden to become a leader in the use and application of AI in the B2B as well as the B2C sector. This environment for companies to thrive has several causes. Some of the most important ones being the country's high social stability, equality and access to government support. This government support also takes place for start-ups wanting to establish in Sweden.

This support is reflected in the research and development expenditure of the Swedish government. Its commitment is reflected in the promise to invest more than three percent of Sweden's GDP in the research and development market, as can be seen in the figure below (Sweden.se, 2020).

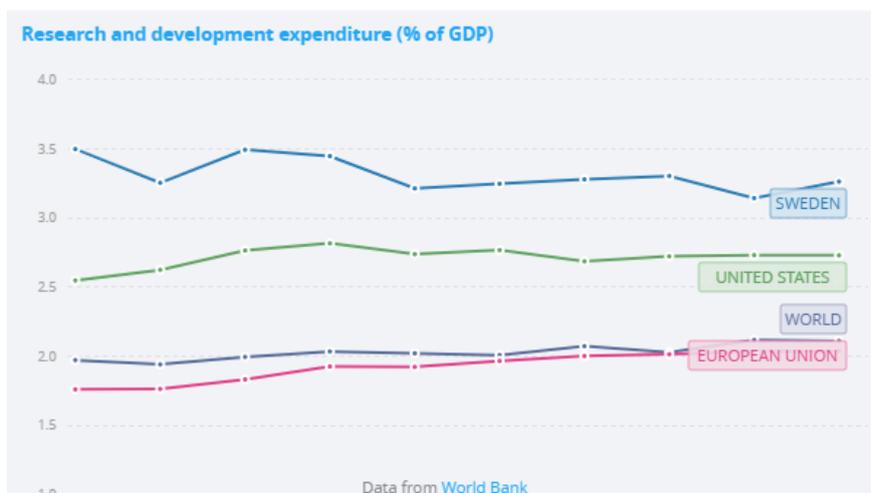


Figure 2: research and development expenditure



Compared to the countries in the chart, Sweden's position within the AI research must be considered weak (Vinnova, 2018). Included in AI research is the on-line publications as well as the attendance of leading AI conferences. In 2018, research regarding AI was weak and no specific growth in respect of AI was predicted. But the government is assisting in research in the field of technology and digitalization. They do this with an innovation strategy defined as the following:

"Sweden is a creative country characterised by pioneering ideas and new ways of thinking and doing in order to shape our future in a global community. People in all parts of Sweden can and want to contribute to creating value for people, the economy and the environment through new or improved solutions. A strong innovation climate by 2020 will enable: People and actors, by being more innovative, to contribute solutions to big societal challenges, in Sweden as well as globally.

Businesses and environments, by being more innovative, to create value, increase their competitiveness and attract expertise, investments and cooperation partners from around the world. Actors in the public sector and their partnership with private and civil society organisations, by being more innovative, to supply public services of a high quality and efficiency (The Swedish Ministry of Enterprise, Energy and Communications , 2019) "

3.2 AREA'S WITH IMPACT

Despite the fact that research regarding artificial intelligence is not up to speed yet, it will be important in the future of the country. Several sectors and industries will be affected by the increased usage. Now, AI is used in several sectors, so it is difficult to assign the importance to some of them. These are the sectors that are expected to become more prominent in the usage of artificial intelligence in Sweden.

1. Industrial development
 2. Transport industries
 3. Sustainability
 4. Health
 5. Finances
- (Vinnova, 2018)

Some specific applications that will be important is the interaction with the usage of artificial intelligence in business and operation models, driving, data access and competence. Skills in digitalization and AI are high in demand right now. This demand for new technical skills will have a high impact on job description and adaptation (Vinnova, 2018).

3.3 SWEDEN'S CAPABILITY OF THE AI MARKET

There are many factors that contribute to the fact that Sweden will have a high capability of welcoming these new technologies in the future. The technology-friendly population, qualified researchers, a culture of innovation and research, and the presence of some technology multinationals (Vinnova, 2018).



3.4.1 Public sector

Artificial intelligence in the public sector has been well received and is used in many different areas. 90 percent of city regions use AI in the daily life of working and see the usage as a positive contribution. With 78 percent of content and perceived benefit, the municipalities are also very present in the public sector regarding the use of artificial intelligence (Vinnova, 2018). Despite the lower number of government-level authorities, it is still widely used. Government agencies and authorities are still divided about the benefit of AI in the work environment. This can be confirmed in the graph below.

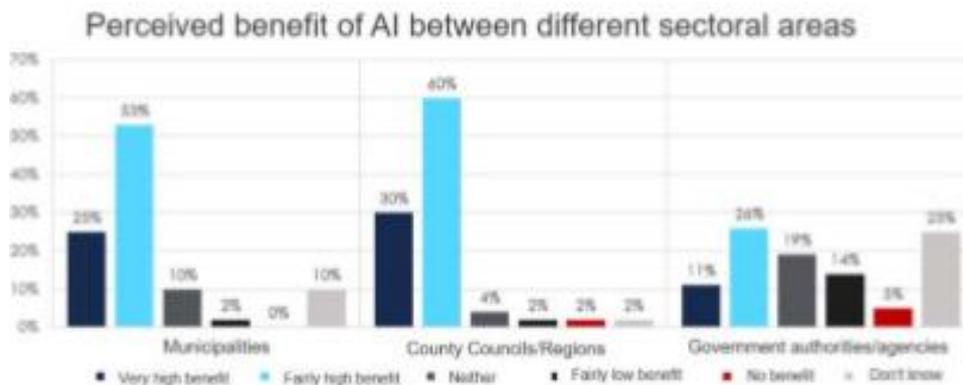


Figure 4: perceived benefit of AI between different sectoral areas

3.4.2 AI in the telecommunications sector

AI in the telecommunications industry in Sweden is expected to be of great importance. It is used to automate the infrastructures as well as to make them more autonomous. As Sweden typically works higher up in the value chain of companies, the telecommunications sector is already a dominant factor. The industry is important in applying AI in other industries. Some key conditions for the telecommunications sector regarding the implementation of AI are open source software, access to data, and open application interfaces (Vinnova, 2018).

3.4.3 AI in the healthcare sector

Healthcare, pharmaceuticals and medical technology are some of the most important sectors to keep in mind when it comes to HR. AI-defined diagnosis in early stages is one of the major developments used in the medical field today. In the medical field, the application of artificial intelligence goes through different stages, often shortened to AI-A, AI-R, and AI-X. AI-A stands for assist and has the most potential for the future. Here, the doctor is still in control about the diagnosis and the AI is just for assistance. AI-R stands for replace, where medical steps are replaced instead of doing them manually, which is done today. The most extreme version is AI-X, where challenges or tasks that are not done manually today (Vinnova, 2018). The main driver behind the potential in the medical field is the research that is being done at the moment.



The main function of the society is to support events regarding AI and data technology and analysis as well as provide a collaborative environment for over 70 partners in Sweden and abroad.

For a company wanting to collaborate with the organization or establish themselves in Sweden, different nodes can be contacted related to the application area of wanting to enter the market. The contact info can be found below. Nodes can be used for events, projects or co-locations for partners. Office space is also available.

Gothenburg Node	Lindholmospiren 11 (Ericsson building), 417 56 Göteborg Helena Theander Eco-system and node manager, Gothenburg node helena.theander@ai.se
Greater Stockholm Node	Just launched, not yet a physical location Petra DaLunde Node Manager, Greater Stockholm Node petra.dalunde@ai.se +46 (0)704 15 92 09
Southern Sweden Node	Will be established in 2020 Malin Larsson Senior Project Manager, South Sweden node malin.larsson@ai.se +46 (0)70 342 23 44
Northern Sweden Node	Will be established in 2020 Anders Johansson Senior Project Manager, North Sweden node anders.oe.johansson@ai.se +46(0)70 562 52 50
Örebro Node (Impact Lab)	collaboration between Örebro University and Region Örebro County Camilla Ulvmyr Örebro Node camilla.ulvmyr@oru.se +46 (0)73-270 25 89
East Node	Will be established in 2020 Niclas Fock Senior Project Manager, East node niclas.fock@ri.se



1. Starcounter

Hovslagargatan 3, 111 48 Stockholm

info@starcounter.com

the company focuses on development of an in-memory database engine and application server for high technology. Developers are able to create apps that are able to automatically integrate data and user interfaces with each other (Pantig, 2018).



2. Strossle – Stockholm

Kungsgatan 58, 111 22 Stockholm

info@strossle.com

The company produces a recommendation engine for advertisers and publishers. Next to this, they created a platform for content recommendation at the bottom of a website based on AI. Their aim is to create personalization for a company, so they are able to adapt to their customers (Pantig, 2018).



3. Univrses

Medborgarplatsen 3, Söderhallarna, Elevator B, 10th floor, 118 26 Stockholm

info@univrses.com

The company focuses on motion tracking tools for the automotive, robotics, drone, and AR/VR industries. Next to this, they have developed algorithms for 2D and 3D object tracking, visual odometry, and object recognition (Pantig, 2018).



4. Lytics

Stortorget 13B, 211 22 Malmö

info@lytics.ai

The company specializes in big data analytics in the health care industry. They offer different services such as data capture, simulations regarding the right medication and setting the right dose (Pantig, 2018).



5. Century Analytics

Bredgatan 4, 211 30 Malmö

info@century.ai

The company focuses on the development of an AI algorithm, for example machine learning, for currency trading and the making of decisions in a financial market (Pantig, 2018).



7. EXPANDING TO SWEDEN

Sweden is a welcoming country for foreign investors wanting to export to - or collaborate with Sweden. Information is readily available, and companies already established are transparent and open. Information on both the market as well as the government procedures is often available in both Swedish and English. Often business procedures are smooth and efficient. Local advisors and business partners are often the most prized aspect of starting up a business or collaboration in Sweden. Collaborations happen the most often in technology as well as research and development. With the investments in R&D mentioned earlier, Swedish companies are often very open to partnerships. Something to keep in mind is that regarding science and technology, competition may be fierce in the Swedish business field.



Figure 6: globalization

When it comes to artificial intelligence and digitalization, innovation is encouraged and expanding your business is definitely a good idea, either in collaboration with a Swedish company in the B2B field or in the B2C sector, aiming directly at the Swedish customer market. With the majority of the population, being 85 percent, living in the southern part of the country, it is wise to establish yourself in that area. Stockholm, Gothenburg, Malmö or Uppsala are the four major cities. With some major universities such as Stockholm University and Uppsala University, it is a great idea to attract young talent as well as to have access to research in the field of your company.

On top of this, Sweden, with its geographical location, is a great place to start expanding to the greater Scandinavian region. With a well-established distribution network, the Norwegian, Danish and Finnish markets are easily available. The market in Sweden is made up of about 90% of the industrial output, of which the engineer and technical sector account for over 50 percent in output and exports (Startup Overseas, n.d.). Collaborations are often supported by the government.

Collaborations, trade or expansion of your company within the EU are facilitated.

7.1 A RELAXED ATMOSPHERE

Doing business in Sweden can be challenging regarding the understanding of a new culture. The business culture may seem similar, nevertheless, the Swedish way of working is different from other countries in the EU.

Communication in a business environment is relaxed and more on the casual side. After meeting for the first time, people often address each other by their first name in written as well as spoken word. The more relaxed atmosphere also translates into a horizontal working environment. This means that a shorter chain of command is present, and that transparency is important for the higher executives. Hierarchy is not present in the company and titles or statuses are just that. That way, it is fairly easy to reach an executive



