SEASONS OF CHANGE

AI powered by Swedish collaboration, innovation and data

AI'S LONG HISTORY IS JUST BEGINNING

Human intelligence has long known the power and potential of AI. The foundations for what we now know as AI were laid in the 1940s when British computer scientists were trying to crack the German 'Enigma' code. Continuing for the next three decades, around the globe scientists and researchers progressed with developing machine learning. Despite this effort, computer scientists struggled to create intelligent machines.

What they lacked was power and data.

The period between the mid-1970s and the mid-1990s have become known as the 'AI Winters'. A dormant period with acute funding shortages and minimal development.

But after the winter, follows the spring. And in the late 1990s, the first seeds of what we now recognise as AI, were planted.

SWEDEN: AN ACTIVE PLAYER

Sweden's research, labour market, regulatory development and infrastructure developments coupled with a culture of co-operative collaboration provide the perfect landscape for AI application development. Major investments in AI research and a focus on developing education that will support AI progression are a priority.
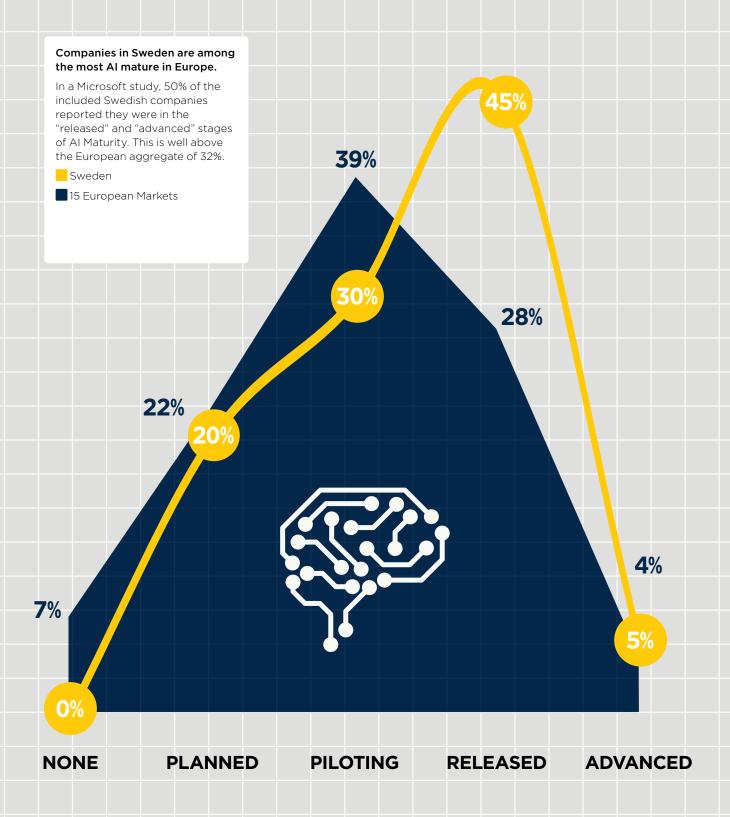
For Sweden to be competitive on a global stage, it is imperative that creating ethical and practical solutions, that drive industry efficiencies and work to improve society for today and tomorrow are at the forefront of the business and political agenda.

But AI is just one part of the technology toolbox. The shift in expectations and applications of how it can be applied shows the true power it has to change the way we deliver services, manage resources, travel and produce. The archaic view of AI as a futuristic, robot-led takeover is being replaced with a deep understanding of how business, industry and social structures can go beyond data to deliver real value to all aspects of life.

Sweden is not unique in its collection of data or leading the world in developing AI. Sweden, and indeed the wider Nordics, have a strong collective willingness to adopt and adapt new digital technology.

What is unique is Sweden's collective view of sharing public data. The power of this open source public data is truly leveraged when it becomes available for innovators to utilise and combine with private data. This begins to unlock complex problems, show patterns and behaviours that were previously impossible to understand.

Government and public investment in AI have pushed Sweden's AI maturity and readiness. But financial investment is only one aspect. Sweden's individual and collective attitudes towards AI, digital development and belief in the benefits of a data-driven future are playing a pivotal role.

AI MATURITY CURVE

Companies in Sweden are among the most AI mature in Europe.

In a Microsoft study, 50% of the included Swedish companies reported they were in the "released" and "advanced" stages of AI Maturity. This is well above the European aggregate of 32%.

- ▇ Sweden
- ▇ 15 European Markets

39%

45%

30%

28%

22%

20%

7%

4%

0%

5%

| NONE | PLANNED | PILOTING | RELEASED | ADVANCED |

COLLABORATIVE INNOVATION IN PRACTICE

AI is a powerful digital tool, a technology that can be applied across industry and cultural boundaries to change traditional methods to be more sustainable, efficient and cost effective. But the true power of AI comes with innovative collaboration with academia and research, industry and business and start-ups.

THE SWEDISH AI ECOSYSTEM

Facilitating academia and research, industry and business and start-ups to flourish, together, is the backbone of the Swedish AI sector. Supported by public and private investment and driven by a collective commitment to applying AI to solve practical problems that improve the lives of individuals and society.

Sweden boasts a wide range of initiatives aimed at supporting the AI ecosystem to reach full potential.

A national and neutral initiative that concentrates forces that accelerate innovation and research work for the implementation of AI. Using a partnership approach to deliver an overall long-term goal to strengthen the competitive force of Swedish industry and Swedish welfare through cross-industry sharing to ignite the Swedish eco-system.

WASP (Wallenberg AI, Autonomous Systems and Software Program) is a major national initiative for strategically motivated basic research, education and faculty recruitment.

With a total budget exceeding SEK 5.5 billion, the programme aims to deliver more than 50 new professors, over 400 new PhDs and recruit up to 60 new research teams, with a view to establishing an internationally leading environment in the field of autonomous systems, software and AI. WASP is on the cusp of launching a first broad investment in Artificial Intelligence with the ambition of advancing Sweden as an internationally recognised leader in these areas.
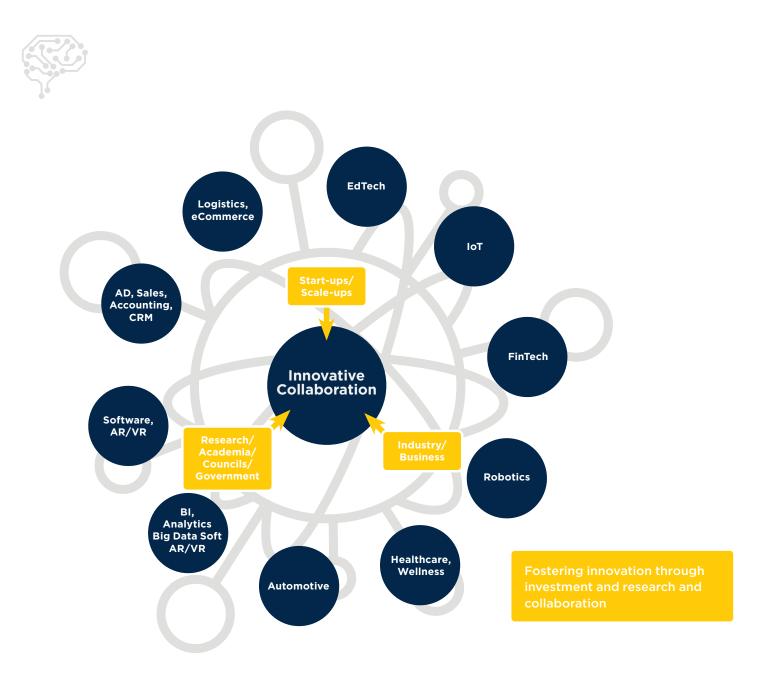

KTH has extensive collaboration with Sweden's industry leaders including, Ericsson, ABB, Scania, Telia. Their Innovative Centre for Embedded Systems (ICES) is a networking centre for embedded systems operating within cyber-physical systems. KTH's artificial intelligence activities cover many different fields of science, and they are leading projects to advance the practical application of AI, including research focussing on computer vision, robotics and machine learning.

Chalmers University of Technology in Gothenburg focuses on research and education in technology and natural sciences at an international level. With over 3100 employees and 10,000 students, Chalmers offers education in engineering, science, shipping and architecture. The Chalmers AI Research Centre (CHAIR) significantly increases Chalmers' expertise and excellence in AI and through close collaboration with industry to build a strong regional ecosystem of AI research and industrial applications.

Logistics, eCommerce

EdTech

IoT

AD, Sales, Accounting, CRM

Start-ups/ Scale-ups

FinTech

Innovative Collaboration

Software, AR/VR

Research/ Academia/ Councils/ Government

Industry/ Business

Robotics

BI, Analytics Big Data Soft AR/VR

Healthcare, Wellness

Automotive

Fostering innovation through investment and research and collaboration

LIU LINKÖPING UNIVERSITY

LIU is conducting world-leading research in multiple AI fields including Computer Vision, knowledge systems and advanced decision support. LIU is host university for the strategic Wallenberg Artificial Intelligence, Autonomous Systems and Software Program (WASP) and home to AIDA - the Analytic Imaging Diagnostic Arena. AIDA is a Swedish arena for research and innovation in artificial intelligence for medical image analysis. AIDA is a forum in which the academic world, the healthcare system and industry meet to translate technical advances in AI to improve patient care and outcomes.

VINNOVA
Sweden's Innovation Agency

Sweden's governmental innovation agency has a mission to contribute to sustainable growth by creating better conditions for innovation. To achieve this goal, Vinnova invests around SEK 3 billion in innovation projects and research aimed at developing new solutions.
By stimulating collaboration between companies, universities, colleges, public sector actors, civil society and other national and international actors, Vinnova contributes to the long-term strength of research and innovation environments. Their commitment to developing the ecosystem is reflected in their approval of 288 AI projects between 2011 and early 2018.

AI: AN INDUSTRY GAME CHANGER

While industry specific application of AI has shown promise, full potential has yet to be reached. Social, business and political institutions are increasingly looking at AI to transform strategic and operational approaches to deliver efficiencies and improved service for their end users. Through collaborative disruption, Sweden is leading the way and fast-tracking innovation which has the power to revolutionise all aspects of modern society.

HEALTHCARE

Changing global demographics, longer life expectancies, and the burden of non-communicable diseases are putting unprecedented pressure on healthcare systems in both developed and emerging economies.

AI has the potential to transform how entire healthcare networks work as well how medical conditions are diagnosed and treated. Healthcare systems are often inflexible and not responsive to increasingly mobile populations or maximising patient data to predict and plan for healthcare trends and demands.

AI is already transforming and improving accuracy within surgery and diagnostics. The potential to build on these innovations has far-reaching benefits for both patients and medical professionals to whole healthcare networks.

One leading example of the application of AI being tested in Sweden is the test bed initiative, Edge Lab provided by AI Sweden, which uses machine learning algorithms which learn from twin-datasets, overcoming otherwise privacy-related obstacles. This project hopes to identify barriers and enablers for integration and national implementation of AI in healthcare, investigate how privacy-preserving AI and data-driven insights can support current healthcare practices, and evaluate ethical and legal implications and pathways to the successful implementation of AI in healthcare.

ROBOTICS

Optimised machine learning has been gaining traction across all industry sectors at a rapid pace and it is anticipated that fully autonomous production facilities will be the norm in the near-future. One of the cornerstones of AI is improving production optimisation through machine learning and analytics to solve complex problems in real-life settings.

This methodology can then be applied to business-critical processes to reduce cost, improve quality and performance or reduce energy consumption. During production processes AI has the potential to help manage short, medium and long-term goals ranging from planning and asset management to small corrective actions.

When machines are equipped with internal intelligence systems, the data produced can inform maintenance schedules, predict failures or mechanical breakdowns, maximise production for optimal output and workflows.

Sweden's manufacturing ecosystem is already applying AI technology to increase and streamline automation. Leading Swedish companies are exploring and applying the potential of AI to :

– automate functions in established value chains, operations, and functions

– develop new business models, products, services, and system solutions

– transform value chains and sectors for brand new development tracks.

AUTONOMOUS TRANSPORT

The Swedish manufacturing sector is dominated by the automotive industry which is a driving force behind AI development and utilisation.

Sustainable, autonomous automotive solutions for large scale mining, farming, public and private sector use are in various stages of development and implementation.

Industry and investment ambitions to improve safety, create more time efficient travel, reduce carbon emissions, improve resource usage and optimise delivery logistics are inspiring cutting-edge development.

Collaborative partnerships between global players such as Volvo, Zenseact, Nvidia are propelling innovation across all aspects of the automotive manufacturing ecosystem. These partnerships are having a positive impact on their entire manufacturing sector with technology cross-over playing a key role in long-term change.

Scania is leading the way with their recent partnership with AI Sweden. The role of AI in developing autonomous vehicles and in data-driven maintenance, both for customers and in production environments, represent substantial opportunities for the companies. Critically, they also that collaboration is key to leveraging the power of AI, and this is being achieved through AI Sweden's Data Factory.

SERVICES

In all aspects of social and civil life, rapid change is challenging how public services are being commissioned, delivered and accessed. Applied AI goes beyond time efficiencies but has the potential to change how public agencies address changing population demographics, both at global, country and local levels.

Ethical decision making powered by intelligent data analysis is transforming civil justice, healthcare planning, education resource allocation, transport and town planning. AI will allow decision making to go beyond human preconceptions, utilising historical data and

forecast modelling to help government and public agencies solve complex problems.

Algorithms will require robust testing to ensure implicit and explicit bias is eliminated. And given much of the investment will come from or impact tax-paying citizens, thorough business cases and test processes will define early development.

Sweden's development in this area is focused on leveraging data and automation in the areas of defence, civil contingency, policing, and customs.

FINANCE

Traditional banking institutions are heavily regulated and historically risk adverse, so rapidly emerging and innovative FinTech start-ups often sit in stark contrast. The sheer scale and diversity of the FinTech sector and the potential for applying AI is changing regulatory and business processes while presenting customers and businesses with new ways of managing financial transactions.

Progress and internal investment across mainstream banking ecosystems has been comparatively slow. But increased recognition that AI is inevitable and can also bring business and growth benefits, investment in technology such as blockchain is seeing a resurgence.

Banks are looking at partner working with start-ups and scale-ups to add value to the customer experience and add efficiencies to internal processes. Appling AI to fraud prevention and risk analysis is paying dividends while the application of data analysis to credit scores and checks is revolutionising the lending sector. Personalised banking solutions are responding to increased consumer demand for transparency and control over payments and fees.

The FinTech sector in Sweden has quickly established a global role in providing alternatives to traditional financial structures. AI is key in developing solutions for finance, insurance, and payment systems.

4 INDUSTRY VOICES

Four key experts from business, research, academia and politics about the future of AI and how the Swedish ecosystem contributes to innovation.

Shiva Sander Tavallaey, Senior Principal Scientist, Applied Analytics, AI Lead ABB Sweden

"ABB is a leading player in the on-going transformation from automation to autonomous systems. We see AI as a key component of our strategy towards future autonomous systems in the industrial sector, which will increase productivity.

AI can also help our customers through increased accessibility and efficiency by using intelligent service and maintenance solutions.

Sweden is at the forefront of automation. There are, and have been, several cross-sector projects, in which non competing companies collaborate and create platforms aimed at developing cutting edge solutions. We need more of these collaborations where power, processing and manufacturing industries, infrastructure and transport sectors co-operate to put Sweden at the forefront of AI internationally."

Dr Daniel Gillblad, PhD; Co-Director Scientific Vision, AI Sweden

"AI can make us smarter and more efficient. AI helps us analyse and draw conclusions from enormous amounts of data – and we can do it fast and efficiently.

There is an enormous potential in Sweden to take a leading role in AI. But since we're a small country compared with the US and China, we must use our resources in a smart way. Sweden is digitally mature and early adopters of technology. We have a broad knowledge base, trust in authorities and good co-operation between business life, authorities and academia, which is a pre-requisite for developing AI."

Ola Pettersson, Ph.D, Manager Platform Development Epiroc

"Epiroc develops and manufactures machines for the mining, infrastructure and natural resources industries, including drilling machines and trucks. We're using AI in our products to plan and optimise the co-operation between the machines, drive and drill autonomously and optimise the steering of several machine functions as well as analyse sensor data for break-down predictions. AI is essential for making the mining industry safe.

There are many universities in Sweden with a strong infrastructure for AI research. The industry sector has received new technology well. Several major companies, including Saab, Volvo Cars and Scania are investing heavily in AI and we can also see several small companies launching products including AI. I really like that!"

Dr. Mats Nordlund, Head of Data Factory, AI Sweden; Director Research and Special Projects, Zenseact

"Zenseact is a joint venture between Volvo Cars and Veoneer (former Autoliv) with a mission to develop the software that realises self-driving cars. AI is a central technology for making driving completely autonomous, particularly when it comes to perception and decision-making.

AI's potential lies in its flexibility and adaptability. The major investment in AI-related research and development that we're seeing right now, combined with the strong growth in available computing power and data, will also improve AI-based solutions and enable them to be used in more applications.

Sweden is now taking important steps from having small and fragmented activities in AI to becoming an AI hub for research and development. Several national initiatives are coming together with companies and public organisations to enable Sweden to take a front position in AI in Europe."

BEYOND THE SPRING

Global investment in AI solutions is on the rise but investment in infrastructure to deliver the potential is only one piece of the puzzle. Sweden's history of positive disruption is enabled by a unique ecosystem that actively encourages collaboration between start-ups, scale-ups, industry and academia.

Sweden's investment in the future of AI is leading the way in Europe and is already delivering positive change across social and business boundaries, for the greater good for society and individuals while helping businesses grow and expand.

The promise of AI will only be realised through collaboration across industry and academic boundaries, utilising public and private data to find solutions that will transform the way society and business work.

AI's dormant period is over. Global attention and investment is now at the tipping point, pointing to sustained and sustainable growth in all industry verticals.

Sweden's AI readiness and maturity sets it apart as Europe's leader to propel innovation through industry collaboration.

BUSINESS SWEDEN

Business Sweden helps international companies invest and expand in Sweden. We ensure that international companies access our knowledge, experience and extensive network to identify new business opportunities and accelerate return on investment with neutral and trustworthy backing for a successful long-term presence in Sweden.

Our market insights and networks across the entire AI ecosystem including industry, academia, start-ups provides unique access and information to global companies looking to move into the booming Swedish and Nordic markets. Business Sweden is owned by the Swedish Government and the industry, a partnership that offers access to contacts and networks at all levels.

CONTACT

Would you like to learn more about how we can help grow your business in Sweden and set you on the path to a collaborative AI future?

Please contact Alexander Morrone:
alexander.morrone@business-sweden.se

BUSINESS SWEDEN Box 240, SE-101 24 Stockholm, Sweden
World Trade Center, Klarabergsviadukten 70
T +46 8 588 660 00 info@business-sweden.com
www.business-sweden.com

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