

Digitising European Industries - Member States Profile: Sweden

Table of Contents

Summary	2
I. General Background	5
Overall economic situation of the country.....	5
Overall strategy / situation concerning the digitization of manufacturing / production.....	5
Digitization level of the country	7
National strategies towards digitization (economy, society).....	7
II. National Strategies towards “Digitizing European Industries”	10
Smart Industry action plan	10
Innovation Partnership Programs	12
“Strategic Innovation Areas” with relation to Digitizing European Industries.....	13
Produktion 2030	14
PIIA - Process Industrial IT and Automation.....	14
III. Digitising European Industry (DEI) Pillar 1 - Digital Industrial Platforms actions & Research, Development and Innovation actions	16
Digital Industrial Platforms actions	16
Research, Development and Innovation actions	18
IV. Digitising European Industry (DEI) Pillar 2 - Standardization actions, regulation and testbeds	20
Standardization actions	20
Pilot Factories and Testbeds.....	21
V. Digitising European Industry (DEI) Pillar 3 - Digital Innovation Hubs actions	22
VI. Digitising European Industry (DEI) Pillar 4 - Skills development	24
VII Specific National Measures	25
Innovation promotion	25
Facilitate access to finance.....	26
V Investments for Digitising European Industry.....	28
References.....	30

Summary

General Background: Sweden has a developed export-oriented economy. The main industries include motor vehicles, telecommunications, pharmaceuticals, industrial machines, and other. Sweden's export-oriented industries are competitive internationally, but they are challenged to renew and reorganise in order to keep pace with changing markets. During the financial crisis, many jobs were lost. In 2016, the Swedish Ministry of Enterprise and Innovation took action to strengthen the development of Swedish industry by launching a new industrialization strategy. "Smart Industry" [2] aims at reinforcing Sweden's position as an attractive location for industrial production. The strategy focuses on four areas: Industry 4.0 (exploiting the potential of digitalization); Sustainable production (increasing resource efficiency); Industrial skills boost (promote a long-term development of the industrial sector); and Test bed Sweden (leadership in research areas contributing to regional industrial production).

Sweden according to DESI is one of the high performing member states in digitization and belongs to the best performing countries worldwide. Swedish businesses actively use digital technologies for a high efficiency, productivity and in sales (e.g. adoption rate of cloud computing: rank 2; online sales: rank 3; electronic invoicing: rank 4. Sweden is challenged to continuously improve on that high level. Sweden's digitization policies aim at optimizing access to fast broadband internet, the modernization of the Swedish economy through digital technologies and further improvements in the public sector.

National Strategies towards "Digitizing European Industries": A "Smart Industry Action Plan" [3] is outlining measures to implement the new "Smart Industry" strategy. The plan presents actions in several policy areas that support the work of "Smart industry" in the form of ongoing efforts. The measures have been prepared after a dialogue process with the social partners, companies and academia. An advisory board has been consultative to the government. The "smart industry" strategy as well as the action plan will be continuously updated. The strategy will be monitored with the help of a number of indicators, which together give an indication of the industrial sectors' ability to adapt and capacity for renewal in relation to the strategy's aims and objectives.

Additionally, the Swedish Government (Minister for Digital Development Peter Eriksson) presented a strategy paper on their digital policy [4; May 2017] that encompasses five focus areas: Digital skills; Digital security; Digital innovation; Digital infrastructure; Digital leadership and improvements through digital transformation. Along with the strategy, a new digitalization council and office have been set up at the Swedish Post and Telecom Authority to support the strategy's implementation. In addition, a State Secretary coordination group at the Government Offices has been appointed. Furthermore, the government has defined so called "innovation partnership programs" in five areas: 1. Next Generation Travel and Transport; 2. Smart cities; 3. Circular biobased economy; 4. Life science; 5. Connected industry and new materials. As three horizontal challenges, digitization, life sciences and environmental and climate technology have been defined.

Digitising European Industry (DEI) - Pillar 1

Digital industrial Platform actions: In July 2015, Prime Minister Stefan Löven and his Government had appointed four senior individuals from different parts of the Swedish industry to advise and support the Government towards a strategy for the renewal of industry. The next steps of the government were the launch of the Smart Industry 2030 strategy (January 2016), the "Smart Industry Action plan"

(June 2016). In September 2016, the implementation was kicked off, followed by a "Smart industry conference" in Stockholm (11/2016). For activities in the first phase, the Swedish government in 2016 has allocated SEK 22 million (~ 2,3 mio. Euro) to Vinnova.

Research, Development and Innovation Actions: The Swedish Government traditionally tasks its agency Vinnova (also the Swedish Energy Agency and Formas) to carry out funding initiatives for strategic innovation areas. Within these areas, the development of strategic innovation agendas as well as their implementation in strategic innovation programs is funded. Vinnova currently runs 16 strategic innovation areas of which 2 are specifically relevant for "Digitizing European Industries":

- Produktion 2030 aims at translating industry challenges to relevant and innovative solutions for the industry; it also aims at building and strengthening cooperation networks, both in Sweden and internationally. The manufacturing industry and research organizations can apply for funding for short-term high risk projects that will test whether ideas can contribute significantly to increased sustainability in the Swedish manufacturing industry. Funding is not more than SEK 500,000. The manufacturing industry must account for at least 30 percent of the project budget.
- Processing IT and Automation (PIA) – aims at strengthening the process industry as well as industry suppliers to develop their innovation abilities. PiiA holds 2 calls for proposals each year.

Along with the governmental focus area "Sustainable production", the government charts mining waste for new green technologies. Two assignments were made to map the need for metals necessary for the development of new technologies in the solar cells of the future.

Digitising European Industry (DEI) - Pillar 2

Standardisation actions: The Swedish Standards Institute has a close cooperation with Vinnova which has been assigned 35 mio SEK (2017-2020) for standardization activities concerning smart industry.

Regulatory Framework: Regulation activities address fair working conditions and Open Government.

Pilot factories and testbeds: Testbed Sweden (Testbädd Sverige) was launched in 01/2016; Vinnova now is tasked to establish a national coordinating function to strengthen test and demonstration activities in Sweden as part of "Testbed Sweden". In June 2017, Produktion2030 launched a call for test bed projects for digitization in the manufacturing industry. The projects will utilize existing testing environments for testing new production methods and production technologies/systems; SEK 8 million max. per project; at least 60% of the project's total budget are funded.

Digitising European Industry (DEI) - Pillar 3

Digital Innovation Hubs actions: Sweden has installed a specific instrument ("Vinnväxt") to support the regional level. Examples for the Swedish competence centers are "CENIIT" (Linköping) or "FindIT" (Gävleborg). "ProcessIT Innovations" (Lulea, Umea). "Automation Region" is an innovation platform where SME, large corporations, academia and public sector collaborate in interdisciplinary projects.

Digitising European Industry (DEI) - Pillar 4

Skills development: In October 2016, the government assigned the Swedish Agency for Growth with the task of stimulating and strengthening the supply with skills for industrial SMEs. A pilot project encompasses information campaigns, searchable support and follow-up.

Specific national measures

Innovation promotion: The Swedish government has initiated activities towards a focus on innovation procurement in Smart Industry on behalf of the procurement authority.

The Swedish government carries out an investment in digitalization consulting for small and medium-

sized enterprises with an investment of SEK 78 million.

Furthermore, the government has assigned Vinnova to implement initiatives for open innovation in Swedish industry in 2016-2017.

Tax incentives exist in the form of a partial exception of social security contributions

The Swedish use of ESIF funds (278,5 mio. Euro) is comparably low.

Facilitate Access to finance: With Almi Invest and the governmental fund SamInvest, Sweden has a clear Venture Capital strategy and infrastructure to fund young companies and high-risk projects. Sweden spends 11.5 mio SEK (1.2 mio. EUR) until 03/2020 for investment promotion related to Smart Industry. Investors and start-ups are stimulated to place or expand production, industrial services, research, development and testing in Sweden.

I. General Background

Overall economic situation of the country

Sweden is a strong industrial nation with worldwide known businesses such as Ericsson, ASEA/ABB, SKF, Alfa Laval, AGA or Dyno Nobel¹. The economy of Sweden is a developed export-oriented economy aided by timber, hydropower, and iron ore [1]. The main industries include motor vehicles, telecommunications, pharmaceuticals, industrial machines, precision equipment, chemical goods, home goods and appliances, forestry, iron, and steel. While Sweden's traditional agricultural economy used to employ over half the domestic workforce, the country today develops engineering, mine, steel, and pulp industries that are competitive internationally. At the same time, Sweden is featuring a generous universal welfare state financed through relatively high income taxes that ensures that income is distributed across the entire society (so called "nordic model").

Today, the Swedish industrial sector, including the industrial services sector, is creating close to one million jobs and is accounting for the major proportion of the Swedish exports. The Swedish export companies are, however, challenged to renew and reorganise production and products in order to keep pace with changing markets. As the Swedish government sees it, for too long, the Swedish industrial sector "has been treated as a historical remnant on the path towards the post-industrial service society" [2]. During the financial crisis, many jobs were lost in Sweden. Competitors, e.g. Germany, were taking a significantly more resolute action.

Overall strategy / situation concerning the digitization of manufacturing / production

In January 2016, the Swedish Government (Ministry of Enterprise and Innovation, Minister Mikael Damberg) has taken action to strengthen the development of Swedish industry by launching a new industrialization strategy for Sweden. "[Smart Industry](#)" [2] aims to strengthen the industrial sector's competitiveness and reinforce Sweden's position as an attractive location for industrial production. Four focus areas of particular importance were chosen:

- Industry 4.0 – Companies in the Swedish industrial sector shall become leaders of the digital transformation and in exploiting the potential of digitalization.
- Sustainable production – Sweden aims at increasing resource efficiency, environmental considerations and a more sustainable production. These aims are seen as a contribution to the industrial sector's value creation, job creation and competitiveness.
- Industrial skills boost – The system for supplying skills is to meet the industrial sector's needs and promote its long-term development.
- Test bed Sweden – with this initiative, Sweden wants to be a leader in research areas that contribute to the regional industrial production of goods and services.

The Swedish vision of "smart industry" is an industrial production that is digitally connected, flexible, resource-efficient, climate and environmentally friendly as well as providing the basis for attractive workplaces. With its "Smart industry"-strategy, Sweden wants to be at the forefront in the use of digitization capabilities with a high level of automation. This includes meeting complex customer

¹ More production sites in Sweden can be found via <http://makeinsweden.se/>

requirements and the production of products with high knowledge content, where the boundary between goods and services is becoming blurred, and where data volumes are creating value for customers and suppliers. A “Smart Industry Action Plan” has been published that describes measures to realize the national strategy for digitizing production (see below). Furthermore, five “innovation partnership programs” have been set up (see below) that aim at strengthening the innovation capacity of the industry. One of these innovation partnership programs, the “Connected industries and new materials” partnership is closely linked to the 'Smart industry' strategy.

The strategy will be followed up on an ongoing basis and the action plan will be continuously updated. The strategy will be monitored with the help of a number of indicators, which together give an indication of the industrial sectors' ability to adapt and capacity for renewal in relation to the strategy's aims and objectives.

Facts on the Swedish National Strategy 'Smart Industry'	
Ministry in Charge	Ministry of Enterprises and InnovationSome [Website]
Contact Person	Minister of Enterprise & Innovation Mikael Damberg Ms Eva Lindström, State Secretary to Mikael Damberg Phone (switchboard) +46 (0)8-405 10 00 naringsdepartementet.registrator@gov.se
Main Strategy Documents	Smart Industry Strategy [2] Smart Industry Action Plan [3]
Related Strategy documents	Strategy paper on digital policy [4] Research policy bill 'Collaborating for knowledge – for society's challenges and strengthened competitiveness [5] Sweden's Export Strategy [6]

The national strategies are in many aspects based on an earlier strategic agenda, that has been published in 2014 by the Association of Swedish Engineering Industries, Teknikföretagen², “Made in Sweden 2030” [7]. It describes the need of establishing a strategic program for innovation in production, covering the entire production chain. Teknikföretagen claims that national funding should be directed towards strengthening the innovation capacity of industry. They also ask for strategic innovation initiatives and precompetitive test beds, needed to demonstrate new ideas for companies and markets.

The agenda is proposing a new vision and recommending long term efforts that are necessary to strengthen innovation, development and production of goods and services in the Swedish manufacturing sector. It articulates on 6 keys areas where Swedish companies and researchers have a strong position to continue a leading role:

- Environmentally sustainable production
- Flexible manufacturing processes
- Virtual production development and simulation
- Human-centred production system
- Product- and production-based services
- Integrated product and production development

² Project manager and editor of the “Made in Sweden 2030” strategy is Cecilia Warrol Ersson, Teknikföretagen

The strategic work of Teknikföretagen has also been continued within the Vinnova funded Strategic innovation area “Produktion2030” which recently (2017) published an updated strategy “Make in Sweden” [8].

Digitization level of the country

According to the [Digital Economy and Society Index \(DESI\)](#)³ [9], Sweden falls into the cluster of high performing countries. It is among the best performing countries worldwide and its main challenge is to continuously improve its already high levels of digitisation

In DESI 2017, Sweden has an overall score of 0.67 and ranks 3rd out of the 28 EU Member States (0.52), behind Denmark and Finland. The country scores well in all dimensions. Concerning connectivity, Sweden has a medium rank in fixed broadband takeup (14), while it scores Nr. 1 in 4G coverage and rank 3 in mobile broadband take-up. During the past year, Sweden has even improved in fast broadband subscriptions. Almost all Swedes (91%) are online and three quarters of them have basic digital skills. ICT professionals represent an increasing share of employment (6,1%; rank 2), but the number of STEM graduates must improve to enable companies to recruit the ICT specialists they need. Sweden ranks the highest in the use of internet by citizens (2nd). These scores are mainly due to media consumption via the internet, while in online shopping / banking, Sweden scores number 5.

Swedish businesses actively use digital technologies to improve efficiency, productivity and sales. They show a high adoption rate of cloud computing (33%, rank 2), and 26% (rank 3) are selling online. 33% of Swedish companies are using electronic invoicing (rank 4), many of them selling online cross-border (9,7%; rank 10). In 2017, the country scored somewhat lower with regard to digital public services, however, Sweden is still above the EU average. The lower score is mainly due (the lacking of) an open data strategy.

National strategies towards digitization (economy, society)

Sweden’s digitization policies aim at optimizing access to fast broadband internet, the modernization of the Swedish economy through digital technologies and improvement in the public sector.

- Access to fast broadband: A continuous broadband development is part of the Swedish digitization strategy. At the moment, about 75% of Swedes are attached to broadband of at least 100 MB/s⁴. The objective to raise the access rate up to 95% until 2020 and up to 100% until 2025. Until 2023, all of Sweden should be connected to stable mobile services of high quality. A new Swedish expansion strategy has been published by the ministry for housing and digital development in March 2017 [10]. In the new strategy, the starting point is a market-driven development, completed by public efforts. In the period 2017-2020, the government intends to increase funding by 850 million SEK for broadband expansion targeting areas where conditions for commercial expansion are missing. Furthermore, the government has decided

³ The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on Europe’s digital performance and tracks the evolution of EU member states in digital competitiveness and Integration of Digital Technology which measures the digitisation of businesses and their exploitation of the online sales channel.

⁴⁴ <https://www.thelocal.se/20161218/all-of-sweden-to-be-online-by-2025>

to redistribute 150 million SEK to broadband expansion within the framework of the European Agricultural Fund for Regional Development (EAFRD; in total 4.25 billion SEK).

- Modernization of the economy: The government intends to modernize the Swedish economy through digitization. This is meant to increase the competitiveness of Swedish businesses and at the same time reduce the impact on the climate.
- eGovernment: The digitization strategy includes measures to modernize administration. Legal certainty, efficiency, and a high degree of quality, service and accessibility are the objectives for the digital transversion of the administration. This is meant to contribute to the continued development of Sweden and efficient EU-related activities.

In an early strategy "ICT for Everyone Digital agenda for Sweden", (2011)[11] the government set a focus on inclusion, easy and safe to use ICT; Infrastructure (Broadband) as well as in the use of ICT for societal development.

In addition, the Swedish Ministry of Enterprise, Energy and Communications published an "Innovation Strategy Sweden 2020" [12] in 2012. It includes measures to strengthen the innovation climate in Sweden. This should enable contributions that provide solutions to big societal challenges, regional as well as globally. It should also allow businesses to increase their competitiveness and attract expertise, investments and cooperation partners from around the world. Finally, actors in the public sector should partner with private and civil society organizations and supply high quality public services.

In May 2017, the Swedish Government (Minister for Digital Development Peter Eriksson) presented a new strategy paper on their digital policy [4] as a contribution to the competitiveness of the country, full employment, and sustainable development. The Digital Strategy encompasses five goals

- Digital skills – Everyone in Sweden should be familiar with digital tools and services and be able to participate in the digital transformation according one's specific situation
- Digital security – Sweden wants to provide the best conditions for security and trust. People, companies and organizations should have trust and confidence in the use of digital services and be able to use them easily. More concretely, this addresses developments such as a digital identity, the realization of high security requirements; privacy, but as well functioning digital markets / security of consumers and democracy safeguards in digital environments
- Digital innovation – Sweden wants to provide the best conditions to ensure that digitally driven innovations (new data driven products and services) are developed, disseminated and used. This also aims at an effective intellectual property law.
- Digital leadership – Sweden aims to promote relevant, targeted and legally sound efficiency improvements through digital transformation. laying a focus on the opportunities of digital transversion, while risks are minimized. Companies, organisations and people should have easy access to public sector activities. The Swedish government regards that as their own governance task , therefore also analysis on the own digital maturity is of importance. Local and regional engagement should be strengthened.
- Digital infrastructure – All of Sweden should have access to infrastructure that provides high-speed broadband and reliable mobile services, and that supports the digital transformation.

Along with the strategy, a new digitalization council and office have been set up at the Swedish Post and Telecom Authority to support the strategy's implementation. In addition, a State Secretary coordination group at the Government Offices has been appointed.

II. National Strategies towards “Digitizing European Industries”

Smart Industry action plan

Following the Smart Industry Strategy, the Swedish Government (Innovation Minister Mikael Damberg) published a “[Smart Industry Action Plan](#)” [3] outlining measures to implement the new industrialization strategy. This action plan presents actions in several policy areas that support the work of “Smart industry” in the form of ongoing efforts. The measures have been prepared after dialogue with the social partners, companies and academia, among other things through the four so-called Industrial conversations that have been held in the strategy's focus areas. In the preparation of the strategy and action plan, the advisory board of the government set up by the government has also been consultative.

According to the action plan, there are strong synergies with other initiatives that the government operates. Some of the key factors for industry have been re-launched in the context of other processes initiated by the government, including the Energy Commission, the Government's export strategy, the long-term infrastructure planning, the food strategy and the national strategy for sustainable regional growth and attractiveness 2015-2020.

The action plan aims at realizing the strategy through measures, that strengthen the vision and the goal of Smart Industry and at the same time will contribute to implementations in the focus areas.

- Foster digital transformation on a regional level: The government has assigned to the Swedish Agency for Growth to support actors with regional development responsibility in contributing to the implementation of smart industry (exchange of experience, project funding).
- Facilitate small and medium-sized enterprises to undergo digital transformation and increase awareness for digitization in business and sustainable production. The government intends to call on an authority, in cooperation with industry, to highlight and visualize good smart industry examples of Swedish companies.
- promote Sweden's active voice in EU cooperation; especially concerning EU legislation and initiatives supporting industrial transformation and sustainable development.
- In 2016, an International Conference on digital transformation was organized (in collaboration with the OECD project "Enabling the Next Production Revolution").

In the focus area “Industry 4.0” the action plan addresses the following needs:

- to stimulate the development, dissemination and use of digital technologies that have the highest potential to lead the industry's transformation. Vinnova has collected stakeholders active in strategic innovation programs, which initiated ambitious projects for a digitized Swedish industry. They will be the starting point for digitization pilots in collaboration between businesses and research organizations. As a result, Vinnova has initiated projects in several areas, including mobile communications in mines and self-learning robots in industry. In addition, the Government intends to assign a mission to Vinnova concerning open innovation (collaboration between major industrial companies and young fast-moving companies).
- To take advantage of the capabilities of digitization regardless of industry, company size and geographic location. Within the framework of a government assignment to the Swedish Agency for Growth, a number of pilot initiatives are carried out with a focus on skills development efforts

aimed at increasing companies' insights into digitization. Furthermore, the SME digitization initiative "Digitaliseringslyft" is going to be extended, an assignment will be submitted to the Swedish Agency for Growth.

- to encourage new business and organizational models to take advantage of the potential of new technology.
- To meet the new knowledge needs for the digital development.
- To Customize framework conditions and infrastructure for the digital era. The government promotes participation in international standardization through a governmental initiative assigned to the Swedish Standardization Federation. Furthermore, through a future government assignment to the Data Inspectorate, information will be developed to facilitate business adaptation to the EU's new data protection regulation, which will enter into force by 2018. The government also promotes active work in EU processes relevant to industry digitization. Priority processes include the implementation of the digital single market, the plan for digitized European industry and the introduction of data protection regulation.

In the focus area "Sustainable Production" the action plan addresses the following needs:

- Develop new or improve existing technologies, goods and services with regard to significantly reduced emissions, phasing out of particularly hazardous substances, higher energy and resource efficiency, higher reuse and recyclability, and higher environmental performance.
- Acquire the potential of new digital and other technologies for the conversion to a fossil-free and circular economy.
- Encourage business models that create values based on circular economics. Here, the government intends to instruct Vinnova to support the development of circular business models so that clusters and collaborations in circular economics and industrial symbiosis can be easily developed and replicated. Other measures address the use of mining waste for recycling. These resources could include minerals necessary for advanced products such as solar cells and wind turbines.
- Ensure that regulations and other instruments make it easier to produce resource-efficient and environmentally friendly and sustainable raw materials supply. The government is working on regulation to promote the transition to a circular economy
- Fostering environmental and climate technology: The government invests SEK 62 million per year (in total for 2016-2019: SEK 248 million; 25,9 M Euro) and thus creates better conditions for environmental and climate technology companies to grow and increase innovation and competitiveness. This package consists of three parts: SEK 25 million for test beds in environmental technology (Vinnova), SEK 20 million to reinforce existing programs at Vinnova for increased recycling and resource efficiency and SEK 17 million for Technologies and Advanced Systems Solutions for Sustainable Urban Development.

In the focus area "Industrial skills boost", the strategy addresses the following needs:

- Increase the interest in science and technology as well as increase the attractiveness of industry-relevant education. Next to a program to raise the attractiveness of becoming a teacher in mathematics and technology, collaboration between schools and SME are meant to improve the school's knowledge of the industry as a workplace.

- Improve the match between industry's labor demand and education system at all levels of education. Study opportunities in applied sciences relevant to industry are increased. In addition, Skolverket will implement a pilot initiative to improve regional cooperation in vocational training.
- Adapt the educational system so it gives students the right knowledge and skills. The amount of maths teaching in schools is going to be raised and strategies for the use of ICT and the teaching of programming in schools are going to be implemented.
- Improve the conditions for lifelong learning.
- Promote career change and mobility between universities and colleges and business. This includes the design of fast tracks for CNC operators, industrial workers, engineers, machine drivers, machine operators, mechanics and other. It aims also at a fast and improved integration of foreigners that apply for work permits.

The “Test bed Sweden” initiative comprises several types of efforts and will be implemented through strategic innovation areas, test and demonstration sites, research institutes, and specific innovation and collaboration programs. The test bed initiative addresses the following needs in the focus area:

- Targeted research and innovation efforts in areas with a particularly high potential to contribute to new industrialization and long-term competitiveness.
- Stimulate the public to be the industry's “test bed” for solving social challenges in close collaboration with actors at local and regional level.
- Increase the use of innovation-friendly procurement.
- Promote collaboration between universities and colleges and industry in research, as well as develop the institutional sector.
- Attract researchers to Sweden:
- Attract companies to invest in and conduct R & D activities in Sweden:

The testbed Sweden initiative was equipped with funding through the research Policy Bill in November 2016 [5]. Furthermore, the government supports the testbed initiative through investment promotion (see below) and common branding. Industrial research institutes are gathered under the common brand “RISE” which helps them to gain a stronger role as research and innovation partners. This creates a new structure with transversal business areas that reflect industry's challenges and better meet SME needs. A common brand also fosters their international positioning.

Innovation Partnership Programs

The government has defined so called “innovation partnership programs”⁵ in five areas: 1. Next Generation Travel and Transport; 2. Smart cities; 3. Circular biobased economy; 4. Life science; 5. Connected industry and new materials. The purpose of these partnership programs is to jointly collaborate on innovation efforts to strengthen Sweden's competitiveness while meeting and benefiting from today's societal challenges. As three horizontal challenges, digitization, life sciences and environmental and climate technology have been defined. Swedish industry will play a central role in all five cooperation programs. The partnership programs have been made a priority by Prime Minister Stefan Löfven via the National Innovation Council. Minister for Enterprise and Innovation

⁵ <http://www.government.se/articles/2016/07/innovation-partnership-programmes--mobilising-new-ways-to-meet-societal-challenges/>

Mikael Damberg is responsible for coordinating the Government's partnership programs. The Swedish Agency for Innovation Systems has been specially tasked with assisting the work on the partnership programs in 2016–2018.

“Strategic Innovation Areas” with relation to Digitizing European Industries

The Swedish Government has tasked Vinnova (as well as the Swedish Energy Agency and Formas) to carry out funding initiatives for strategic innovation areas. These are initiatives in which leading actors from commerce, academia and the public sector identify and define areas where they see a need to focus Swedish competence and joint efforts⁶. Prominent Swedish companies, authorities, and research organizations have the possibility to improve collaboration by joining forces. Actors within the strategic areas are collectively responsible for formulating the challenges to be addressed, establishing joint long-term goals and prioritising the investments made in research, development and innovation. Cross border cooperation is another major aspect of the strategic innovation programs.

To ensure that the program objectives are met and to be able to adapt activities and efforts to changes, strategic innovation programs are organized by a board and a program office who is leading and managing the operation of the program. Next to the strategic areas, Vinnova funds the innovativeness of specific target groups, including SME and start-up companies; cross border cooperation (EU, international, challenge driven) and other, however not specifically concerning smart industry.

Within the areas, two types of funding are available:

- Strategic innovation agendas: visions, goals and strategies for the development of a specific area are collectively defined by a group of actors.
- Strategic innovation programmes⁷, which intend to support the implementation of strategic innovation agendas and comprise projects and other activities that contribute to the visions and goals of these agendas.

Vinnova currently runs 16 strategic innovation areas of which the following are relevant for “Smart industry”⁸:

- Produktion 2030: creation of a national base for research, innovation and education for a competitive Swedish production in 2030 in priority areas
- Processing IT and Automation(PIIA) to strengthen the Swedish process industry in the field of technology at the same time as the industry suppliers develop their abilities to innovate
- Smartare elektroniksystem: a program on smart electronic systems with the aim to make Sweden a world leader in this area until 2025
- Grafen: prediction on new materials through graphs to ensure industrial leadership

⁶ <http://www.formas.se/en/International/Strategic-innovation-areas/>

⁷ <http://www2.vinnova.se/sv/Var-verksamhet/Gransoverskridande-samverkan/Samverkansprogram/Strategiska-innovationsomraden/strategiskainnovationsprogram/>

⁸ <http://www2.vinnova.se/en/Our-activities/Strategically-important-knowledge-areas/Information-Technology/>

- Internet of Things: provision of machinery, vehicles, goods, clothes and other things as well as creatures (Including people) with built-in sensors and processors.
- Lättvikt: Design of light weight products.
- Metalliska material: strategy building in the Swedish metal industry.

The other application areas can also play a role in Digitizing European industries or smart manufacturing such as transportation (Infra Sweden 2030, Drive Sweden), environment (Re:Source, Smart Built environment, STRIM), aviation industry (AviAir) or health and healthcare (Medtech4health, SWELife, BioInnovation).

Produktion 2030

Established in 2013 as a Strategic Innovation Program, Produktion2030⁹ aims at translating industry challenges to relevant and innovative solutions for the industry; it also aims at building and strengthening networks and cooperations, both in Sweden and internationally; Produktion2030 links ideas, actors and funding opportunities to create valuable solutions for the future manufacturing industry. Within the program, the following 5 instruments are applied [8]: Projects, SME transfer, academic courses, knowledge exchange industry & research and internationalization.

Research and innovation projects as well as testing and demonstration projects are initiated through regular calls (1 or 2 per year), whereas the framework conditions (theme, budget and long term achievements) are determined by the program. The application and assessment processes are handled by Vinnova. Co-financing from companies must amount to at least 50%. The projects can involve both early and late stage knowledge phases. The industrial co-financing should therefore be high, at least 60%. The projects focus on testing or demonstrating new technologies and methods in realistic environments.

For SME transfer, Produktion2030 packages and distributes results from these projects to SME's all over Sweden. They conduct workshops and seminars together with regional industrial networks. Since 2014, Produktion2030 organizes a national PhD School in production. Starting in 2017, courses for M.Sc. in Industry 4.0 are available. Produktion2030 supports the exchange of strategic competence between the industry and research actors in the projects funded by the program (personal exchange, study visits). In addition, Vinnova works with lobbying organizations, various EU programs, business intelligence, study trips and bilateral collaborations. A broad overview on Produktion2030 is given by a PwC "Digital transformation monitor" [13].

PIIA¹⁰ - Process Industrial IT and Automation

PiiA aims at strengthening collaboration between the various process-industry sectors, their suppliers, and researchers. PiiA coordinates funding applications for innovation projects, supports research, analyses industry needs, brings together researchers, and helps industry players to access the training and talent that they need. One of PiiA's key roles is supporting RDI-consortiums who wish to undertake project work related to automation and IT for the process industry. We can

⁹ <http://produktion2030.se/en/>

¹⁰ PiiA; <http://sip-piia.se/en/>

provide support and advice at every stage of the journey, from lodging the project application, to receipt of the grant, to completion of the project.

PiiA began operations in 2013 and currently expects to be funded through to 2023. They have ambitious 2022 targets centred around raising the process industry's use of digital technologies and digital business and operational models. One key goal is to help the industry, its IT and automation suppliers, and researchers in the sector to better manage ongoing change. Another is to help the industry and its suppliers to out-perform their global competitors in developing and implementing digital-based solutions. Success in this area will come in the form of the increased use of digital technologies in processes, products, services, and offerings across the industry.

PiiA holds two calls for proposals each year. During these, consortiums formed from industry and academia are invited to apply for funding for projects related to industrial IT and automation for the process industry. The last call for proposal focused on proposals for feasibility studies with a maximum length of six months (Open April-June 2017). Such projects are typically expected to run for about six months, with public funding of up to SEK 500,000 provided and a corresponding amount expected to be contributed by participating parties.

PiiA's operations are steered by a Board consisting of a minimum of eight and a maximum of 12 members. Members are elected for three-year terms, with the Chair chosen for one year at a time. The Chair organises the work of the Board.

III. Digitising European Industry (DEI) Pillar 1 - Digital Industrial Platforms actions & Research, Development and Innovation actions

Digital Industrial Platforms actions

In July 2015, prime Minister Stefan Löven and his Government had appointed four senior individuals from different parts of the Swedish industry to advise and support the Government towards a strategy for the renewal of industry:

- Olof Persson, former CEO Volvo AB, Volvo CE, Bombardier
- Lisa Lindström, CEO Doberman (digital communication and design agency)
- Pia Sandvik, Chair of board RISE, former Vice Chancellor Luleå University of Technology, Vice Chancellor Mid University, Ericsson
- Karl Gustaf Ramström, CEO Prevas, former SSAB and ABB

The next steps of the government were the launch of the Smart Industry 2030 strategy (January 2016), the "Smart Industry Action plan" (June 2016). In September 2016, prime minister Stefan Löfven stated the implementation of the 'Smart industry' reindustrialization strategy. This was followed by a "Smart industry conference" in Stockholm (November 2016), organized by Vinnova. To kick off activities in this area as a first phase, the Swedish government in 2016 has allocated SEK 22 million (~ 2,3 mio. Euro) to Vinnova.

Facts on the Swedish Platform "Produktion 2030"	
Contributors	Universities, Research institutes, Clusters, industry (ABB, Volvo, Siemens, Tetra Pak and many more)
Working Groups	The work is organized along 6 "strength areas" and two cross functional topics <ul style="list-style-type: none"> • Resource-efficient production • Flexible production • Virtual production • People in the production system • Circular production systems and maintenance • Integrated product and production development • Cross functional topic: digitalization • Cross functional topic: sustainability
Contact Persons	Cecilia Warrol, Produktion2030 Programme Director 08-782 08 28 cecilia.warrol@produktion2030.se
Platform Office	Teknikföretagen, Storgatan 5, Box 5510, 114 85 Stockholm
Website	produktion2030.se

This was followed by a direct action towards a digital industrial platform: the setup of the "Connected industries and new materials" partnership program, which is closely linked to the Government's re-industrialization strategy 'Smart industry'. The partnership program aims at stimulating broad digitalization of Swedish industry which as well requires mobilization in the form of cooperation between actors. Especially, partnerships between established industry, IT and telecom companies, service companies, innovative young companies at the forefront of digitalization should

be strengthened, as well as with various research environments to better help enhance Sweden's competitiveness.

Next to that, “bottom up” platform building activities resulted and evolved from the strategic innovation program “Produktion 2030”. Teknikföretagen is heading the program secretariat of Produktion2030 with the aim to support a competitive Swedish manufacturing industry based on a strong collaboration between industry, academia and research institutes.

A second platform building organization is based on the Strategic Program “P!iA”. The original concept for PiiA grew out of the shared ambition of four similar RDI hubs and knowledge centres who wanted to coordinate their activities and create a national agenda for the field. These founding hubs were the Process IT Innovations operations in Luleå and Umeå, the Process Industrial Centre in Linköping and Lund, and Automation Region in Mälardalen. These hubs, and other organizations which have subsequently supported the program provide PiiA with a link to the different Swedish regions. PiiA’s work also benefits from the established networks, relationships with industry, and various resources that these hubs can provide.

The organisation’s activities are run by an independent board, a management team, and a range of advisory groups. PiiA’s host organization is RISE SICS Västerås. P!iA addresses Sweden’s process industry which is seen as a “world leader, thanks partly to the close cooperation it enjoys with the IT and automation companies that supply it with equipment and solutions. To maintain and improve this position, the industry and its suppliers need to enthusiastically embrace digitalisation and to find technologies and working methods that increase efficiency, profitability, and sustainability.”¹¹

Facts on the Swedish Platform “P!ia”	
Management Structure	<p>The <u>Industrial Advisory Board</u> consists of 16 representatives from the process industry and the automation and IT companies that service it. The board’s role includes assessing relevance to the industry, providing advice on the shaping of different investment areas and projects, and highlighting potential synergies and examples of best practice.</p> <p>The <u>Research Network</u> (previous called Research Council) consists of representatives from active research organisations and research divisions within the industry.</p> <p>P!iA has currently 12 <u>Program sponsors</u> (ABB, Siemens, Telenor, a.o.). Sponsorship is open to both companies and organisations.</p>
Working Groups	[No info on work groups]
Contact Persons	Anders OE Johansson; Per Levén anders.oe.johansson@sip-piia.se or, per.leven@umu.se
Platform Office	RISE SICS Västerås Expectrum, Kopparbergsvägen 10, 722 13 Västerås, Sweden http://sip-piia.se/en/contact-us/ Per Levén
Website	http://sip-piia.se/en/

¹¹ <http://sip-piia.se/en/about-piia/piias-mission/>

In spring 2017, PiiA has launched a call for proposals (budget: SEK 20 mio.), aiming at supporting the commencement and completion of RDI projects focused on industrial digitization (including emerging technologies, services and new business models) and create a wider range of improved solutions, methods and innovations within IT and automation for the process industry. The call addressed consortiums made up of companies, universities, colleges, research institutes, and other relevant players. The call for proposals is also open to foreign academic and industry players.

In 2016, PiiA received a 10 year grant from Vinnova (146 mio. SEK) in order to connect large enterprises and SME.

Research, Development and Innovation actions

In November 2016, the Swedish government announced an increase in the appropriations for research and innovation in general of over SEK 3 billion until 2020. By means of the measures proposed in the research policy bill [5], the government intends to strengthen Sweden as a knowledge nation. Next to safeguarding free research, the research policy is linked to global and national societal challenges that are relevant to the Swedish society. Priorities are on research on climate, health and life sciences, as well as digitalization. Also presented in the bill are a number of measures to give researchers, the business sector and the public sector as much access as possible to the best research infrastructure (e.g. test beds).

R&D&I related to Digitizing European Industries:

- Many R&D&I activities are funded through Vinnova's strategic innovation programs within the innovation areas mentioned above, especially next Produktion 2030: processing IT and automation (PiiA), Internet of Things, Smart electronics, design of new materials and light weight products.
Funded by Produktion2030, the manufacturing industry, universities or research institutes can apply for funding for short-term high risk projects. The projects will test ideas with the potential to contribute significantly to increased sustainability in the Swedish manufacturing industry. Funding is not more than SEK 500,000. The manufacturing industry must account for at least 30 percent of the total project budget.
Priorities in application areas for research activities are furthermore set in transportation and automated driving; in biotech and healthcare; in specific sectors of the aviation industry and metal industry and in circular economy and environmental technologies.
- Along with the governmental focus area "Sustainable production", the government charts mining waste for new green technologies. Two assignments (Swedish Geological Survey – SGU, Growth Analysis) were made to map the need for metals necessary for the development of new technologies in the solar cells of the future. This also includes reviewing whether these metals can be extracted from mining waste in Sweden. Most of the metals required for conversion to renewable energy or high technology products such as computers and mobile phones, are not recovered in the EU, while China today accounts for about 95 percent of all rare earths in the world. Growth analysis shall report its final results by 19 October 2017. The Swedish Geological Survey (SGU) is commissioned to map the potential for the extraction of these metals in Sweden,

primarily from mining waste but also from primary sources. The assignment to SGU shall be deliberated by 15 February 2018 and finalized on 7 December 2018. Sweden has a longer tradition and success story of recycling waste and is recycling 99% of its waste¹².

Other related research activities

In June 2016, the Swedish government assigned SEK 40 million to Vinnova for initiating a framework for the five “innovation partnership programs”. The cooperation programs are based on developed cooperation between public actors, business and universities and higher education institutions in Swedish strength areas with a focus on innovation.

Several activities have been launched with the objective to reduce industry emissions. At the Industrial Day in October 2016 in Malmö, the government announced the allocation of SEK 35 million (3.65 mio. Euro) to the Swedish Energy Agency for innovation-promotion efforts and reduced process emissions¹³. It is a strategic work in collaboration with industry, institutions, institutions and other authorities. These include, for example, preliminary studies and test and demo activities aimed at reducing emissions while contributing to the technological advances that are necessary. Sweden wants to take its responsibility according to the Paris climate agreement and pursue an ambitious stance in the EU Emissions Trading System. However, companies that are in the forefront are expected to also benefit from climate innovation and to create jobs in Sweden.

¹² <https://www.globalcitizen.org/en/content/sweden-garbage-waste-recycling-energy/>

¹³ <http://www.regeringen.se/debattartiklar/2016/10/nu-starker-regeringen-forutsattningarna-for-att-minska-industrins-utslapp/>

IV. Digitising European Industry (DEI) Pillar 2 - Standardization actions, regulation and testbeds

Standardization actions

In Sweden, the The Swedish Standard Institute (<https://www.sis.se/>; Contact: Erik.Eklund@sis.se) is responsible for standardisation activities. There is a close cooperation with Vinnova which has been assigned 35 mio SEK between 2017 and 2020 regarding standardization activities concerning smart industry.

Regulatory framework

According to the Swedish smart industry strategy, the public sector plays an important role with respect to long-term means of control, regulatory frameworks, research and development initiatives and procurement processes. A central aim is the promotion of a fossil-free and circular economy. Adequate product and environmental requirements are a prerequisite. Transparent, clear and effective permit and supervisory processes are seen as a facilitator to the industrial sector's effort to produce in a way that is more resource efficient and environmentally friendly.

Regulation of fair working conditions

The Swedish Government is actively engaged in the discussion on the future of Europe and since the start of its mandate has put fair working conditions, inclusive growth, equal opportunities and a well-functioning social dialogue high on its political agenda.¹⁴

Together with President of the European Commission Jean-Claude Juncker, Sweden's Prime Minister Stefan Löfven will host a Social Summit in Gothenburg on 17 November 2017, focusing on promoting fair jobs and growth. The Social Summit for Fair Jobs and Growth will gather heads of state or government, the social partners and other key players to work together on a more social Europe and to promote fair jobs and growth. Well-functioning and fair European labour markets, effective and sustainable social protection systems and the promotion of social dialogue at all levels will be at the heart of the summit agenda.

eGovernment / Open Government¹⁵

Sweden joined the Open Government Partnership (OGP) in 2011. Since then, it has published two action plans and Sweden has reaffirmed its commitment to open government efforts, both in principle and in practice. Sweden's third Action Plan (2016-2018) encompasses the following commitments:

- Putting citizens at the centre (eGovernment)
- Re-using public administration documents and open data
- Improving opportunities for dialogue and transparency in aid management and implementation
- Developing a new format for dialogue with CSOs (new commitment).

¹⁴ <http://www.government.se/government-policy/social-summit-for-fair-jobs-and-growth/background-about-the-summit/>

¹⁵ http://www.opengovpartnership.org/sites/default/files/Sweden_National-Action-Plan-3_2016-18.pdf

Pilot Factories and Testbeds

According to the government's research policy bill [5], Sweden wants to "continue to be a globally attractive place for prominent research and innovation". Testbed Sweden (Testbädd Sverige) was launched in January 2016 in order to encourage that new ideas and solutions are being tested in Sweden. This also aims at attracting international investors in the Swedish research and innovation environments. Test bed Sweden covers several different types of beds. The research institutes play a central role in enabling above all, small and medium-sized enterprises to keep in touch with and exploit opportunities.

In May 2017, the government announced to give Vinnova the task of establishing a national coordinating function to strengthen test and demonstration activities in Sweden as part of testbed Sweden¹⁶. While there are already more than 100 test beds in Sweden, the task is to coordinate these activities and to promote the emergence of internationally particularly attractive test and demonstration environments. The first report is expected in March 2018.

In June 2017, Produktion2030 launched a call for test bed projects for digitization in the manufacturing industry¹⁷. The projects will utilize existing testing environments and should lead to increased digitalization of the Swedish manufacturing industry (testing of new production methods, production systems and production technicians). Applicants can get a maximum of SEK 8 million per project from Produktion2030. At least 60 per cent of the project's total budget are funded.

¹⁶ <http://www.regeringen.se/pressmeddelanden/2017/05/svenska-testbaddar-ska-locka-nya-investeringar-till-sverige/>

¹⁷ https://www.vinnova.se/globalassets/utlysningar/2014-01174/omgangar/produktion2030-utlysning-7-2017_en805216.pdf

V. Digitising European Industry (DEI) Pillar 3 - Digital Innovation Hubs actions

ProcessIT Innovations¹⁸ is a collaboration centre in northern Sweden (Lulea, Umea). The strategic concept of ProcessIT Innovations is to bring together the functional process and engineering industry in the region with ICT services in universities and industry. The aim is to reinforce existing primary industries and develop the region's ICT-industry to an internationally competitive position. This concept meets the challenges faced by today's knowledge-intensive, high-technology primary industry with the extensive knowledge developed by the region's ICT services. Process IT's vision wants to establish a leading European R&D centre in ICT for primary industry in this area. Process IT Innovations currently has slightly more than 100 partners, including large companies such as ABB, Vattenfall or Volvo. With ProcessIT.EU they have also formed a Centre of Innovation Excellence in a number of European industry segments.

Since it started in 2005, ProcessIT Innovations has run about fifty projects and preliminary studies. There is a focus on four main fields: measurement systems, control systems, communications systems and interaction systems. However, in almost all cases, the projects have links to more than one main field. One important issue in measurement systems has been non destructive evaluation and testing systems based on optical measurement or measurement based on ultrasound. Control system projects have dealt with building and handling models. Within the process industry, there is complex plant equipment which can make it difficult to make measurements. The use of models makes it easier to understand these processes. When it comes to communication systems, the big issue has often been on handling wireless communication in tough conditions and extreme environments.

ProcessIT Innovations is a founding member of P!iA and was awarded 2014 in the program "Vinnväxt" (see below). Furthermore, ProcessIT.EU was awarded with an ARTEMIS Label and as one of ARTEMIS Centres of Innovation Excellence, CoIE, at ARTEMIS Spring Event 2013.

Contacts:

- John Lindström, CEO; ProcessIT Innovations, Luleå University of Technology, 971 87 Luleå, Mail: john.lindstrom@ltu.se, Phone: +46 (0)920 49 15 28
- Per Levén, CSO, ProcessIT Innovations, c/o The Department of Informatics, Umeå University, SE-901 87 Umeå, Mail: per.leven@informatik.umu.se, Phone: +46 (0)90 7867065

Automation Region¹⁹ is an innovation platform where small and medium-sized enterprises, large corporations, academia and the public sector collaborate in interdisciplinary projects. New technologies, sustainable business models and innovative capacity is developed in constellations based on people's diversity, skills and ability to work together. The project builds on the established cluster initiative Automation Region, bringing together over 120 dedicated member organizations of which about 100 are automation companies of varying size. Mälardalen University, with leading research in areas such as embedded systems and future energy systems, is the host organization for

¹⁸ <http://www.processitinnovations.se/default.aspx?id=1765>

¹⁹ <http://www.automationregion.com/pages/>

Automation Region. Main financier is the Regional Structural Fund Program “goal 2 East Mid-Sweden”. Automation Region is also funded as a winner of the “Vinnväxt” programme.

Contact: Catarina Berglund, catarina.berglund@automationregion.com

Vinnväxt [14] is an important Swedish instrument for supporting the regional level²⁰. As a competition of regions, the winning region receives funding of up to SEK 10 million per year for a period of ten years. The objective is that the winners will become internationally competitive in their respective fields within this period. A prerequisite for the programme is the active participation of players from the private, public and research sectors and from the political sphere. Vinnväxt comprises support activities (seminars, training, education), the exchange of experience and the extension of knowledge or research.

Contacts: Andrea Råsberg/Göran Andersson; andrea.rasberg@vinnova.se;
goran.andersson@vinnova.se

CENIIT²¹ is a research organization, founded in 1988, within Linköping University. The aim of CENIIT is to support research concerning the use of information technology in industrial products and processes, and to give funding to younger researchers in order to encourage the formation of new research groups.. Parts of the research funding are handled within the university. CENIIT is lead by a board with seven members, three from industry (ABB, Ericsson, SAAB) and four from the university. All projects are evaluated annually; the typical duration of a project is six years. Currently, about 17 projects are performed²². Calls for new or continuation of projects are called upon yearly.

Contact: Erik Frisk frisk@isy.liu.se Department of Electrical Engineering, Linköping University

FindIT, the Forum for Industrial IT Solutions, creates opportunities for small- and medium-sized companies through increased development of skills in the industrial IT area. FindIT is financed by the European Union, by the regions Gävleborg and Dalarna as well as by the community of Sandviken. The initiative aims to prevent the area’s industrial subcontractors from moving to other regions or countries in search of a more capable IT workforce. The initiative aims at developing a cluster of world-class industrial IT competencies. Among other things, FindIT offers seminars, trainings and surveys designed to map competence needs at different businesses. The project will also contribute to promote collaboration between companies and industries with regards to industrial IT and encourage companies to expand into new markets FindIT has a network of about 30 private and public partners.

Contact: Britta Haag, Processleader, 026 - 24 17 57 britta.haag@findit-solutions.com

²⁰ <http://www2.vinnova.se/en/Our-activities/Innovativeness-of-specific-target-groups/Individuals-and-Innovation-Milieus/VINNVAXT/>

²¹ <http://ceniit.lith.liu.se/>

²² <http://ceniit.lith.liu.se/projects/>

VI. Digitising European Industry (DEI) Pillar 4 - Skills development

In October 2016, the Swedish government announced to assign the Swedish Agency for Growth with a 3-year pilot project to promote the cooperation between schools, industry and industrial service companies²³. The purpose of the assignment is to create a supporting structure that helps students to get in close contact with employers in occupational categories with labor shortage. The mission will be carried out in a smaller number of regions and in collaboration with industry organizations, employers and players with regional development responsibility. Parts of the assignment will be carried out in consultation with the National Agency for Education. The investment is SEK 3 million (313.000 Euro) per year; the project will be finalized by 1 March 2019.

Furthermore, in October 2016, the government assigned the Swedish Agency for Growth with the task of stimulating and strengthening the supply with skills for small and medium-sized industrial companies²⁴. The pilot project encompasses information campaigns, searchable support and follow-up. The project is also a measure to validate regional competence platforms as a strategic tool for competence management, and generate information about the benefits of competency mapping for SMEs. The mission will be conducted in dialogue with representatives of industry and industrial service companies as well as players with regional development responsibility. Again, the investment is SEK 3 million per year; and the project will be finalized by 1 March 2019.

²³ <http://www.regeringen.se/pressmeddelanden/2016/10/pilotprojekt-starker-samverkan-mellan-skola-och-industri/>

²⁴ <http://www.regeringen.se/pressmeddelanden/2016/10/nya-pilotprojekt-for-kompetensforsorjning/>

VII Specific National Measures

Innovation promotion

Procurement Measurements

Also, the Swedish government has initiated activities towards a focus on innovation procurement in Smart Industry on behalf of the procurement authority²⁵. It regards procurement to have a great potential as a tool for promoting innovation. With a total investment of SEK 4 million in 2017 and 2018, the procurement authority is tasked to promote the initiative and to provide support to order groups of contracting authorities at national, regional and local level with a common need for innovative solutions.

SME consulting

The Swedish government carries out an investment in digitalization consulting for small and medium-sized enterprises with an investment of SEK 78 million. The Swedish Agency for Growth has been assigned to speed up the digitization of companies around Sweden, with a particular focus on companies in industry. With that measure, Sweden follows the example of several other countries including South Korea and Singapore to stimulate digitization within industrial companies and to speed up automation, robotization and digitization. The mission also includes gathering existing state actors via Vinnova, RISE and other. The project will be finalized by March 2020.

Open Innovation Strategy

The government has assigned Vinnova to implement initiatives for open innovation in Swedish industry in 2016-2017. The purpose of the mission is to strengthen cooperative in generation of innovations between major industrial companies and small innovative companies in the forefront of digitization. The aim is further to utilize the potential of digitization for industry, such as automation and robotization, equipment connectivity and control, sensors, simulation, large amounts of data analysis, machine learning and artificial intelligence. The digitalization can be based, however, on all aspects of the industry's business, including product development, production, business systems, interaction with subcontractors and customers, as well as the relationship with the employees. The investment is SEK 16 for both years. The decision is part of the government's smart industry strategy and in line with the work of the National Innovation Council.

Structural Funds

According to the ICT Monitoring Tool [[Website](#)], Sweden is planning the following ICT Investments under ESIF with relevance to smart manufacturing research and dissemination²⁶:

- EAFRD - ICT in rural funds: € 158 M.
- 047 - ICT: Very high-speed broadband network (access \geq 100 Mbps): € 71 M.
- 082 - ICT Services and applications for SMEs, living labs, web entrepreneurs and ICT start-ups): € 16 M.

²⁵ <http://www.regeringen.se/pressmeddelanden/2016/12/fokus-pa-innovationsupphandling-i-uppdrag-till-upphandlingsmyndigheten/>

²⁶ Data were generated by a search tool from the ESIF Operational Programmes (OP) on planned ICT related investments (retrieved on 20/01/2017 from the SFC2014/Infoview database)

- 044 - Intelligent transport systems (including the introduction of demand management, tolling systems, IT monitoring, control and information systems): € 12 M.
- 081 - ICT solutions addressing the healthy active ageing challenge and e-Health services and applications (including e-Care and ambient assisted living): € 7 M.
- 080 - e-Inclusion, e-Accessibility, e-Learning, e-Education services and applications, digital literacy: € 5 M.
- 078 - e-Government services and applications (including e-Procurement, ICT measures supporting the reform of public administration, cyber-security, trust and privacy measures, e-Justice and e-Democracy): € 5 M.
- 079 - Access to public sector information (including open data e-Culture, digital libraries, e-Content and e-Tourism): € 2 M.
- 015 - Intelligent Energy Distribution Systems at medium and low voltage levels (including smart grids and ICT systems): € 2 M.
- 046 - ICT: High-Speed broadband network (access/local loop; >= 30 Mbps): € 500.000

Which is summing up to a total of 278,5 mio. Euro.

Facilitate access to finance

Venture Capital

- Almi Invest²⁷ is Sweden's most active investor in young growth companies. Half the capital in the fund comes from the EU's structural funds and the other half from regional owners and Almi Företagspartner in equal portions. Almi Företagspartner AB is owned by the Swedish government and is the parent company of a group consisting of 16 regional subsidiaries. Almi Invest invests in companies with scalable business concepts and prospects for long-term capital growth. The portfolio consists of 350 growth companies in different industries (50-70 new businesses per year). The total amount invested to date is SEK 750 million. Almi Invest's role is to supplement that of the market, which involves investing where the risk is high and access to private capital is scarce. The companies must have the ability to compete nationally and internationally, and there must be a clear customer need.
- Saminvest²⁸, owned by the Swedish state, invests in venture capital funds. The company was formed July 1, 2016 and today manages a capital of approximately SEK 5 billion. Saminvest invests indirectly in companies by investing in private-managed venture capital funds with private capital, where there is a need for market-compliant investments. One example is Almi Invest. Saminvest's mission is to provide an alternative and complement to such public and private financiers who have other starting points for their business.

Contact: Peder Hasslev, CEO, peder.hasslev@saminvest.se

Investment promotion

In November 2016, the government announced via a press release²⁹ the spending of 11.5 mio SEK (1.2 mio. EUR) until 03/2020 for investment promotion related to Smart Industry. Supported by

²⁷ <http://www.almi.se/Almi-Invest/About-Almi-Invest/>

²⁸ <http://saminvest.se/sv/startside>

²⁹ <http://www.regeringen.se/pressmeddelanden/2016/11/regeringen-satsar-115-miljoner-pa-ett-starkt-investeringsframjande-for-smart-industri/>

“Business Sweden”³⁰ investors, industrial companies and industry-relevant start-ups should be stimulated to place or expand production, industrial services, research, development and testing in Sweden. Especially the testbed initiative and other cooperation environments are being promoted with this investment. The initiative is also part of the government's initiative Team Sweden Invest within the framework of Sweden's export strategy.

Tax incentives

Sweden is of the leaders in innovation according to the European Innovation Scoreboard³¹ index. It invented, however, tax based incentive only in the form of a partial exception of social security contributions³². There is a special tax regime applicable to individuals who qualify as experts, scientists or executives. Companies can benefit from reduced employer social fees for employees engaged in research or development work within Sweden. The reduction amounts to 10% of the employee's salary within certain brackets. The social fee reduction is maximized at SEK 230,000 per month.

³⁰ <http://www.business-sweden.se/en/about-us/>

³¹ <https://ec.europa.eu/docsroom/documents/17822/attachments/1/translations/en/renditions/native>

³² <https://www.oecd.org/sti/rd-tax-incentives-compendium.pdf>

V Investments for Digitising European Industry

Activity (Sweden)	Timeframe	Reliability	Amount (€)
Smart Industry kickoff phase (Vinnova)	2016	Press release	2.3 M.
Platform building (Produktion2030, PiiA, DIH)			
DEI related research			
Development of environmental and climate technologies (including test beds)	2016-2019	Internet research	25,9 M.
ICT investment under European Structure and Innovation Fund ESIF	Depending on project length, current total investment.		278 M.
Idea projects on sustainable production	2016-2017		52.000
Framework on cooperation programme		Calculates Only 1 of 5 cooperation programs	840.000
Skills development programs	2017-2019		626.000
Investment promotion (includes funding for the testbed initiative)	2017-2020		1.2 M
SME consulting	2017-2020	Press release	8,14 M.
Procurement stimulation	2017/2018	Press release	419.000

References

- [1] Wikipedia, "Economy of Sweden," e: https://en.wikipedia.org/wiki/Economy_of_Sweden.
- [2] Swedish Ministry of Enterprise and Innovation, "Smart Industry - A Strategy for new industrialisation for Sweden," <http://www.government.se/information-material/2016/04/smart-industry---a-strategy-for-new-industrialisation-for-sweden/>, 2016.
- [3] Swedish Ministry , "Handlingsplan Smart industri - en nyindustrialiseringsstrategi för Sverige," N2016/04273/FÖF, <http://www.regeringen.se/informationsmaterial/2016/06/handlingsplan-smart-industri/>, 2016.
- [4] Swedish Ministry of Enterprise and Innovation, "Factsheet For sustainable digital transformation in Sweden - a digital strategy," http://www.government.se/49c292/contentassets/117aec2b9bf44d758564506c2d99e825/2017_digitaliseringsstrategin_faktablad_eng_webb-2.pdf, N2017.23, June 2017.
- [5] Government Offices of Sweden, "Research policy bill 'Collaborating for knowledge – for society's challenges and strengthened competitiveness,'" <http://www.government.se/press-releases/2016/11/collaborating-for-knowledge--for-societys-challenges-and-strengthened-competitiveness/> , 2016.
- [6] Government Offices of Sweden, "Swedish Export Strategy," <http://www.government.se/4aad93/contentassets/0effc2f3c24a4c58b7e2399ffe1eeeb2/swedens-export-strategy.pdf>, 2015.
- [7] Teknikföretagen, "Made in Sweden 2030," <https://www.teknikforetagen.se/globalassets/i-debatten/publikationer/produktion/made-in-sweden-2030-engelsk.pdf>, 2014.
- [8] Produktion2030, "Make in Sweden 2030," http://produktion2030.se/wp-content/uploads/Prod2030_agenda_eng_1702151.pdf, 2017.
- [9] European Commission, "Digital Economy and Society Index (DESI)," 2016. [Online]. Available: <https://ec.europa.eu/digital-single-market/en/scoreboard/sweden>. [Accessed February 2016].
- [10] Government Offices of Sweden, "A completely connected Sweden by 2025 - a broadband strategy," <http://www.government.se/information-material/2017/03/a-completely-connected-sweden-by-2025--a-broadband-strategy/>, 2017.
- [11] Ministry of Enterprise, Energy and Communications, "ICT for Everyone - A digital Agenda for Sweden," <http://www.government.se/contentassets/8512aaa8012941deae5cf9594e50ef4/ict-for-everyone---a-digital-agenda-for-sweden>, 2011.
- [12] Ministry of Enterprise, Energy and Communications, "Innovation Strategy Sweden 2020," <http://www.government.se/contentassets/cbc9485d5a344672963225858118273b/the-swedish-innovation-strategy>, 2012.
- [13] PwC, "Digital Transformation Monitor: Sweden Produktion 2030," 2017.
- [14] Vinnova, "Vinnväxt - A programme renewing and moving Sweden ahead," http://www2.vinnova.se/upload/EPiStorePDF/vi_16_08T.pdf, 2016.