Sweden’s prosperity is partially based on innovative and successful export companies. With only 0.13 per cent of the world’s population, Sweden has managed to create surprisingly many multinational industrial companies. The key to success has been innovativeness and adaptability to change, which made many of these companies maintain their competitiveness and continue growing on the global market for decades.

We are in the midst of an industrial revolution, which once again puts the industry’s innovative thinking to the test. In order to meet the global challenges that we face in common, perhaps higher demands than ever are placed on the industry’s skills level, ability to change and willingness to cooperate.
As a small export-dependent country, globalisation has a decisive influence on the economic development in Sweden. The country’s future is determined by how well its companies succeed in leveraging new opportunities and meeting the global market’s changing needs in a competitive way.

Agenda 2030 indicates the direction of sustainable development – the way we must choose for our planet to be able to meet the needs of a growing population with increased wealth. Industrial actors need to find solutions that reduce their climate impact and alleviate the pressure on the Earth’s finite resources. Integrated sustainability work is today a matter of course in Swedish industry and has even become a competitive advantage.

Digitalisation opens the door to a whole new world of possibilities. Where the development takes us, we cannot yet predict. But we dare to say that those who don’t jump on the bandwagon will miss the journey into the future. The digital transformation in which Swedish industry finds itself involves all aspects of the companies – product development, manufacturing methods, logistics, customer relations and other areas. The results already appear in the form of new products, processes, services, working methods and business models.

In order to exploit the opportunities that result from globalisation, digitalisation and sustainable development, new demands are placed on competences, related to both technology and leadership. Finding the right expertise is a challenge that no company or industry can solve on its own. In Sweden, many different collaborative initiatives are in place to ensure the industry’s short and long-term skills maintenance. It includes everything from internship programmes that inspire young people to choose a technical career, to developing industry-relevant education courses that match the needs of businesses.
Digitalisation is nothing you choose. It is a paradigm shift that will fundamentally change the industrial sector. Businesses’ ability to change will have a decisive impact on their future. There is plenty to learn from Swedish industrial companies when it comes to reinvention and staying in tune with modern developments and technological progress.

There is a strong belief in the power of cooperation and co-creation in Sweden. If we are to achieve sustainable development and be at the forefront of digital development, we believe that cooperation between countries, industries, academia and industry is a prerequisite. Sweden exuberates collaborative initiatives that accelerate the digital transformation of industry and society.

Welcome to have a look inside Swedish industry in the middle of this ongoing transformation. Together we have the keys to unlock the potential in the smart industry of the future.

The Global Goals and Agenda 2030 for Sustainable Development aim at eradicating poverty and hunger, realising human rights for all, achieving gender equality and empowerment for all women and girls, as well as ensuring lasting protection for the planet and its natural resources. The global goals are integrated and indivisible, balancing the three dimensions of sustainable development: economic, social and environmental.

Several goals relate to the future role of industry.
Five 3D printers work in silence in the workshop, each in a glass enclosure. The work area is bright and clinically clean, even though the input itself consists of a fine-grained metal powder. The machines work without pause until the product is ready. Then they are reloaded and run again. The size of the glass enclosure, or the construction chamber as it is called, is the only physical limitation that exists with this type of 3D printing. Other than that, only the imagination sets limits.

Sweden has a long history of efficient and successful industrial production. Perhaps that’s why it took some time to take the full step toward 3D printing. That delay is now compensated by a major investment in the area where leading companies in Sweden’s manufacturing industry have joined together to start the company Amexci.

Amexci is a collaborative initiative that brings together expertise in additive manufacturing. The stakeholders work as partners to the owner companies but act independently. The hope is for focus and speed to increase the pace of innovation and drive the development of next-generation products in metal details and components. Being a collaborative initiative is partly about sharing costs, but equally about exchanging experiences and pursuing common qualifications and certifications of the different processes.

3D printing is an additive manufacturing process that creates physical objects from a digital three-dimensional design. There is a great deal of confidence in additive manufacturing with metal. Not as a replacement for traditional production that already works well, but as a complement in areas where it has previously been difficult with processing. It’s about new thinking patterns, daring to try out solutions that have not been possible in traditional manufacturing, and ultimately about creating better products and solutions.

The Amexci workshop is always full of activity. Here you’re allowed to experiment, test out new things and make mistakes on the way to a future where everything is possible.
Even though robotic lawnmowers have not been around for all that long, today they have become commonplace in Swedish residential neighbourhoods and many other places around the world. In the future, people may have to look up instead of down to see them.

As the developers at Husqvarna Group peer into the future, they envision mowers carried across a city by a hovering self-transporting drone. Fixed sensors located in the city’s green areas have already let the lawnmowers know where trimming is needed. Based on the information, the route is planned and optimised.

The drone lands and the lawnmowers approach their task on the lawn systematically. Thanks to artificial intelligence (AI) they know their surroundings well enough to be able to understand when something out of the ordinary occurs, and can identify what the problem is, such as a large branch blocking their way. A service technician is then automatically called in.

When all the lawns for the day are trimmed, the lawnmowers return to the self-transporting drone and go back to their base. All data collected during the journey is uploaded to the cloud before the mowers’ working day is over and they can recharge their batteries for the next shift.

Many questions remain unanswered before the hovering lawn mower can become reality. But the technology exists, and the vision is pushing the day-to-day development. Since 1689, Husqvarna Group has been working on turning technology into opportunity, and through the centuries, it has taken advantage of opportunities from mechanisation, electrification, automation and now digitalisation.

Today, many technological opportunities arise from AI. Every year, our gadgets become smarter and we approach a time when the sky will not be the limit.
SPEEDING UP DIGITALISATION THROUGH TAILORED MATCHMAKING

On one side, we have the companies that built Sweden – large, established, internationally successful. Then there are the start-ups – smaller, but fast, creative and making things happen. Both are important in the pursuit of future innovations.

While big companies tend to crave new solutions and ideas, start-ups often have their eyes on strategic collaborations and customers. When they interact, both the driving force and the speed of innovation increase.

The national initiative Ignite Sweden was set up in 2017 with the goal of enabling new business collaborations. With a qualified matchmaking programme, Ignite Sweden organises meetings where start-ups with innovations that match the needs of big business are given the opportunity to sell their innovative solutions to the right company.

This is how Alfa Laval and Ekkono met – and it took no more than seven minutes before Alfa Laval realised that Ekkono could be sitting on the solution to one of their challenges.

Alfa Laval sell machinery to the processing industry, and were struggling with the fact that their equipment has maintenance intervals that vary a lot – from six weeks to five years. Up until then, maintenance had been performed with periodic intervals, regardless of whether it was required.

Ekkono is a software company selling machine learning for the Internet of Things (IoT), which means they make machines like Alfa Laval’s smarter. Ekkono’s software allows the machine to learn to interpret patterns and understand deviations such as when it’s time for maintenance. For Alfa Laval, this allowed maintenance to be planned at exactly the right time.

For the end customer in the process industry, this means fewer and planned production disruptions. For Alfa Laval, it cuts costs, with potentially more revenue. For Ekkono, the journey toward global expansion has begun. This is a win-win and a step in the right direction towards a digitalised industry.

Alfa Laval and Ekkono is just one of 650 tailored meetings that Ignite Sweden have arranged since their inception. Half of those meetings have resulted in continued dialogue, with 18 projects commercialised to date.
Slow-healing wounds represent one of the most expensive problems in healthcare. With the help of new materials and modern digital production technology, a whole new world of medical dressings is now opening up.

Movable and moist body parts such as armpits and groins are examples of areas where a medical dressing is difficult to attach. If the dressing is not fastened properly, the wound may be infected or damaged during movement. With the help of the Onskin project, individually adapted dressings can soon become reality. Researchers are investigating the possibility of scanning wounds during surgery and using a 3D printer to directly print dressings tailored specifically to the depth and surface of the wound. The goal is for wounds to heal faster, which would bring great benefits to the healthcare industry and patients alike.

The most common material for 3D printing is plastic, but Onskin sources its material from the Swedish forest. The dressing is largely made of nanocellulose, a material extracted from wood fibres. Nanocellulose is light, extremely strong and also completely renewable. It is identified as a supermaterial that we in the future can expect to find in everything from packaging to car parts – and now also in customised dressings printed from digital blueprints.

The most unique thing about the dressings is that they consist of four different layers, two of which are nanocellulose-based. First a moisturising layer, then an absorbent, then a layer that fixes the dressing in place, and finally a compliant support structure that is designed to hold the dressing in place in difficult areas. Eventually, it may also be possible to make medical dressings with features such as added nutrition, built-in moisture gauges or bacteria reduction.
In a gold mine 400 metres below ground, Swedish industry is being digitalised. A lone wheel loader is working its way into the mine. Instead of a driver, the vehicle is controlled from a comfortable office above ground.

Since 2015, nine stakeholders have worked together in the Kankberg mine in the north of Sweden to test how mobile applications in a heavy industry context can contribute to increased security and improved productivity. Mines are one of the world’s most inaccessible environments and success here means there will be a great likelihood to succeed in other industries as well.

Now, a couple of years later, the very latest mobile communications technology – which is also connected to the public Swedish network – is installed in the mine. With the arrival of 5G, the network will be so fast and reliable that all machines down in the mine can be remotely controlled from above. A very precise positioning system that captures everything that moves in the mine has also been developed. It reduces the risk of accidents because the pilot can see when people are near the vehicles. The system can also locate where to deploy rescue emergency operations in case of an accident.

The digitalisation extends all the way to the bolts that are connected to the rock in connection with blasting. They have smart sensors installed that warn if the mountain moves too much. Due to the presence of gases, it’s dangerous to be in the mine the first hours after blasting. Therefore, network-connected sensors are also used to streamline the ventilation so that it is used in the correct place. It saves energy and helps the business resume operations faster.

All the solutions in the Kankberg mine depend on each other and require all participants to collaborate and share information. Therefore, the project has placed great importance on requirement specifications and service level agreements. Not least, that part of the project has attracted interest from many other underground operations around the world.
In the world’s most modern cab factory for trucks, robots and people work side by side. Over 300 unique cabs leave the plant every day, but with investments made in automation and digitalisation, the capacity can be increased considerably.

The body workshop is the size of six football pitches. Inside the building, 285 high-tech industrial robots are working to build cabs for Scania’s entire European production. The process is fully automated, even though no two cabs are identical, and they are built according to each customer’s unique requirements. There’s a variety of over 450 different active colours to choose from.

Automation means that capacity, quality and ergonomics have improved. The robots have taken over much of the physical work, and employees have instead been assigned tasks with higher demands on technical understanding and competence.

In order to handle the shift in competence needs, the staff in the body workshop have been offered a six months long education programme. It has been received with commitment and involvement, and has contributed to a strong belief in the future.

Despite the size and weight of the robots, the largest handling 500 kilograms, they are very agile and fast, and can in principle learn to perform any work tasks. Some of the quality benefits had not been possible without the robots. For example, Scania is first with an automated assembly of the door seal strip. The robots make it with such precision that the doors close tighter, resulting in truck drivers getting a quieter journey with less noise coming from outside.

In six years, Scania’s cab production has undergone a complete transformation and is ready to meet future needs. Production capacity of cabs has been increased thanks to the investments that have been made at Scania’s facilities in Oskarshamn.
DIGITISATION OF TRAINS LEADS TO LONGER SERVICE INTERVALS

Trains are usually serviced based on specific time intervals or mileages, not on actual wear. The result is unnecessary down-time and high operating and capital costs. However, a pilot project taking place at Swedish railway operator SJ has shown that the SKF Insight Rail wireless condition monitoring system can be used to service trains based on need rather than on mileage or time intervals.

For more than 100 years, the bearings have made things spin without really making much fuss about it. They are found in almost all machines that have moving parts. It was the founder of the Swedish company SKF who invented the double-row self-aligning ball bearing in 1907. And now, thanks to digitisation, the bearings have been given another task.

SKF Insight Rail is a small box that is mounted on the train’s axlebox. The system uses GPS modules, accelerometers, motion detectors, temperature sensors, high-frequency vibration sensors and real-time clocks. Among other things, they can detect the tiniest vibration changes.

By continuously analysing the condition of wheel bearings, the Insight Rail detects wear at an early stage. The sensor data can be transmitted to a remote diagnostic centre with cloud-based monitoring and consulting support. Train maintenance is then scheduled for when a wheel actually needs to be replaced. In addition to cutting direct costs, unexpected breakdowns are also avoided.

The result is that national railway services can operate with greater economic efficiency and benefit customers more since there are fewer breakdowns and trains are left at depots less frequently and for reduced periods of time.
Looking around, you might see an unpacked moving box, an egg carton waiting to be recycled and the box in which a pair of newly purchased shoes was delivered. When you start thinking about the packaging in your life, you realise that there’s plenty of it. Traditionally, packaging has protected products. Now it’s ready to do much more than that.

Stora Enso is a leading provider globally of renewable solutions in packaging, biomaterials, wooden constructions and paper. For Stora Enso, wood has represented an endless source of innovation for over 700 years. With digitalisation comes yet another dimension that will boost customer value: intelligent packaging.

An intelligent package knows a lot about the product inside. Thanks to a unique identification code, among other things the package knows where the product is, where it has been, and how old it is. This allows the product manufacturer to save costs through increased control of storage, handling and transportation. It also provides an opportunity to empower and engage consumers.

With intelligence integrated in goods, consumers can seamlessly connect to and interact with instructional videos, digital services, online stores, related products or collections, and customer service – just by scanning the product with a smartphone.

Prior, the cost of technology that gives each packaging a unique code posed a restriction on development. But now the manufacturing cost has decreased to a level that makes it widely available. Soon, intelligent packages from Stora Enso will be available worldwide.
In 2020 there will be over 35 billion connected devices in the world. Everything from cars to fridges are becoming connected and more intelligent – including packaging.