



PHOTO: BENGT AF GEIJERSTAM/SCANPIX

Sweden's only space rocket base is located near Kiruna in the far north, due to its northerly position and good communications.

## INNOVATION:

# Inventing tomorrow's world

A century ago, Sweden was among the poorest nations in Europe. It's a small country, home to just 0.14 percent of the global population. Yet today, it is a world leader in innovation.

Millions of hearts around the world beat with the help of a pacemaker. Candles are lit with the help of safety matches. And innumerable lives have been saved with the help of the three-point seatbelt. These are just a few examples of Swedish innovations that have made a difference.

The Innovation Union Scoreboard 2010, an index published by the European Commission, ranks Sweden as the leading country for innovation among EU member states. Reasons for this include a historic tradition of inventors, a commitment to gender equality, and a strong belief in the individual. Close collaboration between research institutes and the private and public sectors is another key factor, setting the foundation for global Swedish companies like AstraZeneca, Ericsson, and Volvo.

Innovation is closely linked to research and development. Sweden is one of Europe's top three spenders in this area, investing 3.6 percent of GDP in R&D in 2009. Compare this with the EU-wide target of 3 percent GDP investment by 2020, and it's clear that Sweden is ahead of the game.

### Innovation Capacity Index

Each year, Harvard Business School compiles the National Innovation Capacity Index, a study of different countries' innovation potential. In 2010, Sweden was ranked eighth among 173 countries. In terms of the number of trained engineers per capita, Sweden was ranked second, close behind Japan. The study also notes that in the past 15 years, Sweden has had the second-fastest

growth rate in the number of patents per capita.

Read the study in its entirety at: [www.isc.hbs.edu/Innov\\_9211.pdf](http://www.isc.hbs.edu/Innov_9211.pdf)

### Global Innovation Index

INSEAD Business School's Global Innovation Index 2011 ranks Sweden in second place once again. The index measures the degree to which countries have an infrastructure that enhances a creative environment and allows for innovation, as well as actual output. Sweden has strengths in terms of both output and input. Strong output is demonstrated in many new published research and technical papers, and many registered patents. Sweden is also seen to have a good input basis, with a stable political climate and relevant, high-quality education. ▶

**LEARN MORE**

PHOTO: BIOCHROMIX

**BioChromix works with early diagnosis of Alzheimer's disease.**

**SWEDISH BRAIN POWER**

This interdisciplinary research project focuses on neurological diseases such as Alzheimer's. The program was established in 2005, and planned to run for five years. But an evaluation by a group of international experts found it to be so valuable that The Knut and Alice Wallenberg Foundation decided to extend its support, providing a SEK 100 million grant for another five years. This will help Sweden to maintain a leading position in international neuroscience.

**LIFE SCIENCE IN HAGASTADEN**

The Stockholm region intends to be one of the world's leading areas for life sciences by 2025. A brand-new neighborhood, Hagastaden, is being built on the border between Stockholm and Solna. It will include world-leading research and specialized medical care facilities. The focus is on life sciences for the future, and the area will be integrated with the planned university hospital, New Karolinska Solna, which will open in 2016. The hospital campus is being expanded, and a center will be established there for specialized medical care and advanced bioscience research.

**IDEON - A JOINT CENTER FOR CANCER RESEARCH**

In early 2011, the pharmaceutical company AstraZeneca sold its research facilities in Lund, southern Sweden, to a private foundation. The aim was to establish a new center, the Ideon Life Science Village, for research, innovation and entrepreneurship. Lund University will set up a center for cancer research in the facility, and Skåne Regional Council will locate its biobank and parts of its regional cancer center there.

► The Swedish government has chosen to focus strategic investments on three key areas: medicine and bioscience, technology, and climate.

Sweden is particularly strong in biotechnology. Pharmaceuticals are a key export, and Swedish medical innovations include the asthma medicines Bricanyl and Pulmicort; the growth hormone Genotropin; and the stomach ulcer drug Losec, one of the world's best-selling drugs.

Research is not confined to giants such as AstraZeneca and Pfizer-Pharmacia; many small biotechnology companies conduct their own research. A key area of interest is healthcare. Rapidly growing markets include medical devices such as imaging equipment, orthopedic implants, dialysis equipment, heart-lung machines, and ECG equipment, as well as laboratory

studies of medicines.

Microelectronics is another growth market. Sweden is at the forefront of research into silicon-based components, high-speed electronics, organic electronics, photonics and systems design. ■



PHOTO: JO-LIFE AB

**Lucas, the heart compression system, is a Swedish medical device.**

## Tomorrow's geniuses

In order to encourage young people's interest in technology and entrepreneurship, Swedish schools are working with a variety of organizations. Here are three examples:

**Finn upp**

Finn upp combines an inventing-based teaching method for schools, and Sweden's largest inventors' competition for young people in grades 6-9. Held every three years, the competition aims to stimulate the power of young ideas and inspire a new generation of inventors, innovators and entrepreneurs. Finn upp was founded in 1979 by the engineering interest group Ingenjörssamfundet.

[www.finnupp.se](http://www.finnupp.se)

**Ung Företagsamhet**

The non-profit organization Ung Företagsamhet ("young entrepreneurship") works in partnership with Swedish schools. Older students, aged 16-20, have the opportunity to run their own company during the school year as part of their high school studies. A 2010 survey shows that 8 out of 10 participants felt they learned about running a business. They also indicated that they had developed more self-confidence and a greater ability to take decisions, solve problems, and work with others.

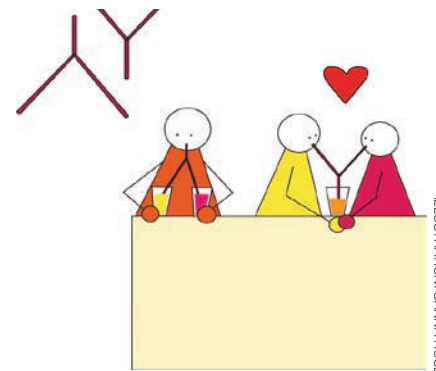


ILLUSTRATION: SANNA ROSEN

**A double straw - one of many "flashes of genius" from Snilleblixarna.**

**Snilleblixarna**

The non-profit association Snilleblixarna ("flashes of genius") is geared to schoolchildren from preschool to fifth grade. The goal is to encourage children's interest in technology, the natural sciences and entrepreneurship. Snilleblixarna provides teachers and educators with tools and a working model to stimulate children's curiosity, desire to learn and ability to think critically.

**SWEDISH INNOVATIONS****MICRO IP**

Tiny gadgets such as car keys and credit cards can now communicate with one another, thanks to an interface called uIP, or micro IP. Scientist Adam Dunkels – recognized by the US university MIT's Technology Review as one of the top 35 young inventors in the world – is the man behind the software that makes this interface possible.

[www.sics.se](http://www.sics.se)

**NANOTECHNOLOGY PRODUCES NEW BODY PARTS**

The European EuroNanoMed network has allocated EUR 17 million to eight European nanomedicine projects. In one project, at Linköping University, researchers are investigating how to repair damaged eyes and grow stem cells for new corneas using nanotechnology.

[www.liu.se](http://www.liu.se)

**ENVIRONMENTALLY FRIENDLY CLOTHES**

The research foundation Mistra is investing SEK 4 million in a multidisciplinary research project to make the Swedish clothing industry a world leader in sustainable fashion. During the project, a brand-new cotton-like material made of cellulose will also be developed. The project is led by a consortium, Future Fashion.

[www.mistra.se](http://www.mistra.se)

**CALL FOR FREE WITH SKYPE**

Skype is a software application that allows users to make free voice and video calls over the Internet. Skype was founded in 2003 by two entrepreneurs, Niklas Zennström from Sweden and Janus Friis from Denmark. Skype was acquired by eBay in 2005, and sold to Microsoft in 2011.

**ONLINE MUSIC WITH SPOTIFY**

Spotify is an online music service that lets users stream millions of tracks on demand to their computer or mobile device. It offers a monthly subscription service, or a free version supported by advertising. Founded in 2006 by Daniel Ek and Martin Lorentzon, the company is now multinational and recently launched in the US.

## Long-term networking

There is an extensive network of organizations and companies, in the public and private sectors, working with academic bodies in Sweden.

They aim to develop new products, services and processes that will make long-term contributions to sustainable growth. To name just a few:

- The Knowledge Foundation (KK-stiftelsen) aims to stimulate competitiveness by creating conditions for innovation and creativity, and by strengthening the links between academia and industry.
- The Swedish Foundation for Strategic Research (SSF) is an independent organization that supports research in the natural sciences, engineering and medicine.
- The Swedish Governmental Agency for Innovation Systems (Vinnova) focuses on innovations linked to research and development; particularly information and communication technology (ICT), biotechnology, working life, materials, transportation and bringing products to production.
- The Swedish Agency for Economic and Regional Growth (Tillväxtverket) is a government body that aims to foster greater enterprise growth and sustainable, competitive business and industry throughout Sweden.

## More Swedish innovations

**Solar safe water system**

A child dies every 15 seconds as a result of contaminated water. Solvatten is a household water-treatment unit that cleans organically contaminated water with the help of the sun. The portable 10-liter container is a patented and scientifically proven Swedish invention. Put Solvatten in a sunny place, give it 2-6 hours, and the water will be drinkable. An indicator shows when it is safe to drink the water. Solvatten can also be used as a solar water heater, providing hot water for cooking and hygiene.

[www.solvatten.se](http://www.solvatten.se)

**Ocean Search**

The Ocean Search project links advanced sensor technology with social media, and is aimed at the sailing community. The idea is to create a fleet of boats equipped with sensors that measure water quality. Together, participants create a better picture of the state of our oceans by collecting data such as carbon dioxide levels and pH values. The first prototype for private boats was mounted on the boat Journeyman in summer 2011.

[www.oceansearch.org](http://www.oceansearch.org)

**Global standard in travel**

Global Positioning & Communication is a system that uses satellite navigation and radio communication to transmit the GPS position, speed and direction of aircraft

and ships in relation to one another. It was invented by Håkan Lans, who also invented the graphic processor for color computer graphics, and the predecessor to today's computer mouse.

[www.gpc.se](http://www.gpc.se)

**Safe solution for sanitation**

More than 2.6 billion people, about 40 percent of the world's population, lack access to basic sanitation. Peepoople AB was created to develop, produce and distribute the Peepoo (patent pending) sanitation solution. Peepoople's mission is to improve the health and quality of life of poor people by providing them with a hygienic, safe and dignified sanitation solution.

[www.peepoople.com](http://www.peepoople.com)



PHOTO: PEEPOOPLE

**SWEDISH INNOVATIONS****FROM OXYGEN TO DYNAMITE**

The Royal Swedish Academy of Sciences was founded in 1739. Prominent members include Carl Linnaeus (developer of the scientific classification system used to chart the natural world), Carl Wilhelm Scheele (who discovered oxygen,) and Anders Celsius (creator of the Celsius temperature scale). From the 1870s, industrial engineers began to contribute innovations such as the AGA stove (Nils Gustaf Dalén), the cream separator (Gustaf de Laval) and dynamite (Alfred Nobel).

[www.kva.se](http://www.kva.se)

## Sweden in space

Swedish space research employs some 200 people. The Swedish National Space Board is the agency responsible for government-funded space research, which is usually carried out in international collaborative projects. The first Swedish rocket, Plutnik, was sent into space in 1961. Since then, more than 500 sounding rockets and 550 stratospheric balloons have been launched from Esrange, the European Space and Sounding Rocket Range, which is Sweden's only space rocket base. Some 20 unmanned rockets are launched each year from Esrange. The base is owned by the Swedish Space Corporation and located outside Kiruna in northern Sweden. Sweden's space industry also includes around 1,000 people at companies such as Volvo Aero Corporation and RUAG Space AB, in activities such as technology development and processing of data from satellites.



PHOTO: JOHAN WILLNER/JOHNER

Nils Bohlin's three-point seatbelt is estimated to have saved a life every six minutes since its launch in 1959. It is acknowledged as one of the most important car safety innovations of all time.

## Useful links

- [www.forskning.se](http://www.forskning.se) Nationwide Swedish research website
- [www.hogskoleverket.se](http://www.hogskoleverket.se) The Swedish National Agency for Higher Education
- [www.iva.se](http://www.iva.se) The Royal Swedish Academy of Engineering Sciences
- [www.kks.se](http://www.kks.se) The Knowledge Foundation
- [www.kth.se](http://www.kth.se) KTH, Royal Institute of Technology
- [www.snsb.se](http://www.snsb.se) The Swedish National Space Board
- [www.stockholminnovation.com](http://www.stockholminnovation.com) Stockholm Innovation & Growth
- [www.stratresearch.se](http://www.stratresearch.se) The Swedish Foundation for Strategic Research
- [www.svensktnaringsliv.se](http://www.svensktnaringsliv.se) The Confederation of Swedish Enterprise
- [www.tillvaxtverket.se](http://www.tillvaxtverket.se) The Swedish Agency for Economic and Regional Growth
- [www.uppfinnare.se](http://www.uppfinnare.se) The Swedish Inventors' Association
- [www.vinnova.se](http://www.vinnova.se) The Swedish Governmental Agency for Innovation Systems
- [www.vr.se](http://www.vr.se) The Swedish Research Council

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