



PHOTO: METTE FJELLBOH/SWEDISH SPACE CORPORATION

Since 1974, the Swedish Space Corporation has launched 550 scientific balloons.

INNOVATION, SCIENCE/RESEARCH:

Inventing tomorrow's world

Many important inventions originate in Sweden, and the pace of innovation shows no sign of slowing down. Between 2009 and 2012, the Swedish government will invest more than ever before in research and bright ideas.

The pacemaker, the ball bearing, the safety match, the adjustable wrench, the zipper and the Tetra Pak carton are all Swedish inventions — and products of a long history of science and research.

Sweden is today in the forefront of efforts to make Europe “the most competitive and dynamic knowledge-based economy in the world by 2010.” In a bid to give Sweden more of a competitive edge, the Swedish government has earmarked SEK 5 billion (USD 616 million) for research and innovation during 2009–2012 — more than double what has been allocated previously.

In line with the Lisbon objective, EU member states are expected to allocate three percent of gross national product to research and development (two percent from the private sector and one percent from the public sector). The SEK 5 billion invested by the Swedish government means this has already been achieved.

Within the research budget framework, the Swedish government has chosen to make strategic investments in the following fields:

- *Medicine* — Molecular biology, stem cell research and regenerative

medicine, diabetes, neuroscience, epidemiology, cancer, psychiatry, and care sciences.

- *Technology* — Nanoscience and nanotechnology, e-science, materials science, production engineering, IT and mobile communication, transport research, aerospace, and space science.
- *Climate* — Energy, natural resources, climate models, and the marine environment.
- *Other areas* — Security and contingency planning, conditions for growth, and politically important geographical regions.

FACTS IN BRIEF

HOTBED OF COMPUTER TALENT

Computer game technology and design is instrumental in creating innovative user interfaces for learning, disabled-adapted services, energy efficiency, positioning and simulation. NetPort is a science park in southern Sweden focusing on new media, creative industry and intelligent logistics.
www.netport.se

SWEDISH BRAIN POWER

Swedish Brain Power is an interdisciplinary research project centering on neurological diseases such as Alzheimer's. With the aid of IT and pure and applied nursing research, diagnoses can be reached earlier, and better treatment offered.
www.swedishbrainpower.se

FORMATION FLYING IN SPACE

Prisma is a Swedish-led satellite project working to develop new technology for science missions in space. Prisma is due to launch in June 2009. Participants include the Swedish National Space Board, Saab Ericsson Space, Omnisys and ECAPS.
www.snsb.se
www.prismasatellites.se

FROM OXYGEN TO SEPARATOR

The Royal Swedish Academy of Sciences was founded in 1739. Prominent members include Carl Linnaeus (who mapped the natural world), Carl Wilhelm Scheele (discoverer of oxygen) and Anders Celsius (creator of the Celsius thermometer). From the 1870s, industrial engineers contributed inventions such as the AGA stove (Nils Gustaf Dalén), the cream separator (Gustaf de Laval) and dynamite (Nobel).
www.kva.se



PHOTO: NASA

First Swede in space: astronaut Christer Fuglesang became a national hero in December 2006.

Growth industry

Sweden is particularly strong in biotechnology. Pharmaceuticals are one of its main exports 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 Pharmacia/Pfizer; many small biotechnology companies conduct their own research. One of the main areas of interest is health. Probiotic dairy products and wholemeal cereals are a rapidly growing market, as are medical devices such as imaging equipment, orthopedic im-

plants, laboratory medicine, dialysis equipment, heart-lung machines and ECG apparatus.

Micro-electronics is another growth market. Sweden is in the forefront of research in silicon-based components, high-speed electronics, organic electronics, and photonics and systems design.



PHOTO: ST. JUDE MEDICAL AB /IMAGE BANK SWEDEN

The pacemaker is a well-known lifesaving Swedish invention.

Ranked No.1 for innovation

The European Innovation Scoreboard (EIS) analyzes the innovation performance of EU member states as well as Japan, the US and other countries. Sweden topped the index in 2008, with research and development in high-tech multinationals such as Ericsson,

ABB, AstraZeneca, Saab, Scania and Volvo offering the best conditions for innovation.

Despite Sweden's capacity for generating innovative ideas the EIS noted that getting production moving on a par with R&D remained a challenge.

SWEDISH INNOVATIONS

CARBON DIOXIDE AND THE CLIMATE

The greenhouse effect was discovered in 1896 by the Nobel Prize-winning Swedish physicist and chemist Svante Arrhenius, who made the link between carbon dioxide and the earth's temperature. His findings underpinned the work of the United Nations Intergovernmental Panel on Climate Change, which along with Al Gore was awarded the Nobel Peace Prize in 2007.

THE ROBOTIC VACUUM CLEANER

Ines and Per Ljunggren developed and designed the world's first robotic, mass-produced and self-charging household vacuum cleaner, the Trilobite, launched in 2001.

www.trilobite.se

A SMART HELMET

Scientists at KTH, the Royal Institute of Technology and Karolinska Institute have developed a riding helmet modeled on how the body protects the brain on impact. This makes it 40 percent safer than ordinary riding helmets. A motorbike helmet is due to be launched in 2009.

www.mipshelmet.se

THREE-POINT SEAT BELT

Nils Bohlin's three-point seat belt has saved a life every six minutes since its launch in 1959. It is acknowledged as one of the most important car safety innovations ever developed.

HVDC TECHNOLOGY

HVDC or high voltage direct current transmission systems are used to transfer electrical power over long distances using overhead or undersea cables. The technology was developed by Uno Lamm for ASEA (now ABB) in the 1930s.

METRO - A SWEDISH IDEA

The free newspaper Metro first appeared in Sweden in 1995. Now published in 21 countries, Metro is the world's biggest international newspaper with more than 20 million readers daily.

www.metro.se



PHOTO: HANS BJURLING/IMAGE BANK SWEDEN

The Vinnova program VINNMER helps female postgraduates qualify as researchers after getting their PhDs.

Long-term networking

There is a large network of organizations and companies, both public and private, working with academia in Sweden. They are aiming to develop new products, services and processes that will make a long-term contribution to sustainable growth.

To name just a few:

The Swedish Governmental Agency for Innovation Systems (Vinnova) focuses on innovations linked to research and development, in particular information and communications technology (ICT), biotechnology, working life, product realization, materials and transportation.

The Swedish Agency for Economic and Regional Growth (Nutek) is a government body whose remit includes company financing, regional business

development, advisory services and establishing links between research and industry.

Innovationsbron helps translate the ideas of researchers, inventors and entrepreneurs into business opportunities. Support is provided at an early stage of development before venture capitalists get involved.

The Knowledge Foundation (KK-stiftelsen) aims to stimulate competitiveness by creating the conditions for innovation and creativity and strengthening the links between academia and industry.

The Swedish Foundation for Strategic Research (SSF) is an independent organization that supports research in natural science, engineering and medicine.

Crossing borders

Swedish researchers are increasingly engaged in interdisciplinary projects. For the Energy Systems Program the Swedish Energy Agency and research teams at Linköping University, Uppsala University, Chalmers University of Technology and KTH, Royal Institute of Technology are studying the long-

term development of sustainable and resource-efficient energy systems.

Economists and behavioral scientists at Stockholm University's interdisciplinary center are looking at how to turn knowledge about climate change into action, for example the best way to reduce carbon dioxide emissions.

SWEDISH INNOVATIONS

ARTIFICIAL INTELLIGENCE WARNS AGAINST ADDICTION

The state-owned gaming company Svenska Spel and ICU Intelligence have used artificial intelligence to develop Spelkoll, which warns a person if their behavior verges on addiction.
www.svenskaspel.se

GLOBAL STANDARD IN AIR AND MARITIME TRAVEL

Håkan Lans invented the graphic processor for color computer graphics and the predecessor to the computer mouse. He also developed Global Positioning & Communication, a system that uses satellite navigation and radio communication to transmit the GPS position, speed and direction of aircraft/ships in relation to one another.
www.gpc.se

VIRTUAL PATIENT RECORDS

The project Old@Home enables IT-supported mobile care and nursing of the elderly. The virtual patient record gives care staff important information about the patient they are visiting and allows them to document patient information while they are in the field.
www.vinnova.se

ROBOTIC EATING AID FOR THE DISABLED

In Robotdalen (Robot Valley), the private sector, academia and public institutions have joined to produce cutting-edge solutions in robotic automation. One example is the robotic eating aid Bestic, which helps disabled people to eat unassisted.
www.robotdalen.se
www.bestic.se



PHOTO: POINTUS LINDAHL/SCANPIX

Toshihide Maskawa, Nobel laureate in physics, 2008, receives his medal from King Carl XVI Gustaf at the Nobel Prize award ceremony in Stockholm Concert Hall.

NOBEL – FIRST AMONG PRIZES

The Nobel Prizes were a bequest from Alfred Nobel, the inventor of dynamite, to reward those who “have conferred the greatest benefit on mankind.” The prizes have been awarded every year since 1901 (with a few exceptions such as the Second World War) for achievements in physics, chemistry, physiology or medicine, literature and peace.
www.nobelprize.org

Useful links

- www.vetenskapsradet.se — Swedish Research Council
- www.vinnova.se — Swedish Governmental Agency for Innovation Systems
- www.forskning.se — Swedish research nationwide
- www.kks.se — Knowledge Foundation
- www.stratresearch.se — Swedish Foundation for Strategic Research
- www.iva.se — Royal Swedish Academy of Engineering Sciences
- www.stockholminnovation.com — Stockholm Innovation & Growth
- www.kth.se — KTH, Royal Institute of Technology
- www.svensktnaringsliv.se — Confederation of Swedish Enterprise
- www.innovation-technology.se — Innovation & Technology Award
- www.formas.se — The Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning
- www.innovationscentrum.se — Almi Innovation
- www.hogskoleverket.se — Swedish National Agency for Higher Education
- www.uppfinnare.se — Swedish Inventors' Association
- www.ssc.se — Swedish Space Corporation

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Further information about Sweden:
www.sweden.se, the Swedish embassy or consulate in your country, or the Swedish Institute, Box 7434, SE-103 91 Stockholm, Sweden
Phone: +46 8 453 78 00 Mail: si@si.se
www.si.se, www.swedenbookshop.com